

Pregnant Women' Knowledge and Attitude regarding Hepatitis B Virus Infection: a Structured Teaching Program

Fatma Kamal Ali, Hanan Amin Ali, Ola Abdel-Wahab Afifi Araby

Obstetrics and Woman's Health Nursing, Faculty of Nursing, Benha University, Egypt

Abstract

Background: Hepatitis B Virus infection is one of the world's most common viral hepatitis and a significant global public health issue with varied prevalence across the world. **Aim** of the research was to investigate the effectiveness of a structured teaching program on pregnant women' knowledge and attitude regarding hepatitis B virus infection with pregnancy. **Design:** A quasi-experimental research design was adopted. **Setting:** the research was performed at an outpatient clinic for obstetrics and gynaecology affiliated to the Benha University Hospital. **Sample:** A purposive sample of 220 pregnant women were recruited. **Tools:** three tools were used for data collection; a structured self-administered questionnaire, knowledge assessment sheet and modified likert scale for maternal attitude. **Results:** illustrated that there was a highly statistically significant improvement in relation to pregnant women' knowledge and attitude regarding hepatitis B virus infection at post-intervention phase compared to pre-intervention phase ($P \leq 0.001$). As well, there were a positive highly statistically significant correlation between total knowledge and total attitude scores at pre-intervention and post-intervention phases ($P \leq 0.001$). **Conclusion:** the structured teaching programme had a positive effect on the improvement of pregnant women' knowledge and attitude regarding hepatitis B virus infection with pregnancy. **Recommendations:** Educational program about hepatitis B virus infection should be a part of antenatal care for every pregnant woman.

Keywords: pregnant women, knowledge and attitude, hepatitis B virus infection, structured teaching program.

Corresponding author: fatmakamal898@yahoo.com

Introduction

Hepatitis B Virus (HBV) infection is one of the world's most prevalent viral hepatitis and a significant global public health concern with varying prevalence worldwide (Osei et al., 2017). Around one-third of the world's population is believed to have been infected with HBV and about 290 million are chronic carriers, despite the availability of effective virus vaccines. (Razavi-Shearer et al., 2018; Westin et al., 2020). Thus, in most parts of the world, the virus is endemic, with higher endemicity in Asia and sub-Saharan Africa, where seroprevalence is

above 6%. (Locarnini et al., (2015); Arnold et al., 2017).

Infections with the Hepatitis B virus are blood-borne viruses that pose significant public health threats worldwide. The challenge posed by viral hepatitis is particularly acute in Egypt. Hepatitis B virus is the primary cause of chronic hepatitis, liver cirrhosis and hepatocellular carcinoma. The World Health Organization has announced that HBV is the second most important human carcinogen after smoking tobacco. Hepatitis B virus is 50 to 100 times more infectious than the human

immunodeficiency virus (HIV) and Americans are suffering from it four times more than HIV. Since HBV has become the most common blood-borne infectious disease in the world, one out of every 15 people worldwide has HBV. (Amiweru, et al., 2017).

Hepatitis B virus can exist in many body fluids such as saliva, blood, vaginal fluid and semen. For more than 7 days, the virus will live outside the body. Therefore, infection happens if scratched skin is in contact with a contaminated surface. The patient begins the incubation period when hepatitis infection occurs, which is asymptomatic and the patient is normally unaware of the infection. During this period, liver transaminases are normal (Ismail, et al., 2017).

Hepatitis B virus has two primary modes of transmission, from an infected sexual or household contact through percutaneous exposure to blood which is called horizontal and transmission from infected mother to newborn during delivery which is called vertical transmission (Block, et al., 2016).

Hepatitis B tests should be performed on all pregnant women. For women who fall into high-risk categories, such as health care workers, women from ethnic communities where hepatitis B is prevalent, spouses or partners living with an infected individual, testing is particularly important. There is controversy about the complications of the disease in pregnant women and fetuses. In pregnant women with HBV, the evaluation of foetal distress showed that HBV infection could cause chorionic angiopathy and reduce placental function. (Stephen, and Contag, 2016).

HBV infection is an important cause of liver disease in pregnancy. There are many changes in the maternal

immune system during pregnancy, a change in the Th1-Th2 balance towards a Th2 response, and increased numbers of regulatory T cells that lead to a depressed HBV immune response. Perinatal transmission is a common mode of HBV transmission worldwide. The Antibodies of hepatitis B antigen and anti-hepatitis B core antigen cross the placental barrier and do not appear in all babies before 12 and 24 months of birth (Yang et al., 2013).

Acute or chronic HBV infection in pregnancy is comparable in most cases to that in the general population of adults. Hepatitis B virus infection does not increase the mortality and does not cause a teratogenic effect. However, a higher incidence of low birth weight, low APGAR score at birth (<7) and neonatal asphyxia at birth, neonatal intraventricular haemorrhage, foetal loss, perinatal mortality, congenital malformation, foetal distress, and admission to neonatal intensive care unit, preterm premature rupture of membranes, and prematurity has been reported during acute infection than in the general population. Neonates who acquire infections at an early age are at an increased risk of progressing to chronicity or hepatocellular carcinoma in the worst situation (Ofori-Asenso and Agyeman, 2016).

Babies born to a mother with hepatitis B have a greater than 90% chance of developing chronic hepatitis B if they are not properly treated at birth. To avoid passing the virus on to the infant during birth, it is important for pregnant women to know the status of hepatitis B. If the doctor knows that the mother has hepatitis B, the doctor will make plans in the delivery room to provide the correct medicine and precautions to prevent the baby from being infected. (Sheng, et al., 2018).

Hepatitis B virus treatment in pregnancy is complicated. With a careful, individualized treatment plan, successful pregnancy with healthy offspring can be achieved for women with chronic hepatitis B. For women with HBV who wish to become pregnant, treatment can be delayed in cases of mild disease until after childbirth. In cases of moderate or serious disease or becoming pregnant during treatment it is important to determine the possible risks of antiviral drug treatment against the possibility of worsening of the disease in the absence of treatment. Pregnant women with low viral loads do not need immediate treatment, while for severely viral mothers (> 109 copies/mL), antiretroviral therapy in the last trimester of pregnancy should be considered (Afihene, et al., 2015; Dun-Dery, et al., 2017).

The role of nurse primarily implies health education and counselling and to a lesser extent diagnostic and therapeutic services. Health education is crucial to preserve optimal health condition and functional abilities and refers to all knowledge and skills of women. Where the women's is living and which influence her attitudes towards favourable health behaviours related to the promotion and preserving functional ability and good health in women (Niu, et al., 2015).

The nurse has the responsibility to enhance their professional role as advocates for new generation to take charge of good health. Health promotion and disease prevention should be an essential part of nursing patient care. Nurses should participate in HBV pregnancy prevention or HBV risk reduction programmes to prevent or delay the development of the disease. (Kolasa, et al., 2017).

Significance of the research:

Viral infection with hepatitis B remains one of the world's leading causes of morbidity and mortality globally accounting for 38-53% of chronic liver diseases and about 686,000 deaths annually. The prevalence of HBV is 9-20% in Sub-Saharan Africa, it is 5-30% among the general population and 9.4% among pregnant women. HBV prevalence varies among pregnant women living in the countries of the Eastern Mediterranean Regional Office and the Middle East, with 1.2 percent registered in Iran, 2.2 percent in Egypt, and 4 percent in Turkey (Malekifar, et al., 2018).

The World Health Organization estimated that about 360 million people have been infected with HBV world widely. Hepatitis B infection is common in the Middle East countries compared to the United States and Europe (Gebrecherkos, et al., 2019).

Hepatitis B virus infection is a serious hazard to pregnant women's health, and can cause liver disease during pregnancy. Despite the urgency of this topic, the pregnant women in Egypt have limited knowledge about HBV, its mode of transmission, and prevention techniques, and, at the same time, the health care team does not seem concerned about the importance of improving pregnant women's knowledge about HBV (Chweitzer, et al, 2015). Therefore, this study was conducted to investigate the effectiveness of a structured teaching program on pregnant women' knowledge and attitude regarding hepatitis B virus infection.

Aim of the research:

The research aimed to investigate the effectiveness of a structured teaching

program on pregnant women' knowledge and attitude regarding hepatitis B virus infection. This aim was achieved through the following objectives:

- Assessing pregnant women' knowledge and attitude regarding hepatitis B virus infection.

- Planning and designing a structured teaching program for pregnant women regarding hepatitis B virus infection

- Implementing a structured teaching program for pregnant women regarding hepatitis B virus infection.

- Evaluating effect of the structured teaching program on pregnant women' knowledge and attitude regarding hepatitis B virus infection.

Research hypothesis:

The researchers hypothesized that; there will be a significant improvement of pregnant women' knowledge and attitude regarding hepatitis B virus infection after applying the structured teaching program.

Subjects and Method:

Research Design

A **quasi-experimental design** was utilized to fulfill the aim of this research. (One-Group, Pre-test / Post-test design). A quasi-experiment is an observational interventional analysis used without random assignment to estimate the causal effect of an intervention on the target population. Quasi-experimental study shares similarities with conventional experimental design or randomised controlled trials, but the aspect of random assignment to treatment or control is clearly missing. (Dinardo, 2008; Iowa State University of Science and

Technology, 2020). In a pretest-posttest design, the dependent variable is calculated once before and once after implementation of the program. (Posternak & Miller, 2001; Spurlock, 2018).

Setting

This research was performed at an outpatient clinic for obstetrics and gynaecology affiliated to the Benha University Hospital. It is a large hospital in Benha city and attracts clients from Al Qualubia Governorate and other Neighboring Governorates. This clinic provides health care services of obstetrics and gynecological women, as well as family planning.

Sampling:

- **Sample type:** A purposive sample

- **Sample size:** The sample was collected among those who attended the previously mentioned settings, for 6 months which were (220) pregnant women that were available at the time of data collection. Inclusion criteria were applied as: women at first and second trimester, at least read and write, free from any medical or obstetrics disorders, women had a desire to take part in the research and were available during the study period.

Tools of Data Collection:

First tool: A structured self-administered questionnaire; it was designed by the researcher after reviewing the related literature (Han, et al., 2017; Zseri, et al., 2018; Al-Essa, et al., 2020) and included the following parts:

Part 1: Personal characteristics of pregnant women, it included (age, residence, educational level, occupation, monthly income, marital status, family history of hepatitis HBV, source of information)

Part 2: Status of vaccination of pregnant women, it consisted of (whether women vaccinated against hepatitis HBV or not, reason for not being vaccinated, reason for starting vaccination, completion of the vaccination doses and reason for discontinuation of second or third dose)

Part 3: Obstetrical history of women, it consisted of (mode of delivery, parity, previous abortions and gestational age)

Part 4: Medical history of women, it consisted of (exposure to previous operations, exposure to filling operations, and take off a fierce or teeth, blood transfusion).

Second tool: knowledge assessment sheet:

Knowledge assessment sheet was designed by the researchers after reviewing relevant literature (Aruna et al., 2019; Al-Essa, et al., 2020) and was translated by the researchers into Arabic language. The 17- multiple-choice questions designed to measure pregnant women' knowledge regarding hepatitis B virus infection. Each question has four options, (one right answer, two wrong answer and I don't know). The concepts included for developing the tools were; definition of HBV infection, definition of HBV infection with pregnancy, incubation period, types, common symptoms of acute HBV, common symptoms of chronic HBV, high risk group, methods of transmission, ways in which HBV is not transmitted, diagnosis,

complication, effect of HBV infection on pregnancy, preventive measures for the pregnant women, preventive measures to the child of positive mother, population groups needing HBV vaccination, hepatitis B vaccine schedule and managing of HBV in pregnancy.

Scoring:

The correct answer was given as a score (1), the wrong answers and don't know answer were given a score (0). The total score earned by pregnant women reflect their knowledge regarding hepatitis B virus infection. A possible total knowledge score were; good when the total knowledge score was >75% to 100%, average when the total knowledge score was 50 - < 75% and Poor when the total knowledge score was < 50%.

Third tool: Modified Likert Scale for Maternal Attitude:

It was adapted from (Panda, 2016) and translated by the researchers into Arabic language. The 18 items questionnaire to assess pregnant women' attitude toward hepatitis B virus infection consisted of (Hepatitis B virus is contagious, Hepatitis B virus infection is not considered to be a shame or something shameful, Hepatitis B vaccine is safe and effective with pregnancy, It is necessary for everyone to get the Hepatitis B vaccine, It is necessary for screening for HBV infection before marriage, It is necessary for screening for HBV infection during pregnancy, Changing gloves while collecting blood samples contributes to the non-transmission of Hepatitis B virus infection, Following infection control guidelines will protect me from being infected with HBV at work, Use additional infection control precautions when treating patients with HBV ...etc.).

Scoring:

The items were judged according to a three-point continuum of the Likert scale from agree (2), neutral (1), and disagree (zero). Summing up the scores of the items then the overall score gave total attitude score. Pregnant women' total attitude score was graded as;

highly positive attitude when the total score was $\geq 75\%$, Positive attitude when the total score was $50\% < 75\%$ and negative attitude when the total score was $< 50\%$.

Method

The research was carried out in accordance with the following steps:

Administrative approval:

A written formal approval was obtained from the dean of the faculty of nursing to the director of the Benha University Hospital and then delivered to the director of the department of Obstetrics and Gynecology to obtain their consent to conduct the study after explaining its purpose.

Validity

Content validity of the tools was revised by a panel of five experts included three from obstetrics and woman health nursing professors and two from obstetrics and gynecological medicine, minor modifications were required in formulating sentences.

Reliability:

The reliability was done by Cronbach's Alpha coefficient test, which revealed that the internal consistency of knowledge assessment questionnaire was 0.81 and the internal consistency of attitude assessment scale was 0.79.

Ethical considerations:

Each woman was informed about the purpose and benefits of the research at the beginning of the interview and time throughout the research. Oral consent was obtained from each woman before starting data collection. The women were ensured that the data would remain confidential and used for research purposes only. The women' right to autonomy and freedom from harm was ensured. The women were also given an unconditional right of withdrawal at any time.

A Pilot study:

A pilot analysis was performed on 10% of total duration of collected data (3 weeks) to test the applicability and clarity of the research tools and estimate the time required to fill the tools. Pregnant women participating in the pilot were omitted from the studied sample to avoid contamination of the sample.

Fieldwork:

The following phases were adopted to fulfil the aim of this research. Preparatory phase, interviewing and assessment phase, planning phase, a structured teaching programme implementation phase and evaluation phase. These phases were carried out from the beginning of April, 2020 and completed at the end of September 2020 covering six months. The researcher visited the previously mentioned setting two days/week, (Tuesdays, Thursdays), from 9.00 Am to 12.00 Pm.

This research was conducted through five sequential phases:

Preparatory phase:

It was the first phase of the research. A review of current and past national and international relevant literature related to hepatitis b virus infection with pregnancy was carried out by using local and international books, journals, periodicals in addition to computer search to develop the research tools and contents.

Interviewing and assessment phase:

This phase encompassed interviewing each woman in the waiting room of the outpatient clinic. The researcher greeted the woman at the beginning of the interview, introduced herself to each woman participating in the research, explained the intent of the research, provided the woman with all details about the research and oral consent was taken to participate in the research. The researcher collected data through the administration of the tools (tool I: A self-administered questionnaire, tool II: maternal knowledge questionnaire and tool III: maternal attitude questionnaire) to each woman (tool II and III were pre-test). The average time for each woman to complete the interview was about (20-30 minutes). A number of interviewed women / day ranged from 2-3 women. The data collected during this stage was the basis for further comparison to determine the effect of the structured teaching program.

Planning phase:

Based on results obtained during assessment phase, the structured teaching program was designed by the researchers to accommodate the studied pregnant women's deficit knowledge and practices regarding hepatitis B virus with pregnancy. The number of sessions and

its contents, instructional media, and different methods of teaching were determined. Objectives have been developed which included the following:

General objective:

By the end of the structured teaching program sessions, each woman would be able to acquire basic knowledge and positive attitude about hepatitis B virus infection.

Specific objectives:

By the end of the structured teaching program sessions, each woman would be able to:

- Define hepatitis B virus disease.
- Enumerate the types of hepatitis B virus (acute and chronic) and the symptoms of each type.
- Identifying incubation period of hepatitis B virus disease.
- Outline the diagnostic tests used for hepatitis B virus
- Memorize methods of hepatitis B virus transmission
- Summarize complication of hepatitis B virus
- Recognize the effect of hepatitis B virus infection on pregnancy
- Express preventive measures for the pregnant women to avoid hepatitis B virus infection
- Explain preventive measures to the child of positive mother
- Identify hepatitis B vaccine schedule

- Explain the management of hepatitis B vaccine in pregnancy

Implementation phase:

The researcher designed the structured teaching program to enhance women's knowledge and change their attitude positively regarding hepatitis B virus infection with pregnancy. This program was implemented through three scheduled sessions. It was conducted immediately upon completion of the assessment phase in the waiting room of the outpatient clinic. The length of each session was 30-45 minutes. At the beginning of the first session, women were oriented with the structured teaching program contents. The subsequent session began with a feedback about the previous session and the objectives of the current session, simple Arabic language were used to fit the level of understanding of women. At the end of each session, five minutes were devoted to permit women to ask questions to clarify the session contents and to correct any misunderstanding. Each woman was informed about the time of the next sessions.

The first session included definition, types, symptoms, incubation period, diagnostic tests and transmission methods of hepatitis B virus disease. **The second session** included complication of hepatitis B virus and the effect of hepatitis B virus infection on pregnancy. **The third session** included, preventive measures for the pregnant women to avoid hepatitis B virus infection, Preventive measures to the child of positive mother, hepatitis B vaccine schedule and the management of hepatitis B vaccine in pregnancy.

Various methods of teaching such as discussion, demonstration, re-demonstration and brainstorming were

used. Instructional media included video contain all content of the sessions and the structured teaching program which designed by the researchers in a form of printed Arabic booklet supported by illustrated and coloured figures and graphs, after reviewing the related literatures were distributed to all recruited women in the study from the first session to achieve its objectives.

Evaluation phase:

Three weeks after implementation, the efficacy of the of the structured teaching program was evaluated, using the same template of tools that used during the assessment phase (pre-post test format) which were (tool II, to evaluate women's knowledge and tool III, to evaluate women's attitude regarding hepatitis B virus infection). At almost time the researchers followed the women during antenatal visits and via telephone.

Statistical design:

Data entry and statistical analysis were done using the Statistical Package for Social Science (SPSS version 22). Descriptive statistics included frequencies and percentages, means, and standard deviations. Inferential statistics as the Chi-square test was used to test the study hypothesis. The correlation coefficient was used to investigate the relationship between scores of knowledge and attitude. For all of the statistical tests done, p-value > 0.05 indicated no statistically significant difference, p-value ≤ 0.05 indicated a statistically significant difference, and p-value $P \leq 0.001$ indicated a highly statistically significant difference.

Limitation of the research:

- A number of women didn't come regularly for attending the

educational sessions which necessitated calling them by telephone to remind them of appointments.

- Occasionally, the waiting place of the obstetrics and gynecology outpatient clinic was crowded and noisy, which required more time and effort to conduct the sessions.

Results

Table (1): clarifies Personal characteristics of the studied sample. It was showed that about half (49.1%) of studied sample were in age group 25-<35 years with a mean age of 27.45 ± 5.75 years. As regards the residence, three quarter (75.5%) of them lived in rural areas. Regarding the educational level, less than half of them (45.9%) had secondary level of education. Concerning the occupation, more than half of them (56.8%) were housewives. According to the income, more than half of them (55.9%) hadn't enough income. Regarding marital status, most of the studied sample (87.7%) were married. Moreover, about three quarter of the studied sample (74.5%) hadn't family history regarding HBV.

Figure (1) Shows that more than two third (68.2%) of the studied sample not vaccinated against hepatitis B virus infection.

Figure (2) Shows that more than half (54.3%) of the vaccinated sample discontinued the second or third dose of hepatitis B virus vaccine.

Table (2) shows that at baseline more than two third (68.2%) of the studied women had no vaccination against HBV and about two fifth (40.6%) of them were not aware of vaccine for HBV. In addition, at baseline less than one third (31.8%) of the studied women

started vaccination and less than one third (31.4%) of them started vaccination because of family history of HBV. Moreover, at baseline less than one fifth (17.3%) of the studied women discontinued of second or third dose of hepatitis B vaccine and more than one quarter (28.9%) of them discontinued because of forgotten to take the vaccine on the due date.

Table (3) illustrates that, about two third of the studied sample (65.0%) were in the first trimester. Less than two third of the studied sample (61.4%) and (63.6%) had C.S. delivery and were multipara respectively. Moreover, most of the studied sample (85.5%) had not previous abortion.

Table (4) demonstrates that, more than two third of the studied sample (69.5%) exposed to previous operations. More than half of the studied sample (58.2%) exposed to filling operations, or take off a fierce or teeth. Moreover, about two thirds of them (68.2%) not exposed to blood transfusions

Figure (3) Shows that more than half of the studied women (52.2%) and (55.4%) had information about HBV with pregnancy from mass media and health team respectively. Taking into consideration results not mutually exclusive because the studied sample may have many sources of information at the same time.

Table (5) clears that there was a highly statistical significant difference between the results of post-intervention phase compared to pre- intervention phase in favour of post- intervention regarding all items of studied sample's knowledge regarding hepatitis B virus infection with pregnancy ($p \leq 0.001$).

Figure (4) shows that, (15.9%) and (78.6%) of studied sample had good knowledge regarding hepatitis B virus infection at pre-intervention and post-intervention phases respectively. While, it was revealed that (69.5%) and (11.8%) of studied sample had poor knowledge regarding hepatitis B virus infection at pre-intervention and post-intervention phases respectively.

Table (6): clears that there was a highly statistical significant difference between the results of post-intervention phase compared to pre- intervention phase in favour of post- intervention regarding all items of studied sample's

attitude regarding hepatitis b virus infection with pregnancy ($p \leq 0.001$).

Figure (5) shows that, (32.7%) and (77.3%) of studied sample had positive attitude regarding hepatitis B virus infection with pregnancy at pre-intervention and post-intervention phases respectively.

Table (7) clarifies that; there was a highly positive statistical significant correlation between total knowledge and total attitude score regarding hepatitis B virus infection at pre-intervention and post intervention phase ($P \leq 0.001$).

Table (1): Frequency distribution of studied sample regarding their personal characteristics (n =220)

Personal characteristics	No	%
Age (years)		
<25	74	33.6
25-<35	108	49.1
35+	38	17.3
Mean \pmSD	27.45 \pm 5.75	
Residence		
Rural	166	75.5
Urban	54	24.5
Educational level		
Read and write	15	6.8
Primary education	24	10.9
Preparatory education	27	12.3
Secondary education	101	45.9
University education	53	24.1
Occupation		
Housewife	125	56.8
Employed	95	43.2
Monthly income		
Enough	97	44.1
Not enough	123	55.9
Marital Status		
Married	193	87.7
Widow	5	2.3
Divorce	22	10.0
Family history of HBV		
Yes	36	16.4
No	164	74.5
I do not know	20	9.1

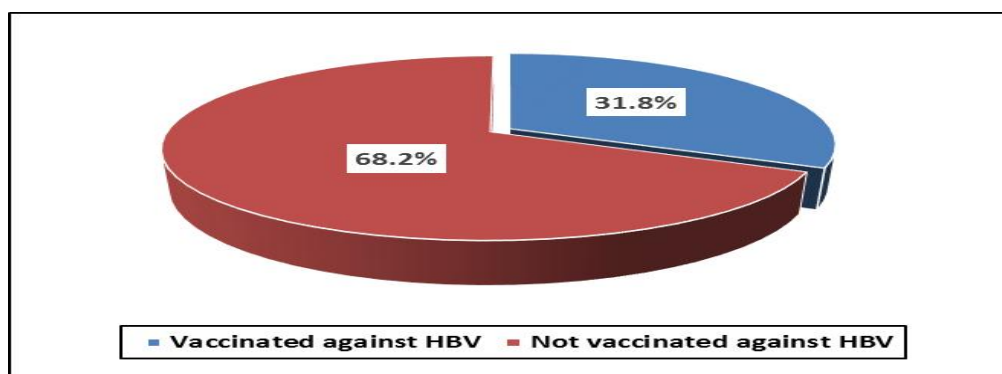


Figure (1): Percentage distribution of studied sample regarding their HBV vaccination (n =220)

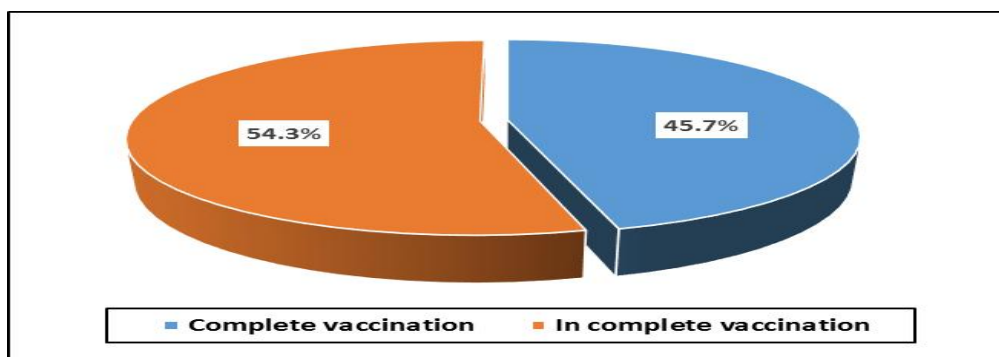


Figure (2): Percentage distribution of studied sample regarding their status of vaccination (n =70)

Table (2): Frequency distribution of studied sample according to their status of vaccination

Status of vaccination	Response (N)	Response (%)
Reason for not being vaccinated (women not vaccinated at baseline, N=150 (68.2%)		
Was not aware of vaccine for HBV	60	40.6
Did not know the availability of vaccine in many hospitals	27	17.4
Was under belief that vaccine is very expensive	44	29.3
Don't believe that vaccine will give protection	19	12.7
Reason for starting vaccination (women completely or partially vaccinated at baseline, N=70 (31.8%)		
Suggested by friends to start vaccine	8	11.4
Was advised by doctors	20	28.6
Was enforced by housekeeping supervisor	9	12.9
Family history of HBV	22	31.4
Had a needle stick injury and then got the awareness	11	15.7
Reason for discontinuation of second or third dose? (Women partially vaccinated at baseline, N=38 (17.3%)		
Lack of time	7	18.4
Forgot to take on the due date	11	28.9
Thought one/two doses was/were sufficient	7	18.4
Vaccine was not available on the due date	6	15.8
Had side effects after first dose	2	5.3
Because she became pregnant as the vaccine has side effects on pregnancy	5	13.2

Table (3): Distribution of studied sample regarding their obstetrical history (n=220)

Obstetrical history	No	%
Gestational age		
First trimester	143	65.0
Second trimester	77	35.0
Mode of delivery		
Normal	85	38.6
C.S	135	61.4
Parity		
Primi	80	36.4
Multi	140	63.6
Previous abortions		
No	188	85.5
Yes	32	14.5

Table (4): Distribution of studied sample regarding their medical history (n=220)

Variables	No	%
Exposure to previous operations		
Exposed	153	69.5
Not exposed	67	30.5
Exposure to filling operations, or take off a fierce or teeth		
Exposed	128	58.2
Not exposed	92	41.8
Blood transfusions		
Exposure to Blood transfusions	70	31.8
Not exposed	150	68.2

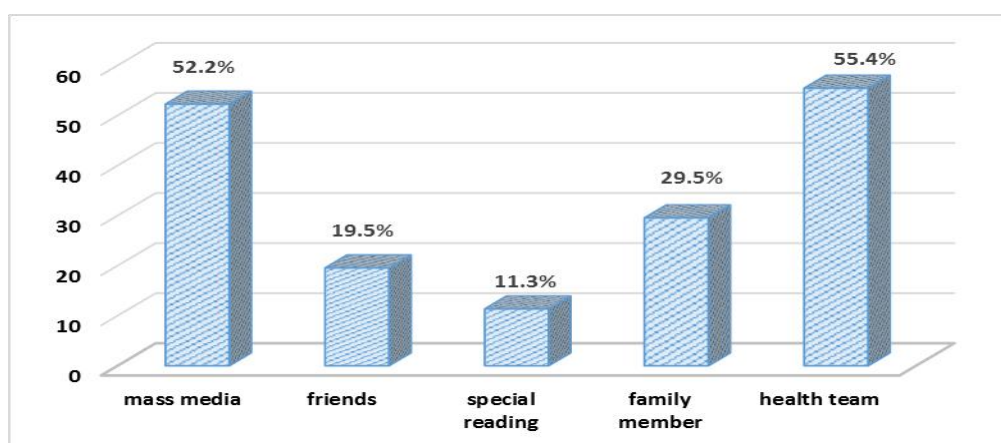


Figure (3): Percentage distribution of studied sample regarding their source of information about HBV infection (n=220)

Table (5): Distribution of studied sample regarding their knowledge about HBV infection (n=220).

Knowledge items	Pre-intervention				Post-intervention				X ²	P-value
	Correct answer		Incorrect & don't know answer		Adequate answer		Incorrect & don't know answer			
	No	%	No	%	No	%	No	%		
Definition of Hepatitis B virus infection	80	36.4	140	63.6	182	82.7	38	17.3	98.1	0.000
Definition of Hepatitis B virus infection with pregnancy	75	34.1	145	65.9	180	81.8	40	18.2	102.8	0.000
Incubation period for Hepatitis B virus	0	0.0	220	100	182	82.7	38	17.3	310.3	0.000
Types of Hepatitis B virus	20	9.1	200	90.9	184	83.6	36	16.4	245.8	0.000
Common symptoms of acute Hepatitis B virus	11	5.0	209	95.0	188	85.5	32	14.5	287.4	0.000
Common symptoms of chronic Hepatitis B virus	8	3.6	212	96.4	185	84.1	35	15.9	289.1	0.000
The high risk group for Hepatitis B virus	35	15.9	185	84.1	180	81.8	40	18.2	191.2	0.000
Population groups needing HBV vaccination	45	20.5	175	79.5	183	83.2	37	16.8	173.3	0.000
Methods of HBV transmission	75	34.1	145	65.9	186	84.5	34	15.5	116.0	0.000
Ways in which HBV is not transmitted	54	24.5	166	75.5	179	81.4	41	18.6	142.5	0.000
Diagnosis of Hepatitis B virus	33	15.0	187	85	175	79.5	45	20.5	183.8	0.000
Complication of Hepatitis B virus	41	18.6	179	81.4	181	82.3	39	17.7	178.1	0.000
Effect of HBV infection on pregnancy	32	14.5	188	85.5	173	78.6	47	21.4	181.5	0.000
Preventive measures for the pregnant women to avoid HBV	43	19.5	177	80.5	189	85.9	31	14.1	194.3	0.000
Preventive measures to the child of positive mother	25	11.4	195	88.6	175	79.5	45	20.5	206.2	0.000
Hepatitis B vaccine schedule	0	0.0	220	100	184	83.6	36	16.4	316.2	0.000
Managing of HBV in pregnancy	15	6.8	205	93.2	165	75.0	55	25.0	211.5	0.000

A Statistical significant $p \leq 0.05$ A Highly Statistical significant $p \leq 0.001$

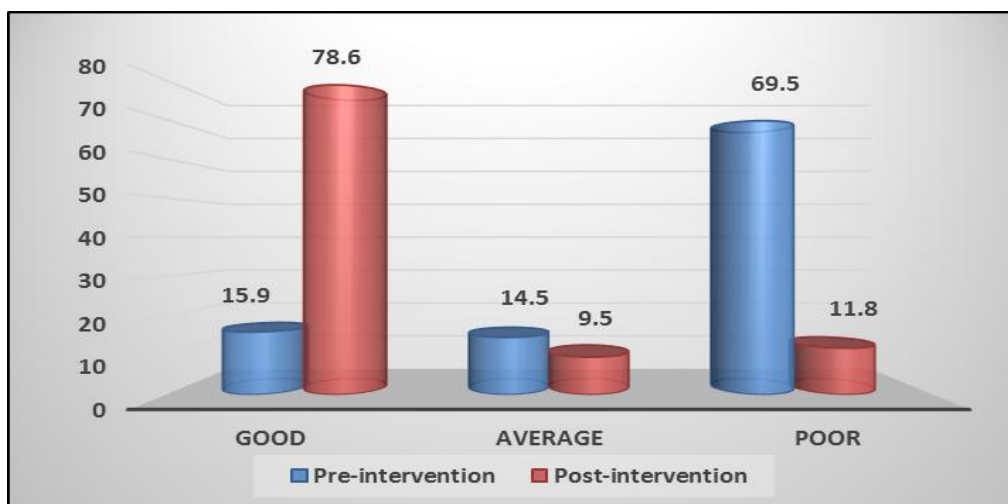
**Figure (4): Percentage distribution of studied sample regarding their total knowledge score about HBV infection at pre and post intervention phases (n=220).**

Table (6): Distribution of studied sample regarding their attitude about HBV infection (n=220).

Attitudes items	Pre-intervention						Post-intervention						X2	P-value
	Agree		Uncertain		Disagree		Agree		Uncertain		Disagree			
	No	%	No	%	No	%	No	%	No	%	No	%		
Willing to screened for hepatitis B virus	72	32.7	48	21.8	100	45.5	172	78.2	27	12.3	21	9.5	98.4	0.000
Hepatitis B virus is a curable disease.	66	30.0	50	22.7	104	47.3	194	88.2	13	5.9	13	5.9	155.5	0.000
Hepatitis B virus is a life threatening disease	82	37.3	20	9.1	116	52.7	184	83.6	30	13.6	6	2.8	139.5	0.000
Hepatitis B virus is contagious	65	29.5	40	18.2	115	52.3	201	91.3	14	6.4	5	2.3	182.8	0.000
Hepatitis B virus is not considered to be a shame or something shameful	120	54.5	10	4.6	90	40.9	159	72.3	28	12.7	33	15.0	40.3	0.000
Hepatitis B virus can't be transmitted through a handshake	85	38.6	23	10.5	112	50.9	174	79.1	25	11.4	21	9.5	92.9	0.000
Hepatitis B virus can be transmitted from mother to child	74	33.6	32	14.6	114	51.8	194	88.2	26	11.8	0	0.0	168.3	0.000
It is necessary for everyone to get the Hepatitis B vaccine	63	28.6	23	10.5	134	60.9	210	95.5	10	4.5	0	0.0	218.2	0.000
It is necessary for screening for HBV infection before marriage	77	35.0	13	5.9	130	59.1	189	85.9	11	5.0	20	9.1	127.9	0.000
It is necessary for screening for HBV infection during pregnancy	52	23.6	33	15.0	135	61.4	183	83.2	16	7.3	21	9.5	162.2	0.000
Changing gloves while collecting blood samples contributes to the non-transmission of hepatitis B virus infection	43	19.5	39	17.8	138	62.7	195	88.6	15	6.8	10	4.6	218.4	0.000
Following infection control guidelines will protect from being infected with HBV at work	64	29.1	22	10.0	134	60.9	197	89.5	14	6.4	9	4.1	178.8	0.000
Use additional infection control precautions when treating patients with HBV	35	15.9	17	7.7	168	76.4	181	82.3	16	7.3	23	10.4	208.7	0.000
Do not stop working in the food industry for infected people	86	39.1	15	6.8	119	54.1	193	87.7	17	7.7	10	4.6	133.2	0.000
Hepatitis B virus positive patients shouldn't stay away from other family members to avoid infection	55	25.0	29	13.2	136	61.8	116	52.7	55	25.0	49	22.3	70.7	0.000
Allow the newly born child to receive HBV vaccine to prevent infection	85	38.6	14	6.4	121	55.0	211	95.9	5	2.3	4	1.8	167.4	0.000
Return child to hospital to perform a test of the virus several times during the first year after birth	79	35.9	18	8.2	123	55.9	207	94.1	2	0.9	11	5.0	163.6	0.000
Education is effective in improving knowledge on Hepatitis B virus	81	36.8	42	19.1	97	44.1	199	90.4	9	4.1	12	5.5	137.3	0.000

A Statistical significant $p \leq 0.05$ A Highly Statistical significant $p \leq 0.001$

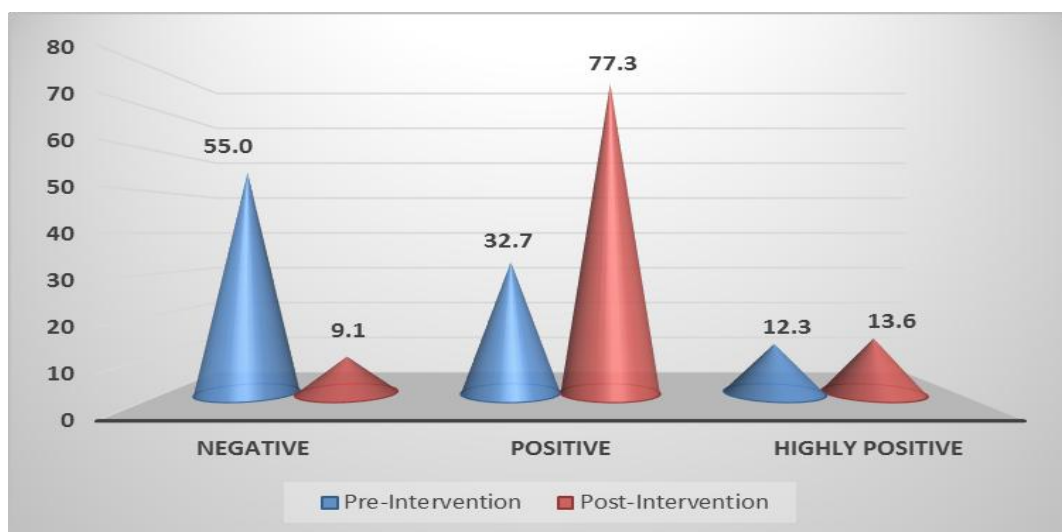


Figure (5): Percentage distribution of studied sample regarding their total attitude score about HBV infection at pre and post intervention phases (n=220).

Table (7): Correlation between total knowledge and total attitude score of the studied sample regarding HBV infection at pre and post intervention phases (n = 220).

Variables	Total knowledge			
	Pre-Intervention		Post-Intervention	
	R	P-value	R	P-value
Total attitude	0.504	0.000	0.746	0.000

Discussion

Infection with the hepatitis B virus (HBV) produces a global health burden with substantial morbidity and mortality, including chronic hepatitis, cirrhosis and hepatocellular carcinoma, from both acute infection and chronic complications. For extended periods, it may live outside the body. The risk of developing chronic HBV infection following acute exposure varies from 90% in HBeAg-positive mothers' newborns to 25%-30% in infants and children under 5 years to less than 5% in adults. Moreover, following acute infection, immunosuppressed individuals are more likely to develop chronic hepatitis B virus infection. (He, et al., 2018).

The current research aimed to investigate the effectiveness of a structured teaching programme on pregnant women' knowledge and attitude regarding hepatitis B virus infection. The findings of this research were accepted the research hypothesis which was, there will be a significant improvement of pregnant women' knowledge and attitude regarding HBV infection after applying the structured teaching program.

Personal characteristics can play a major role in determining the exact features pregnant woman that may affect their perception about a specific topic. Regarding personal characteristics, the results of the current research showed that about half of studied sample were in age group 25-<35 years with a mean age of 27.45 ± 5.75 years. As regards the residence, three quarter of the studied

sample were lived in rural areas. Less than half of them had secondary level of education. Concerning the occupation, more than half of them of the studied sample were housewives and more than half of them hadn't enough income. Moreover, most of the studied sample were married. The possible explanation may be the low socioeconomic status of the family in Egypt lead to decrease the mother's level of education. As well as, rural areas, especially in Egypt, have less strict precautions as regards the different modes of HBV infection and comparably less awareness about HBV than urban areas. Mothers were selected for the research sample because they are responsible for all family members.

The results of the current research agreed with **(Helmy et al., 2018)** who studied "the effect of a hospital-based awareness programme on the knowledge of pregnant women toward hepatitis B virus", the results showed that study sample' age ranged from 20 to 37 years, with a mean age of 27 ± 4.6 years, and 83.75% were residing in rural areas. The result was also matched with **(Gebrecherkos et al., 2020)** who studied "knowledge, attitude, and practice regarding hepatitis B virus among pregnant women attending antenatal care at the university of gondar comprehensive specialized hospital", the findings cleared that (45.5%) and (90.4%) of the studied sample were housewives and were married respectively.

Results of the current research showed that at baseline more than two third of the studied women had no vaccination against HBV and about two fifth of them were not aware of vaccine for HBV. In addition, at baseline less than one third of the studied women started vaccination and less than one third of them started vaccination because of family history of HBV. Moreover, at

baseline less than one fifth of the studied women discontinued of second or third dose of hepatitis B vaccine and more than one quarter of them discontinued because of forgot to take the vaccine on the due date.

The present findings were supported by **(Arumugam et al., 2019)** who conducted "A study to Investigate the role of educational intervention, to enhance hepatitis B vaccination among housekeeping staffs of our hospital", The results illustrated that 49% (312/636) participants were not vaccinated against HBV and their predominant reason was owing to the fact that they were not aware of existence of vaccine against HBV (60%) (184/312). A 51% (324/636) participants had started first dose of HBV vaccine; prime reason of their awareness was influence from their colleagues 43% (138/324). An 11% (67/636) of participants had discontinued HBV vaccine and hence were partially vaccinated, due to forgetfulness (49%).

As regards obstetrical history, the results of the current research illustrated that, about two third of the studied sample were in the first trimester. Less than two third of the studied sample had C.S. delivery and were multipara. Moreover, most of the studied sample had not previous abortion. The results of the current research correspond to the results of **(Makhlouf et al., 2015)** who carried out "a quasi-experimental study to assess the impact of an educational intervention on knowledge about viral hepatitis infection (B&C) among pregnant women". A convenient sample conduction of 100 pregnant women was included in this study. The results showed that two third of the women had C.S. delivery and less than three quarter were multipara.

The high-risk groups for HBV infection include people exposed to

previous operations and who frequently require blood and blood products. Regarding, medical history, the present research demonstrated that, more than two third of the studied sample exposed to previous operations. More than half of the studied sample exposed to filling operations, or take off a fierce or teeth and about two thirds of them not exposed to blood transfusions. The results of the current research correspond to the results of (**Makhlouf et al., 2015**) that showed that 89% were exposed to surgery versus 11% were not exposed to surgery. Otherwise, women's susceptibility to blood transfusions was 16 percent exposed to blood transfusions and 84 percent not exposed to blood transfusions.

Knowledge is the understanding of any given topic. Pregnant women' knowledge towards HBV infection is essential in order to promote reproductive health awareness and prevention of HBV among pregnant women. In the current research, it refers to a pregnant women's understanding of hepatitis B viral disease, hepatitis B viral transmission and prevention of HBV infection (**Patel et al, 2016**).

On assessing pregnant women' knowledge regarding HBV infection, the findings of the current research revealed that more than two third of the studied sample had poor knowledge regarding HBV infection at pre- intervention phase. Their low scores of knowledge might be attributed to there were no awareness rising programs about HBV infection and its effect on both mother and childbirth and absence of health care provider's recommendation regarding HBV with pregnancy. The results of the current research agreed with (**Adeyemi et al., 2014**) who studied "Knowledge of hepatitis B virus, vaccination and access to screening among pregnant women ". A study among 643 pregnant women

reported that 76% had poor knowledge regarding HBV. Also, the findings of **Gebrecherkos, et al., (2019)** who studied "Hepatitis B virus knowledge, attitude and practise among pregnant women attending antenatal care at the Gondar Comprehensive Specialist Hospital University, Northwest Ethiopia", reported that less than three quarter of the studied sample had poor knowledge regarding HBV with pregnancy.

Meanwhile, the findings of the current research showed that there was a highly statistical significant difference between the results of post-intervention phase compared to pre- intervention phase in favour of post- intervention regarding all items of studied sample's knowledge regarding hepatitis b virus infection. These findings suggest that the structured teaching program helps to develop the knowledge of pregnant women regarding hepatitis B virus infection. As well as the written booklet distributed as an enduring guide to pregnant women, which was useful in the acquisition of information by women.

These findings were in agreement with the results of (**Makhlouf et al., 2015**) who found that the 63% in the pre-test group versus 99% in the posttest group, were aware of the method of viral hepatitis B & C infections, and know that the method of viral hepatitis infection occurs through the blood or fluids of a human being infected. 36% in the pretest group vs 92% in the posttest group know that during pregnancy and childbirth the viral hepatitis infection process occurred. As well as, the results were supported by (**Rani, 2015**) who conducted "A study to evaluate the effect of structured teaching program on knowledge about hepatitis B among nursing students in selected schools of nursing". The result indicates that the experimental group's post-test mean knowledge score was greater than

the control group's posttest mean knowledge score at the level of $p < 0.05$.

In addition, the results of the current research matched with **(Mohammed and Taha, 2016)** who conducted "a quasi-experimental study to assess effectiveness of an educational program on nurses' knowledge regarding hepatitis B Virus in Ninawah Governorate Hospitals". The results of the study showed that the influence of the educational programme on the knowledge of nurses in relation to HBV was positive. The results also showed statistically highly relevant differences in the knowledge of nurses after the implementation of the HBV educational programme than prior to the implementation.

Moreover, these findings were in agreement with **(Shinedev et al. 2017)** who carried out "a quasi-experimental study to evaluate the effect of structured teaching programme on knowledge about prevention of viral hepatitis among pre – university students", the result showed that post-test knowledge score was significantly higher than the pre-test. Finally, the results were consistent with **(Shah et al, 2019)** who performed "a study about interventional knowledge, practice and attitude regarding hepatitis b virus infection and vaccination using educational video", and the results cleared that knowledge scores were improved after post-educational video intervention.

Attitudes are social, motivational, perceptive and cognitive beliefs that affect the behaviour or practise of a person positively or negatively **(Vainikka, 2015)**.

Pertaining to the studied sample's attitude regarding hepatitis B virus infection, the results showed that about one third of studied sample had positive

attitude regarding hepatitis b virus infection at pre-intervention phase. This result might be attributed to decreasing knowledge about HBV infection can be a powerful means of fostering negative attitudes. These results agreed with **(panda, 2016)** who carried out "a cross-sectional study of knowledge, practice and attitude towards hepatitis B among pregnant women attending antenatal clinics in honiara, solomon islands", found that only thirty-five percent had positive attitude toward hepatitis B virus.

Meanwhile, the results of the present research illustrated that there was a highly statistical significant difference between the results of post-intervention phase compared to pre- intervention phase in favour of post- intervention regarding all items of studied sample's attitude regarding hepatitis b virus infection. The difference in pregnant women's health attitude score as recorded can be attributed to women paying more attention to teaching programme sessions that are more inclusive teaching than usual health education provided at antenatal clinics. In addition, improvement of knowledge, motivation, and behavioral skills are necessary to change related behaviors and attain correct attitude and self-care behaviours.

These results were in accordance with **(Topbas et al., 2017)** who performed "a quasi-experimental study to determine effectiveness of hepatitis B education among nursing students", The result showed that there was a statistically significant difference in hepatitis training between the overall mean pre and post test scores $p < 0.05$. The study concluded that the hepatitis education increased the nursing student's awareness regarding hepatitis.

As well as, **Sareetha et al., (2018)** who conducted "a study to evaluate the

effect of educational intervention on knowledge, attitude and practice of hepatitis B vaccine among medical students", showed that mean score for transmission modes $p = 0.0001$, preventive measures $p = 0.0001$ and hepatitis B vaccine $p = 0.0001$ to post test. Thus, educational intervention on hepatitis B vaccination among medical students showed improved knowledge and behaviour. Moreover, the results were supported by (Shah et al., 2019) who illustrated improvement in knowledge and attitude among studied sample. There were extremely statistically significant (P value < 0.0001 , paired t-test) after educational video intervention.

Concerning, correlation between total knowledge and total attitude score. The results of the present research showed that there was a highly positive statistical significant correlation between total knowledge and total attitude score regarding hepatitis B virus infection with pregnancy at pre and post intervention phase. This result may be due to increasing knowledge about an infection which act as a powerful means of fostering positive attitudes. So pregnant women with adequate knowledge are more likely to display positive attitudes towards HBV infection with pregnancy. The result was supported by (Panda, 2016) who reported that there was a statistically significant positive correlation between knowledge-attitude ($r=0.276$, $p<0.01$).in addition, Zseri et al, (2018) who conducted "a study "Knowledge, attitude and practice among Jazan university students in health sciences colleges regarding hepatitis B virus and its vaccine", stated that there was a highly a statistically significant positive correlation between knowledge-attitude ($r = 0.212$, $p < 0.05$).

Conclusion

The structured teaching program had a positive effect on the improvement of pregnant women' knowledge and attitude regarding HBV infection. As well, a positive highly statistically significant correlation between total knowledge and total attitude scores at pre-intervention and post-intervention phase were observed. Therefore, the research hypotheses are supported.

Recommendations

- Educational program about HBV infection should be a part of antenatal care for every pregnant woman

- Training educational program should be provided to nurses working at antenatal clinics, to improve their knowledge about HBV, to prevent spread of infection of HBV and upgrade knowledge, attitude and practices among pregnant women.

Further researches:

- Development of a national program, including periodical workshops regarding the prevention, early detection and management of HBV in Egypt for maternity nurses and midwife in maternity health services.

- It is important to conduct an extensive study on large sample size and at different settings to improve pregnant women' knowledge and attitude regarding hepatitis B virus infection with pregnancy.

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References

- Adeyemi AB, Ugwu I, Enabor O, and Bello FA, (2014).** Knowledge of hepatitis B virus infection, access to screening and vaccination among pregnant women in Ibadan, Nigeria. *Journal of Obstetrics and Gynaecology* 33(2):155-9. DOI: 10.3109/01443615.2012.711389
- Afihene M Y, Duduyemi B M, and Khatib M, (2015):** Knowledge, attitude and practices concerning Hepatitis B infection, among healthcare workers in Bantama, Ghana: A cross sectional study.1 (2):41.
- AlEssa M, Alyahya A, Mulhim A, Alyousof A, Al-Mulhim M, Essa A, (2020).** Perception of and Attitude towards Hepatitis B Infection among Saudi Pregnant Females Attending Antenatal Care Unit in Al-Ahsa City, Kingdom of Saudi Arabia. 16; 12(1):e6673. doi: 10.7759/cureus.6673.
- Amiweru C E, Nelson E A, Yusuf M, Olaosebikan, O F, Adeboye M, Adamu U G, and Oladele C, (2017).** Knowledge, Awareness and Prevalence of Viral Hepatitis Among Health Care Workers (HCWs) Of the Federal Medical Centre Bida, Nigeria. *The Journal of Medical Research.* 3(3):114-120.
- Arnold L, Sylvester D, and Sylvester L, (2017).** . Seroprevalence of Hepatitis B surface antigen amongst pregnant women attending an antenatal clinic, Volta region, Ghana. *J Public Health Africa;* 7(2): 584. [http://dx.doi.org/10.4081/jphia.2016.584] [PMID: 28299162]
- Arumugam A , Deepashree R , Bhat P , Akshatha R , Dhodapkar R and Sastry A (2019).** Educational Intervention to Increase Case Series Hepatitis B Vaccination among Housekeeping Staff. *Journal of Clinical and Diagnostic Research.* 13(2): DOI: 10.7860/JCDR/2019/39882.12595
- Aruna A, Deepashree R, Prasanna B, Akshatha R, Dhodapkar R, and Apurba S, (2019).** Educational Intervention to Increase Case Series Hepatitis B Vaccination among Housekeeping Staff. *Journal of Clinical and Diagnostic Research.* 13(2): DC01-DC06
- Block T M, Alter, H J, London, W T, and Bray M, (2016).** A historical perspective on the discovery and elucidation of the hepatitis B virus. *Antiviral Research.* 131(43):109–123.
- Chweitzer A, Horn J, Mikolajczyk R T, Krause G, and Ott J J, (2015):** Estimations of worldwide prevalence of chronic hepatitis B virus infection: a systematic review of data published between 1965 and 2013. *Lancet.* 386(10003):1546–1555.

- Dinardo, J. (2008):** Natural experiments and quasi-natural experiments. The New Palgrave Dictionary of Economics. p. 856 – 859. doi:10.1057/9780230226203.1162. ISBN 978-0-333-78676-5.
- Dun-Dery F, Adokiya M N, Walana W, Yirkyio E, and Ziem JB, (2017).** Assessing the knowledge of expectant mothers on mother-to-child transmission of viral hepatitis B in Upper West region of Ghana. BMC Infectious Diseases.17 (1) 416.
- Gebrecherkos T, Girmay G, Lemma M and 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; 2020: 5617603. doi: 10.1155/2020/5617603
- Gebrecherkos T, Girmay G, Lemma M, and Negash M, (2019):** Knowledge, Attitude, and Practice towards Hepatitis B Virus among Pregnant Women Attending Antenatal Care at the University of Gondar Comprehensive Specialized Hospital, Northwest Ethiopia. International Journal of Hepatology.2020:1-10. <https://doi.org/10.1155/2020/5617603>.
- Gebrecherkos, T., Girmay, G., Lemma, M., and Negash, M., (2019):** Knowledge, Attitude, and Practice towards Hepatitis B Virus among Pregnant Women Attending Antenatal Care at the University of Gondar Comprehensive Specialized Hospital, Northwest Ethiopia. International Journal of Hepatology.2020:1-10. <https://doi.org/10.1155/2020/5617603>
- Han Z., Yin Y., Zhang Y., et al.** Knowledge of and attitudes towards hepatitis B and its transmission from mother to child among pregnant women in Guangdong Province, China. PLoS One. 2017;12(6):p. e0178671. doi: 10.1371/journal.pone.0178671.
- He, T., Bai, Y., Cai, H., Ou, X., Liu, M., Yi, W., and Jia, J., (2018):** Safety and efficacy of lamivudine or telbivudine started in early pregnancy for mothers with active chronic hepatitis B. Hepatology International.12 (2):118–125.
- Helmy HK, Mohamed AA and Goda AA (2018).** The impact of a hospital-based awareness program on the knowledge of pregnant women about hepatitis b virus. Egyptian Nursing Journal. 15(2):162-168. DOI: 10.4103/ENJ.ENJ_12_18
- Iowa State University of Science and Technology. (2020):** Research Methodologies Guide (Quasi-Experimental Design). Available at: <https://instr.iastate.libguides.com/researchmethod.s>. Accessed on January 10, 2020, 9 am.
- Ismail S A, Cuadros D F, and Benova L, (2017).** Hepatitis B in Egypt: A cross-sectional analysis of prevalence and risk factors for active infection from a nationwide survey. Liver International. 37(12):1814-1822.
- Kolasa M S, Tsai Y, Xu J, Fenlon N, and Schillie S, (2017):** Hepatitis B surface antigen testing among pregnant women, United States 2014. The Pediatric Infectious Disease Journal. 36(7):175–180.
- Locarnini S, Hatzakis A, Chen D-S, and Lok A, (2015).** Strategies to

- control hepatitis B: Public policy, epidemiology, vaccine and drugs. *J Hepatol*; 62(1): S76-86. [http://dx.doi.org/10.1016/j.jhep.2015.01.018] [PMID: 25920093]
- Makhlouf E M, Khaled S A, and Tosson M M, (2015).** Impact of an educational intervention on knowledge about viral hepatitis infection (B&C) among pregnant women: Al Dawadmi, Saudi Arabia. *Egyptian Journal of Health Care*, 6 (1):1-12.
- Malekifar P, Babanejad M, Izadi, N, and Alavian, S M, (2018).** The Frequency of HBsAg in Pregnant Women from Eastern Mediterranean and Middle Eastern Countries: A Systematic Review and Meta-Analysis, *Hepatitis Monthly*.18 (9): e58830.
- Mohammed M M and Taha H T, (2016).** The Effect of an Educational Program on Nurses' Knowledge about Hepatitis B Virus (HBV) in Ninawah Governorate Hospitals. *Mosul Journal of Nursing*, Vol.2, No.2, 2016
- Niu B, Forde K A, and Goldberg D S, (2015).** Coding algorithms for identifying patients with cirrhosis and hepatitis B or C virus using administrative data. *Pharmacoepidemiology and Drug Safety*. 24(1):107-111.
- Ofori-Asenso R, and Agyeman A A, (2016).** Hepatitis B in Ghana: A systematic review and meta-analysis of prevalence studies (1995–2015). *BMC infectious diseases*.16 (1):130.
- Osei E, Lokpo SY, and Agboli E, (2017).** Sero-prevalence of hepatitis B infection among blood donors in a secondary care hospital, Ghana (2014): a retrospective analysis. *BMC Res Notes*; 10(1): 391. [http://dx.doi.org/10.1186/s13104-017-2733-3] [PMID: 28797275]
- Panda N, (2016).** A cross-sectional study of knowledge, attitude and practice towards hepatitis b among pregnant women attending antenatal clinics in honiara, solomon islands. Thesis for: Master of Applied Epidemiology. DOI: 10.13140/RG.2.2.21823.30881
- Patel BB, Gurmeet P, Sinalkar DR, Pandya KH, Mahen A and Singh N. (2016):** A study on knowledge and practices of antenatal care among pregnant women attending antenatal clinic at a Tertiary Care Hospital of Pune, Maharashtra. *Medical Journal*; 9(3): 354-362
- Posternak, M. A., & Miller, I. (2001):** Untreated short-term course of major depression: A meta-analysis of studies using outcomes from studies using wait-list control groups. *Journal of Affective Disorders*, 66, 139–146.
- Rani D, (2015).** A Study to Assess the Effectiveness of Structured Teaching Programme on Knowledge Regarding Hepatitis-B among Nursing Students in Selected Schools of Nursing Moga, Punjab. *Journal of Multidisciplinary Research in Healthcare* Vol. 1, No. 2 April 2015 pp. 75–95. DOI: 10.15415/jmrh.2015.12006
- Razavi-Shearer D, Gamkrelidze I, Nguyen MH, Chen D-S, Van Damme P, and Abbas Z (2018).** Global prevalence, treatment, and prevention of hepatitis B virus infection in 2016: A modelling study. *Lancet Gastroenterol Hepatol*; 3(6): 383-403. [http://dx.doi.org/10.1016/S2468-1253(18)30056-6] [PMID: 29599078]

- Sareetha AV., Nagabushan H., Supriya KH, (2018).** Effect of educational intervention on knowledge, attitude and practice of hepatitis B vaccine among medical students. *International journal of basic and clinical pharmacology.* 7(5). DOI: <http://dx.doi.org/10.18203/2319-2003.ijbcp20181648>
- Shah P D, Mehta T K and Patil L V (2019).** Interventional Knowledge, Attitude and Practice Study Regarding Hepatitis B Virus Infection and its Vaccination Using Educational Video among Health Care Workers. *National Journal of Community Medicine.* 10(3):130-134. pISSN 0976 3325 | eISSN 2229 6816.
- Shah PD, Mehta TK, and Patil LV (2019).** Interventional Knowledge, Attitude and Practice Study Regarding Hepatitis B Virus Infection and its Vaccination Using Educational Video among Health Care Workers. *National Journal of Community Medicine.* 10(3):130-134. pISSN 0976 3325 | eISSN 2229 6816
- Sheng Q J, Wang S J, Wu Y Y, Dou X G, and Ding Y, (2018):** Hepatitis B virus serosurvey and awareness of mother-to-child transmission among pregnant women in Shenyang, China: An observational study. *Medicine (Baltimore).* 97(22): e10931. doi: 10.1097/MD.00000000000010931.
- Shinedev et al., (2017).** Effectiveness of Structured Teaching Programme On Knowledge Regarding Prevention of Viral Hepatitis among Pre – University Students At Hassan. *Global Journal for Research Analysis.* 6(12):23 & 24.
- Spurlock DR Jr. (2018):** The single-group, pre- and posttest design in nursing education research: it's time to move on. *J Nurs Educ,* 57(2), 69-71.
- Stephen A, and Contag, M D, (2016).** Hepatitis in Pregnancy. *Medscape* <https://emedicine.medscape.com/article/1562368-overview>. (Accessed at Mar 13, 2019).
- Topbas E, Terzi B, Gayrim A and Bayoğlu T (2017).** The Results of a Hepatitis Training Provided for Nursing Students. *International journal of health sciences* 6(3):118-124
- Vainikka, P., (2015).** Psychological factors influencing consumer behaviour. Bachelor's Thesis. Centria University of Applied Sciences. Pp27:28
- Westin J, Aleman S, and Castedal M, (2020).** Management of hepatitis B virus infection, updated Swedish guidelines. *Infect Dis (Lond);* 52(1): 1-22. [<http://dx.doi.org/10.1080/23744235.2019.1675903>] [PMID: 31613181]
- Yang EJ, Cheung CM, So SK, Chang ET, Chao SD (2013).** Education and counseling of pregnant patients with chronic hepatitis B: perspectives from obstetricians and perinatal nurses in Santa Clara County, California. *Asian Pac J Cancer Prev* 2013; 14:1707–1713.
- Zseri A, Zaihi, Z, Mohammed F, Osman E, Somily E, and Zalah A, (2018).** Knowledge, attitude and practice among Jazan university students in health sciences colleges regarding Hepatitis B virus and its vaccine. *The Egyptian journal of hospital medicine.* 73(6):6959-6966.