

Effect of Primary prevention for Infection with Hepatitis B & C on Nurses' Knowledge and practices

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Abstract: Primary prevention program of viral hepatitis B & C is a vital element in controlling the spread of the disease between nursing staff. The aim : assess the effect of Primary prevention for Infection with Hepatitis B & C on Nurses' Knowledge and practices. The research design: Quasi experimental study was utilized for current study. Setting The study was conducted in medical, surgical ward and intensive care unit in national liver institute and medical wards in menofia university hospital in Shebin El-Kom City. Sample convenient sample consist of 117 nurses were recruited for the study. Tools: two tools used to collect data , an interview questionnaire sheet to assess demographic characteristics data about nurses, assessing the nurses knowledge about HBV &HCV and Observational checklist used to *Part I:* evaluates nurses' practices before, after and follow up of application of primary prevention, *Part II:* used to evaluate infection control in hospital. Results: Revealed a statistical significant relation between nurse knowledge and practices regarding to preventive measures of viral hepatitis B&C preprogram, post program and follow up and also there was a statistical significant relation between nurse total knowledge and total practices regarding to viral hepatitis B&C Conclusion: This study concluded that, nurses' knowledge and practices regarding to preventive measures of viral hepatitis B&C improved after implementation of primary prevention program Recommendation: The study recommended that adequate education for nurses about the effect of the disease on their quality of life and infection control practices inside hospital, periodic training program for nurses related to blood borne diseases especially viral hepatitis B& C. Hospital should have a role to control infection with hepatitis B&C virus through availability of hepatitis B vaccine and infection control supplies, solutions and equipment.

Keywords: HCV, HBV, Nurses' Knowledge and practices.

1. INTRODUCTION

Hepatitis is an infection of the liver caused by several viruses, the most common of which are Hepatitis A, B and C. Both Hepatitis B Virus (HBV) and Hepatitis C Virus (HCV) are spread mainly through contaminated blood and blood products, contaminated needles and sexual contact. Although there has been a decrease in the incidence of viral hepatitis over the last decade, it is still the most common cause of chronic liver disease worldwide (Yang, 2016).

Hepatitis B (HB) and hepatitis C (HC) infection are a major public health problem globally. It is the tenth leading cause of mortality worldwide and one of the most important infectious diseases, especially in developing countries. HB and HC infection are the most common cause of chronic liver disease globally accounting for 80% of all liver cancer mortalities worldwide (Abeje, 2015).

Viral hepatitis B and C infection are caused by blood contact and is a public health problem throughout the world. Its clinical course may be severe and can lead to work disability or to death. Considerable costs are incurred for prophylactic and treatment measures and result from the chronic clinical progress of the disease, loss of working hours and premature death. According to the WHO, approximately 150 million people in the world are chronically infected with HCV, and hepatitis C is the cause of 350 000 deaths annually. HCV is mainly transmitted by contact with infected blood due to injuries to the skin or mucous membranes. Acute infection is often asymptomatic and therefore frequently overlooked. In up to 80% of patients, the clinical course is chronic, leading to an increased risk of developing hepatic cirrhosis or hepatic cell carcinoma (*WHO, 2015; Askarian, 2016*).

Viral hepatitis B & C caused 1.34 million deaths in 2015. Most viral hepatitis deaths in 2015 were due to chronic liver disease (720 000 deaths due to cirrhosis) and primary liver cancer (470 000 deaths due to hepatocellular carcinoma). Globally, in 2015, an estimated 257 million people were living with chronic HBV infection, and 71 million people with chronic HCV infection. The epidemic caused by HBV affects mostly African Region and the Western Pacific Region. The epidemic caused by HCV affects all regions, with major differences between and within countries (*WHO, 2016*).

Viral hepatitis B & C was first identified as an occupational hazard for health care workers more than 60 years ago. For the past few decades, hepatitis B has been one of the most significant occupational infectious risks for health care providers. With the increasing prevalence of hepatitis C infections around the world, occupational transmission of this virus from infected patients to their providers has also become a significant concern. Several factors influence the risk for occupational blood-borne hepatitis infection among health care providers, among them: the prevalence of infection among the population served, the infection status of the patients to whom workers are exposed, the types and frequencies of parenteral and mucosal exposures to blood and blood-containing body fluids, and whether the patient or provider has been immunized with the hepatitis B vaccine (*Holla, 2016*).

Health care personnel are at increased risk of contracting blood borne pathogens due to their occupational exposure to blood and body fluids. More than twenty diseases can get transmitted through needle stick injuries including Hepatitis B, Hepatitis C. Global burden of HBV due to contaminated sharp injuries in HCWs is estimated to be 66,000 cases and 261 deaths annually, in developing countries 40-60% HBV infections in HCWs are attributed to sharp injuries specially nurses because they often have to deal with spilt blood, needle stick and sharps injuries which can transmit blood-borne infections between patients and healthcare staff (*Holla, 2016*).

Susan (2016) reported that between all HCWs, nurses are the ones who sustain a high needle sticks injuries burden. Since these professionals are also the ones who most often handle such material while performing their tasks. Occupational accidents, particularly those involving cutting and piercing instruments among health professionals, have been a cause for increasing concern due to the prevalence of diseases and infections caused by Hepatitis B and Hepatitis C viruses, which are sometimes asymptomatic and unnoticed, thus increasing the possibility of contamination (*Dille, 2016*).

HBV can effectively be prevented by vaccination but there is no vaccine against HCV infection. WHO recommended implementing universal vaccination against hepatitis B for newborns in all countries with an HBV prevalence rate higher than 5% in 1995. A safe and effective vaccine for HBV has been available since 1982 and is 95% effective at preventing new infection, education about how to avoid risky behavior plays an important role in HBV prevention and universal vaccination at a young age preferably at birth in high-endemicity countries is desirable, at the very least, vaccination should be offered to all individuals who are at risk and pregnant women must be screened for HBV before delivery, as this offers an opportunity to prevent another generation of chronically infected persons (*Shepard, 2015*).

Primary prevention of hepatitis B and hepatitis C, as a nurse activity to prevent the disease from occurring, includes activities to reduce or eliminate transmission of HBV and HCV to vulnerable persons, and focuses on decreasing risk factors. Blood, blood components, and plasma derivatives, such high-risk activities as injecting-drug use and percutaneous exposures to blood in health care, exposure to needle stick and other (tattooing and body piercing) settings. Infection with hepatitis B and hepatitis C among nursing staff can be prevented through immunizations against hepatitis, apply universal precautions, control measures, education and training and reporting and follow-up of exposure (*Page, 2015*).

Aim of the study:

The aim of this study is to evaluate the effect of primary prevention program for Infection with hepatitis B and C on Nurses' knowledge and practices through the following:

1. Assess nurses' knowledge about viral hepatitis B and C.
2. Assess nurses' preventive practices about viral hepatitis B and C to detect their needs. .
3. Developing and implementing of primary prevention program according to nurses' need.
4. Evaluating the effect of primary prevention program on nurses' knowledge and practices.

Research hypotheses:

1. The nurses' knowledge and practices will be improved after implementation of primary prevention program.
2. The primary prevention program will reduce the infection with hepatitis B and C among nurses' staff.

2. SUBJECTS AND METHODS

I. Technical design:

A. Research design: Quasi experimental study was used in this study to fulfill the study aim.

B. Research setting:

The current study was conducted in medical, surgical ward and intensive care unit in national liver institute (the main hospital in Middle East for hepatic patient) and medical wards in menofia university hospital in Shebin El-Kom City.

c. Sampling:

Convenient samples of 117 nurses, 96 work at national liver institute and 21 work at Menoufia university hospital,

- 46 nurses working in medical word at national liver institute.
- 22 nurses working in surgical word at national liver institute
- 28 nurses working in intensive care unit at national liver institute.
- 11 nurses working in male medical word at Menoufia university hospital.
- 10 nurses working in female medical word at Menoufia university hospital.

Tools of data collections.

Two tools were used for data collection:

1st tool: An interviewing questionnaire tool to assess:

Part I: Nurses' socio-demographic data which include hospital, word, sex, social status, level of education, years of experience , previous formal or informal training related to prevention of HBV & HCV infection, exposing to needle stick while dealing with patient and What did the nurse do when exposed to needle stick.

Part II: Nurses knowledge about HBV &HCV.

This was used to assess nurses' knowledge about hepatitis B virus and hepatitis C virus. It was developed by the investigator based on review of literature. In this part, the questions are formulated to gather data about the nurses' knowledge, it consisted of 24 items as MCQs (pre, post and follow up of primary prevention of HBV &HCV the program) its include: definition of viral hepatitis, causative agent, mode of transmission, signs and symptoms, the incubation period, the most important source of infection with HBV& HCV inside hospital and the most susceptible person to be infected with HBV& HCV (question no. 9: 32).

Scoring system: for the knowledge items, correct response was scored 1 and incorrect score 0 for each area of knowledge, the scored of the items were summed- up, the total score were 56 which is equal to 100%, 60% and more was considered satisfactory, less than 60% was considered unsatisfactory.

2nd tool: Observational checklist before, after and follow up of application of primary prevention program which consist of two parts:

Part I; used to evaluate nurses' practices regarding to "wash hands before contact with the patient, wash hands after contact with the patient, wash hands between patients, wash hands before putting on gloves, wearing gloves before providing patient care, wearing gloves when handling of blood and blood products , wearing gloves when cleaning equipment prior to sterilization or disinfection, remove gloves immediately after providing patient care , replacement of gloves before administering intravenous medication, exchanging gloves between patients, wearing gown wearing mask when splattering of blood onto face is possible, don't recap syringe, received hepatitis B vaccine and if nurse doing follow up for being infected with HCV& HBV. Each item was checked by direct observation by the investigator (question no. 1: 27) adopted from (Nadira, 2016).

Scoring system: for the practices items, done items was scored 1 and not done score 0 for each area of practices, the scored of the items were summed- up, the total score were 27 which is equal to 100%, 60% and more was considered accepted, less than 60% was considered not accepted.

Part II: Evaluate hospital environment regarding to: Providing fiscal and human resource support for maintaining the infection prevention and control program, availability of enough personal protective equipment (gloves & gown), availability of Antiseptic solutions, hospital use proper methods of disinfection and sterilizing of equipment, availability of safety box next to each bed, cleaning and disinfection of beds and the areas around the patient daily and hospital use proper methods for wastes management. Each item was checked by direct observation by the investigator for the following criteria of availability: yes or no (question no. 1: 20) adopted from (CDC, 2015).

Scoring system: for the hospital assessment items, for each response, a point value of 1 indicates (yes) a recommended practice, and. responses with 0 point value are generally for (no) or not recommended practice, the scored of the items were summed- up, the total score were 20 which is equal to 100%, **75-100%** possible points: **E** = Excellent practice in the hospital

50-75% possible points: **G** = Good practice in the hospital

<50% possible points: **P** = Poor practices needing immediate attention.

Reliability and validity of the tools:

Reliability was applied by the investigator for testing the internal consistency of the tools.

Validity was tested for content validity by jury of five experts in the field of community health nursing to ascertain relevance, clarity and completeness. Suggestions were incorporated into the tools.

II. Operational design

The operational design includes preparatory phase, pilot study, fieldwork, tool content validity and reliability.

a. Preparatory Phase:

A review of the past and current available related literatures covering all aspects of the research subjects using the available articles, magazines, Internet, journals and books in order to get a clear picture on the research problem, as well as, to design the study tools for data collection.

b. Pilot Study:

Pilot study was conducted on 12 nurses working at medical ward, surgical ward and intensive care unit at national liver institute and also nursing staff working in medical department at menofia university hospital to assess the applicability and clarity of tools and estimate the time needed for the intervention. The necessary modifications were done as revealed from the pilot study. The sample of pilot study was excluded into the total sample to assure the stability of the result.

c. Field work

- Data was collected at medical ward, surgical ward and intensive care unit at national liver institute and all nursing staff working in medical wards at menofia university hospital, after explaining the aim of the study to participants and reassuring them about the confidentiality of the data collected.
- A written approval letter was obtained from the Dean of Faculty of Nursing, ain shams University for practice the study at national liver institute and menoufia university hospital at Menuofia Governorate.
- After obtaining a permit the investigator meet the head nurse of national liver institute and head nurse of menoufia university hospital and explain the aim and primary prevention program content.
- The investigator started with introducing herself to the selected nurses and explaining the aim of the study, assured that data collected will be confidential and will used only to achieve the purpose of the study.
- The study work was carried out within duration 11monthes started from October 2017the end of August 2018.
- The investigator visit the pre mentioned setting three days per for(9 am: 1pm, 4: 5 nurses per day) for collecting the data from 117 nurses, it lasted two months to be fulfill before implementation of the program.
- The implementation phase of the program lasted for three months through visited the pre national liver institute and menoufia university hospital two days per week (Monday and Wednesday) to be accomplished.
- The evaluation phase of the program lasted for six months to determine the level of improvement for nurse's knowledge and practices toward primary prevention of HBV& HCV infection. The evaluation was done after implementation with one month (posttest) that took 6 weeks to be accomplished ,two months after posttest, the investigator started follow up test that took another 6 weeks to be accomplished

Program development phases.

- ***Assessment phase.***
- ***Implementation phase.***
- ***Evaluation phase.***

1. Program development phase: the program was designed by the investigator and based on the result obtained from the study tools; also review of recent, current, national and international related literature in various aspect of primary prevention of HBV& HCV. This program content was revised and validated by experts in faculty of nursing community health nursing department.

2. Assessment phase: three days /week, three hours /day (9am: 2 pm) were allocated for data collection (pretest), which was carried out through two month the average time consumed to fill tools was 30-45 minutes.

3. program implementation phase: Program implementing based on conducting session plan using different educational methods and media in addition to the use of guiding booklet specially designed and developed based on client assessment needs implementation of the program took three months through visited the pre mentioned setting two days /week (Monday and Wednesday) 2/3hours /day, number of hours different from one session to another to accomplish nursing intervention program session and practice training.

Steps of program development:-
a. General objective:

By the end of the educational program the nurses will be able to improve their knowledge and practices about viral hepatitis B, C and infection control measure to prevent transmission of infection to the nurses.

b. Specific objectives:

By the end of the program, the nurses will be able to:

- Define viral hepatitis B& C.
- Enumerate types of viral hepatitis.

International Journal of Novel Research in Healthcare and Nursing

Vol. 6, Issue 2, pp: (481-492), Month: May - August 2019, Available at: www.noveltyjournals.com

- Identify function of liver
- Identify causes of hepatitis B& C.
- Describe mode of transmission of HBV& HCV.
- List signs, symptoms and complication of HBV& HCV.
- List incubation period for HBV& HCV.
- Determine the main source of infection among nurses.
- Determine high risk group whom exposed to HBV& HCV.
- Determine diagnostic tests for HBV& HCV.
- Illustrate preventive measures to prevent infection of HBV& HCV.
- Apply cleaning hand washing to prevent infection.
- Apply hand scrubbing with alcohol.
- Develop an educational primary prevention program to prevent infection from HBV& HCV.

The total number of the session were 6session, 2 theoretical and 4practical lasting for 12 hours. From two: three hours is the time required for each session; 4 hours theory and 8 practice. The researcher visit national liver institute and menoufia university hospital two days per week (Munday and Wednesday) to interviewed the nurses in their work place. The researcher divided the nurses into four groups; the program was implemented for groups 24 nurses/ group. The university hospital nurses were divided into two groups (10- 11nurses).

At the beginning of the first session an orientation to the program and its aim tool place, simple words, Arabic language was used to+ suit the nurses level of understanding and feedback was given in the beginning of each session about the previous one, nurses were motivated and encouraged for their participation in the program.

Different teaching methods were used as role play, group discussion, brain storming, demonstration and re-demonstrations instructional media included picture and handouts.

1. Evaluation phase:

This phase was included evaluation the effect the primary prevention program on nurse's performance (knowledge & practice) by comparing the result (pre& post and follow up) by using the same data collection tools and it was done one month (posttest) and three months (follow up) after primary prevention program implementation.

Administration Design:

Approval to carry out this study was obtained from Dean of Faculty of nursing, Ain Shams University

Ethical considerations:

- The searcher approval was obtained from the ethical committee before starting the study.
- The study subject's consent to participate in the study was obtained.
- The researcher was clarified the objectives of the study to the study subjects.
- The researcher ensured complete privacy and total confidentiality of any information.
- The study subjects were allowed to participate or withdraw from the study at any time

III.Statistical design:

Collected data were arranged, tabulated and analyzed using suitable statistical significance test.

3. RESULTS

According to research hypothesis No. 1

Table (1) Distribution of the nurses' corrects knowledge regarding to viral hepatitis B & C pre, post and follow up of application of primary prevention program (No.= 117).

Items	Nurses' correct knowledge						χ^2	P-Value.
	Pre- program N= 117		Post- program N= 117		Follow- up N= 111			
	No.	%	No.	%	No	%		
The most important source of infection with HBV& HCV inside hospital.								
▪ Needle stick.	74	63.2	117	100.0	117	100.0	187.5	<0.001
▪ Using personal equipment of pt.	43	36.8	0	0.00	0	0.00	207.6	<0.001
Factors contributing infection with HBV&HCV between nurses.								
▪ Dealing with patient without using gloves.	94	80.3	115	98.3	111	94.9	36.35	<0.001
▪ Recapping syringe	64	54.7	114	97.4	111	94.9	92.4	<0.001
▪ Use of pt. personal equipment	69	59.0	102	87.2	97	82.9	32.2	<0.001
▪ Direct blood contact.	115	98.3	117	100.0	117	100.0	4.4	>0.05
▪ Don't having vaccine.	66	56.4	114	97.6	107	91.5	77.08	<0.001
Total.	81	69.2	112	95.7	108	92.3	39.78	<0.001
The most susceptible person to be infected with HBV& HCV.								
▪ Health care workers.	82	70.1	117	100.0	112	95.7	60.66	<0.001
▪ Visitors	20	17.1	0	0.00	0.00	0.00	64.0	<0.001
It is necessary to take vaccination of HBV in the following case:								
▪ Dealing with patients	113	96.6	117	100.0	117	100.0	8.8	<0.05
▪ Contact with body fluid	63	53.8	115	98.3	115	98.3	111.6	<0.001
▪ Needle stick.	5	4.3	112	95.7	112	95.7	287.6	<0.001
The most important test for diagnosis of HBV& HCV.	108	92.3	109	93.1	107	91.5	1.7	>0.05

Table (3) represented that, 63.2% of nurses had correct knowledge regarding that, needle stick is the most important source of infection with HBV& HCV inside hospital preprogram while 100% improved post program and 100% in follow up and the result show highly statistical significance difference ($\chi^2=187.5$, $p<0.001$). 69.2%of nurses had correct knowledge regarding to factors contributing infection with HBV&HCV between nurses improved to 95.7% post program and 92.3% in follow up, yet there were highly statistical significance difference ($\chi^2=39.78$, $p<0.001$). Regarding to The most susceptible person to be infected with HBV& HCV 70.1% of nurses stated health care workers preprogram increased to 100% post program and 95.7% in follow up and the result show highly statistical significance difference ($\chi^2=60.66$, $p<0.001$).

Figure (1): Distribution of the nurses' correct total knowledge regarding to preventive measures of viral hepatitis B&C (No: 117).

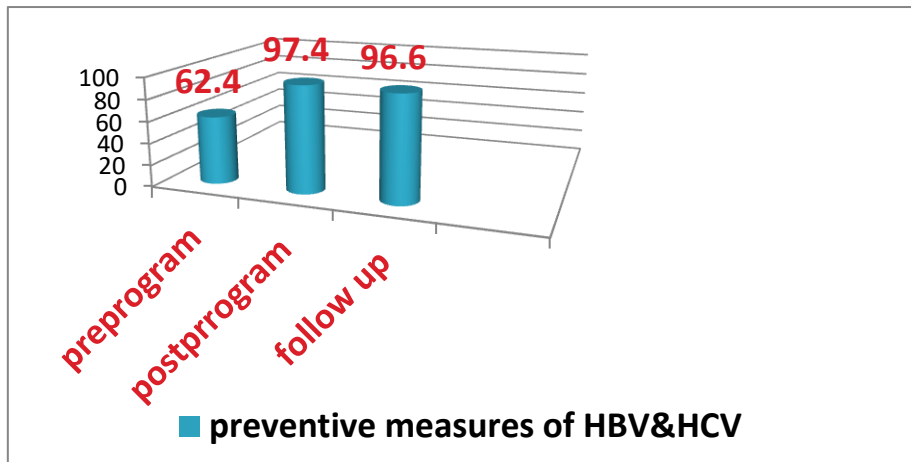


Figure (1) shows, 62.4% of nurses had correct knowledge regarding to Preventive measures of HBV& HCV preprogram improved to 97.4% post program and 96.6% in follow up, this result show highly statistical significance difference ($\chi^2=72.29$, $p<0.001$).

Table (2): Distribution of nurses' done practices regarding hand washing pre, post and follow up of primary prevention program(No.= 117).

Hand washing	Nurses' done practices						χ^2	P- Value.
	Pre-program N= 117		Post-program N= 117		Follow-up. N= 117			
	No.	%	No.	%	No.	%		
The nurse washes hands before contact with pt.	26	22.5	95	81.8	95	81.2	114.6	<0.001
The nurse wash hands after patient care	75	64.1	106	90.6	109	93.2	42.18	<0.001
The nurse wash hands between patients	18	15.4	76	65.0	46	39.3	59.9	<0.001
The nurse washes hands before putting gloves	5	4.3	105	89.7	103	88.0	234.1	<.0001
The nurse washes hands after removing gloves.	35	29.9	103	88.0	105	89.7	127.4	<0.001
Total	32	27.4	97	82.9	92	78.6	100.9	<0.001

Table (2) represented that, 22.5% of nurses wash their hands before dealing with patient preprogram while 81.8% improved post program and 81.2% in follow up, 64.1% wash their hands after patient care preprogram improved to 90.6% post program and 93.2% in follow up additionally 29.9% of nurses washes their hands after removing gloves improved to 88.0% post program and in follow, yet there were highly statistical significance difference ($\chi^2=127.4$, $p<0.001$).

Figure (2): Distribution of the nurses' done practices regarding to total wearing gloves pre, post and follow up of primary prevention program (No: 117).

Wearing gloves

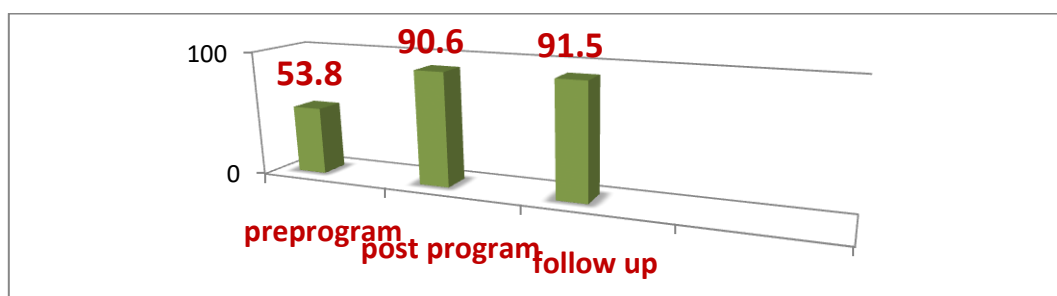


Figure (2) shows, 53.8% of nurses wears gloves when dealing with patient, blood and blood product and when cleaning equipment preprogram while improved to 90.6% post program and 91.5% in follow up , this result show highly statistical significance between pre, post program and follow up ($\chi^2=64.1, p<0.001$)

Table (3): Distribution of nurses' done practices regarding to personal protective measures for viral hepatitis B& C pre, post and follow up of primary prevention program(No.= 117).

Personal protective measures	Nurses' done practices						χ^2	P- Value.
	Post-program n.=117		Pre-program. n.=117		Post-program n.=117			
	No.	%	No.	%	No.	%		
▪ The nurse prepares medications in a room or area separated from the patient treatment area.	28	23.9	42	35.9	42	35.9	5.14	>0.05
▪ The nurse avoiding direct contact with infected blood.	84	71.8	115	98.3	115	98.3	58.06	<.001
▪ The nurse exercise particular care in handling and disposal of sharps.	69	59	83	70.9	78	66.8	3.80	>0.05
▪ The nurse clear up spillage of blood promptly and disinfect surfaces.	57	48.7	102	87.2	104	88.9	64.27	<.001
▪ The nurse disposes of sharp equipment in safety box.	84	71.8	115	98.3	116	99.1	61.47	<.001
▪ The nurse don't recap syringe.	92	78.6	116	99.1	114	97.4	39.9	<.001
▪ The nurse informed the Infection Control Committee when exposed to needle stick.	21	17.9	115	98.3	116	99.1	251.3	<.001
▪ The nurse received hepatitis B vaccine.	96	82.1	97	82.9	101	86.3	0.88	>.05
▪ The nurse follows safe procedures for disposal of contaminated waste.	68	58.2	116	99.1	114	97.4	96.6	<.001
▪ The nurse covers existing wounds, skin lesions and all breaks in exposed skin with waterproof dressings.	19	16.2	117	100.0	112	95.7	251.1	<.001
▪ Total	62	53.0	102	87.2	101	86.3	48.0	<0.001

Table (3) represented that, 53% of nurses apply other personal protective practices for avoid infection with viral hepatitis B& C preprogram while improve to 87.2% post program and 86.3% in follow up and the result show highly statistical significance between pre, post program and follow up ($\chi^2=48.0, p<0.001$).

According to research hypothesis No. (2)

Table (4): Distribution of nurses' corrects practices regarding to preventive measure of viral hepatitis B& C pre, post and follow up of primary prevention program (No.= 117).

Other personal protective practices	Nurses' correct practices						χ^2	P- Value.
	Pre program n.=117		Post-program. n.=117		Follow up n.=117			
	No.	%	No.	%	No.	%		
Does the nurse doing follow up for being infected with HCV& HBV?	81	69.2	98	83.8	98	83.8	14.42	<0.001
Have you infected with HCV or HBV as a result of work.	7	6.0	0	0.00	0	0.00	14.28	<0.001

Table(4) Shows that, 69.2% of nurses doing follow up for being infected with HBV or HCV while improved to 83.8% post program and 83.8% in follow up and the result show highly statistical significance between pre, post program and follow up ($\chi^2=14.42, p<0.001$). 6% of nurses were infected with HCV as a result of work preprogram, compared with 0.00% post program and 0.00% in follow up (reinfection or new infection not occurred among nurses) and the result show highly statistical significance between pre, post program and follow up ($\chi^2= 14.28, p<0.001$).

4. DISCUSSION

Table (1) shows the difference between pre, post and follow up test percentage of knowledge as regard the most important source of infection with HBV& HCV inside hospital is needle stick and factors contributing infection with HBV&HCV between nurses are dealing with patient without using gloves, recapping syringe and direct blood contact, the most susceptible person to be infected with HBV& HCV and this results is in agreement with (**Reang, 2016**) who stated that There was a statistically significant difference between pre-test and post-test scores of knowledge levels within the hepatitis education provided for the nursing students in our study.

In relation to nurses' knowledge regarding to preventive measures of HBV& HCV, precautions for using rubber and the method of disposing needles there was highly statistically deference between pre, post and follow up test (**figure 1**) and this results is in agreement with (**Mahrous, 2016**) who stated that knowledge of nurses about HBV, HCV and uses preventive measures was inadequate before the educational program, and improved after participation in the program.

In relation to nurses' practices regarding to preventive measure of viral hepatitis B& C. hand washing before and after contact with patient and before and after putting on the gloves (**Table, 2**) the present study revealed that there was highly statistically deference between pre, post and follow up test and results is in agreement with the study conducted by (**Mahrous, 2016**) who stated that low frequency practice hand washing before and after procedure, wash hands before and after putting on the gloves and washing hands before leaving patient's environment was observed among nurses in the pretest and improved after participation in program.

As regard wearing gloves (**figure.2**) the present study shows that there were highly statistically deference between pre, post and follow up test. This may be attributed to inadequate knowledge of the important of wearing gloves before procedure and exchange gloves between patients due to high work load, shortage of staffing, and lack of encouragement, this result also revealed that primary prevention program was effective

In relation to nurses protective practices (**Table, 3**) avoiding direct contact with infected blood, disposing of sharp equipment in safety box, recapping syringe and informed the Infection Control Committee when exposed to needle stick there was highly statistically deference between pre, post and follow up test and this result is agreement with the study conducted by (**Mahrous, 2016**) who stated that there was a statistically significant difference between pre-test and post-test scores of practices levels regarding to safe injection practices and avoiding recapping needles and a significant relationship was found between nursing students who had a history of training about universal

Precautions and their appropriate actions after an accidental needle stick injury from a patient with known active viral hepatitis infection.

Table (4) shows that, percentage of nurses who did follow up for being infected with HCV or HBV was improved after primary prevention program and there was not reinfection among nurses, there highly statistically deference between pre, post and follow up test, this result this result is agreement with (**Askarian, 2014**) who stated that, training programs regarding occupational hazards of HBV are very important to all health care.

5. CONCLUSION

According to current study results and research hypothesis it concluded that there was a highly statistically significant differences between nurses' knowledge regarding viral hepatitis B&C preprogram, post program and follow up of application of primary prevention program. Study also revealed that there was a highly statistically significant difference between nurses' practices regarding to preventive measures of viral hepatitis B&C preprogram, post program and follow up of application of primary prevention program.

The study revealed a highly statistically significant difference between post primary prevention program total knowledge and total practices. Also there was a highly statistical significance between follow up of primary prevention program total knowledge and total practices.

Study also there was highly statistical significance between age and years of work with their knowledge regarding viral hepatitis B & C after application of primary prevention program.

This study also shows that one of two hospitals provides enough personal protective devices and antiseptic solution to nurses for helping them to avoid infection with viral hepatitis B&C.

6. RECOMMENDATIONS

The findings of the current study suggested the following recommendations:

- A periodic training program for nurses related to blood borne diseases especially viral hepatitis B & C.
- Adequate education for nurses about the effect of the disease on their quality of life and infection control practices inside hospital.
- Hospital should have a role to control infection with viral hepatitis B & C through availability of hepatitis B vaccine and infection control equipment and antiseptic solutions.
- Continuous applying of medical survey program in the hospital for early case finding and early management to control spread of infection.
- Follow up of post exposure cases and providing of post exposure prophylaxis of HBV to prevent infection with the disease.

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