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Studies Program

Seroprevalence of Hepatitis C and Risk Factors Identification Among Couples Attending Premarital Screening in Kingdom of Bahrain and its Policy Implication

A Thesis Submitted in Partial Fulfillment of the Requirements for the Master's
Degree in Health Policy and Population Studies

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KINGDOM OF BAHRAIN

January 2008 (A.D.)

Muharram 1429 (A.H.)

In the name of Allah, The Beneficent, The Merciful

DEDICATION

This thesis is dedicated to my parents, my dedicated husband and children

ACKNOWLEDGEMENTS

I would like to praise God without whose mercy this thesis would not have been completed.

First I would thank the Ministry of Health that gave me the opportunity to enroll in this wonderful program; it enriched my knowledge and made me appreciate the concept of policy making as a scientific and challenging subject.

Special thanks to my supervisor, Prof Faisal Al Nasir and to my co-supervisor Dr Khaled Tabbara for their great guidance and support, without whom the completion of this work would not have been possible.

I would also like to thank the Arabian Gulf University with special thank to Prof Randah Hamada for her effort and great help in establishing and maintaining the program.

Many others contributed directly and indirectly to this work, to mention but few here, Dr Qassim Al Shboul, and the stasticians Emad and Moh'd Obaid and Mr Mohammed Ghali, Reference and E-Resources Librarian for their valuable help and support. I also acknowledge Maternal and Child health department staff for their support in my data collection.

Last, but not least many thanks to all the couples who participated in this study for their cooperation.

List of abbreviations

HCV: Hepatitis C virus

PMC: Premarital counselling

EIAs: Enzyme immune Assays

RNA: Ribonucleic acid

PCR: Polymerase chain reaction

IVDU: Intravenous drug users

HIV: Human immunodeficiency virus

WHO: World Health Organization

HCC: Hepato-cellular carcinoma

CDC: Center for Disease Control and Prevention (USA)

V
ABSTRACT

Background: Hepatitis C virus (HCV) infection is one of the major causes of chronic hepatitis, cirrhosis, and hepato-cellular carcinoma. The global burden of HCV infection is unknown due to the asymptomatic nature of acute infections. World Health Organization (WHO) estimated in 1999 that 3% of the world's population was chronically infected with HCV. No data is available on the prevalence of HCV in Bahrain. Since 2005 premarital screening for hereditary blood diseases and sexually transmitted diseases is obligatory to all Bahrainis applying for marriage certificate. The objective of this study was to determine the sero-prevalence of HCV, identify the characteristics of positive cases and most common risk factors among candidates attending premarital screening in Bahrain in order to determine if policy changes were required to include HCV as part of premarital testing.

Methodology: A cross sectional study involving individuals attending premarital screening in Bahrain during the period of 1st April and 15th May 2006. The inclusion criterion was that one or both of the partners was Bahraini. A single blood sample was collected and analysed for anti-HCV using third-generation enzyme immunoassay (EIAs) and confirmatory immunoblot assays including INNO-LIA and RTPCR. A structured questionnaire was filled by the researcher to identify possible risk factors and behaviors for acquiring HCV infection, through interviewing of positive candidates.

Results: The study population was 1070 with Males=546 (51%), Females=524 (49%) The mean age of the sample was 25.9 ± 7.1 years, ranging between 14 and 74 years. The mean age of the positive HCV cases was 31.5 ± 8.9 , median was 24 years ranging between 18 and 43 years. The seroprevalence for HCV antibodies was 1.5%. There was no significant relation between HCV infection and gender, education level, working status,

or marital sequence. There was significant relation of HCV infection with age ($P = .000$) with peak prevalence between 34- 43 years. The two main significant risks identified in positive cases were history of surgery (50%) of cases and blood transfusion (25%) of cases.

There was significant association between HCV infection and history of surgery ($\chi^2 15.047 P = .000$), history of blood transfusion ($\chi^2 91.738 P = .000$), history of STDs ($\chi^2 6.065 P = .014$), history of substance abuse ($\chi^2 50.811 P = .000$).

Conclusion: The study showed low prevalence of HCV according to WHO classification and the majority of positive cases had history of at least one risk factor that could be identified with careful history during the routine premarital counseling. The rate of HCV seropositivities in this study are similar to those reported by WHO for other GCC countries. These results cannot be extrapolated to the whole population in Bahrain; however, they provide a good reference for future studies and for disease prevention and healthcare planning. It is recommended to improve the current screening procedure relevant to HCV high-risk identification during premarital counselling, and screening those individuals identified as high risk.

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CHAPTER 1

INTRODUCTION

1.1 Hepatitis C infection:

Hepatitis C virus is a major health problem and is a leading cause for chronic hepatitis, cirrhosis, hepato-cellular carcinoma, and liver failure.

Hepatitis C virus (HCV)

Is a viral infection of the liver that had been referred to as parenterally transmitted "non- A, non- B hepatitis" until identification of the causative agent in 1989 (R. H. Purcell, Alter, & Dienstag, 2000; Sherlock, 1996) which was cloned by Michael Houghton and colleagues in 1990. Since the discovery of HCV and the introduction of specific diagnostic tests, it became evident that most of the post-transfusional and sporadic non -A non -B hepatitis are caused by HCV (Bortolotti et al., 1991; Kuo et al., 1989).

HCV is a single-stranded enveloped RNA positive virus that belongs to the Flaviviridae group, a considerably heterogeneous family of viruses, with at least six known genotypes (1 to 6) and more than 50 subtypes. The genome is approximately 10,000 nucleotides and encodes a single polyprotein of about 3,000 amino acids (R. Purcell, 1997) with an estimated half life ($t_{1/2}$) of 2.7 hours. Daily, 10 trillion virions are produced in individuals with HCV infection (Neumann et al., 1998). The incubation period of HCV infection ranges between 15 and 150 days. Despite the diagnostic improvements, the time between infection with HCV and the appearance of detectable antibodies (window period) is generally more than 40 days (Barrera et al., 1995; Schreiber, Busch, Kleinman, & Korelitz, 1996).

Prevalence of HCV Genotypes varies according to geographic region; In the United States, genotype 1 accounts for approximately 75% of cases of chronic hepatitis C (Alter et al., 1999), while 1a, is the prototype genotype common in Northern Europe. Genotype 2 is found worldwide but is

particularly common in Northern Italy and Japan, while Genotype 3 is most frequent in the Indian subcontinent and, genotype 4 is the most common in Africa and the Middle East. Genotype 5 is found in South Africa, and genotype 6 is found in South East Asia (Hoofnagle, 2002).

1.2 The nature of HCV infection

There is no generally accepted definition of an acute hepatitis C infection, however; the following criteria have been used; a clear point of exposure and a positive HCV RNA within six months or a significant rise in serum alanine aminotransferase or seroconversion in which antibody and/or HCV RNA is absent from a first but present in a second sample (CDC, 2006).

Acute HCV infections are typically asymptomatic. The most common symptom is fatigue with only 20% of patients developing clinical jaundice after initial infection. Up to 40% of cases recover fully, however the majority of cases (60 - 70%), go on to develop chronic infection, and are mostly asymptomatic until the manifestation of significant liver damage (Seeff, 2002). The high rate of chronic infection is mainly due to a high rate of mutation of the virus and the lack of a vigorous T-lymphocyte response (Gerlich, Gschwend, Uchtenhagen, Kramer, & Rehm, 2006).

Cirrhosis develops in about 10% to 20% of persons with chronic infection, and liver cancer in 1% to 5% of persons with chronic infection over a period of 20 to 30 years. Hepatitis C exacerbates the severity of underlying liver disease when it coexists with other hepatic conditions such as hepatitis B, or alcoholism (CDC 2005). An estimated 27% of cirrhosis and 25% of hepatocellular carcinoma (HCC) worldwide occur in HCV-infected people (Perz, Armstrong, Farrington, Hutin, & Bell, 2006). HCC may develop in as many as 1-4% per year of patients with established cirrhosis (Seeff, 2002).

In Saudia Arabia 30.4% of patients with chronic liver disease and hepatocellular carcinoma (HCC) were found to be HCV positive (al Karawi, Shariq, el Shiekh Mohamed, Saeed, & Ahmed, 1992).

1.3 Size of the problem

It is very difficult to estimate the rate of new cases of HCV (incidence) because most acute infections are asymptomatic, and cannot be reported even in countries with well-established surveillance systems (Hagan et al., 2002; Spada et al., 2001).

Because many countries lack data, estimates are based on weighted averages for regions rather than individual countries. The estimated global prevalence of HCV infection is 2.2% (WHO, 2004) with an estimated range of <1.0% in Northern Europe to >2.9% in Northern Africa. Lowest prevalence rates (0.01% - 0.1%) have been reported in the United Kingdom and Scandinavia while the highest (15%-20%) has been reported for Egypt (Frank et al., 2000; Mohamed, Rakhaa, Shoeir, & Saber, 1996; Shepard, Finelli, Fiore, & Bell, 2005).

World-wide endemicity of HCV according to the World Health Organization (WHO, 2002) is classified as low if the prevalence range is 1-2.5%, moderate if between 2.5-10% and high endemicity if > 10% (Figure 1).

The 1999 WHO report estimated that 3% of the world's population (170 million people) was chronically infected with HCV, with 3-4 million new infections occurring each year (Figure 2).

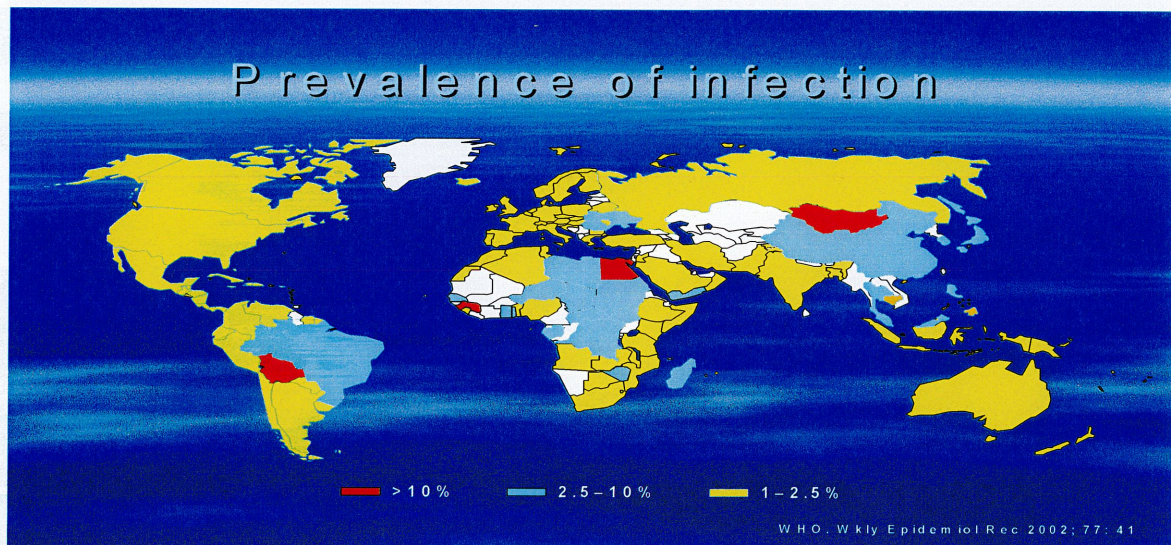


Figure 1
Distribution of HCV endemicity worldwide

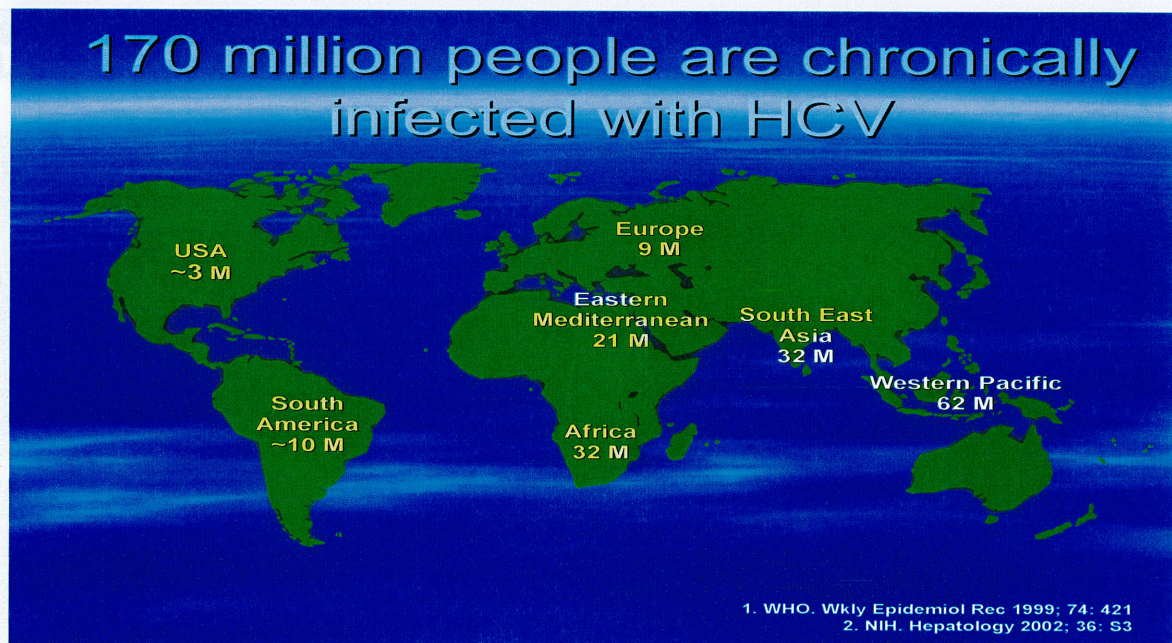


Figure 2
Number of HCV chronically infected individuals by geographic region.

In Bahrain there are no previous population- based studies to determine the prevalence rate. Incidence rate per 100,000 population of notifiable HCV in the year 2006 was 0.9 (appendix 4.4). Data available from blood donor screening revealed a prevalence rate of 0.2%, which has remained unchanged in 2005 and in 2006 (Central blood bank, MOH- Bahrain). On the other hand from a total of 13,997 individuals with possible high-risk such as blood transfusion, history of STDs were screened in the same year through the central public health laboratory, only 4.7% were confirmed to be positive. Prevalence among drug users was highest with a rate of (30.4%), while only 1% of pregnant women with risk factors screened were positive, and 5.5% of high-risk candidates attending premarital counseling were positive. (Appendix 4.2), (Health data base system, MDIS- HID 2006).

1.4 Modes of Transmission

HCV is spread primarily by direct contact with human blood. The most common way of transmission of HCV is through large or repeated direct percutaneous exposures to blood such as transfusion or organ transplantation from infectious donors. Patients with chronic renal failure on dialysis are at high risk of acquiring the infection and those sharing needle while injecting drug (CDC 2006). The majority of infected individuals have either received blood transfusions or transplant prior to 1990, before blood screening for HCV was first implemented.

HCV is less efficiently transmitted by single small dose percutaneous exposures such as accidental needle sticks, the reuse of inadequately sterilized needles, syringes or other medical equipment (Puro, Petrosillo, & Ippolito, 1995).

Sexual transmission between monogamous couples is rare but persons with multiple sex partners who engage in unprotected sex (Terrault, 2002) and

perinatal transmission may also occur, although less frequently (Roberts & Yeung, 2002). Nasal inhalation of cocaine and other such as social, cultural, and behavioral practices using percutaneous procedures including circumcision, cupping (hijama), beauty treatments (tattooing, ear and body piercing, manicure/chiropractic, and barber shop shaving), can occur if inadequately sterilized equipment is used. Household transmission through percutaneous /mucosal exposure to blood and the sharing of contaminated personal items such as razors, toothbrushes or nail-grooming equipment can also occur but is rare (Mohamed et al., 2005).

HCV is not spread by breast feeding, sneezing, coughing, hugging, sharing eating utensils or drinking glasses, other normal social contact, or food and water (Mast, Alter, & Margolis, 1999).

In developed countries, most of the HCV-related disease burden has resulted from injectable drug use, receipt of transfusions before donor screening, and high-risk sexual activity, while most of the disease burden in developing countries is related to receipt of unsafe therapeutic injections and contaminated blood (Alter, 2007).

1.5 Diagnosis

The laboratory diagnosis of HCV infection is usually made on the basis of the detection of circulating antibodies to HCV in the serum. Serological tests for the detection of antibodies to HCV are generally classified into screening tests and confirmatory tests. The average time between exposure to HCV and seroconversion is 8–9 weeks (Barrera et al., 1995; Schreiber et al., 1996) and anti-HCV can be detected in >97% of persons by 6 months after exposure (CDC 2005).

The most widely used HCV antibody tests are “Enzyme Immune Assays (EIAs)”-based, are cheap, reproducible and appropriate for screening large

numbers of specimens on a daily basis. The first generation HCV EIAs were developed in the 1990s. They had poor sensitivity and were not helpful early after infection since the antibodies appeared four to six months after infection. Third generation HCV EIAs are highly sensitive (>99%), and specific (99%). In immuno-competent patients the window period between HCV infection and the detection of anti-HCV antibodies is, on average, 7-8 weeks (Barrera et al., 1995; NIH, 2002; Pawlotsky, 1999). Accuracy can be improved if additional supplemental or confirmatory test(s), of equal or higher specificity, are used to retest all those samples found reactive by the screening tests (Iancu, 2001).

A recombinant immunoblot assay (RIBA) that identifies antibodies, which react with individual HCV antigens, is often used as a supplemental test for confirmation of a positive EIA result. Confirmation of serological results as well as assessment of the effectiveness of antiviral therapy can be achieved using molecular methods, including RNA amplification tests (e.g. polymerase chain reaction or PCR, branched DNA assay). HCV RNA can be detected in blood within 1–3 weeks after exposure. A positive result indicates the presence of active infection and a potential for spread of the infection and or/ the development of chronic liver disease (Pawlotsky, 1999).

1.6 Treatment

There have been improvements in the success of HCV treatment, and several approved treatments are currently available. The primary objective of treatment is viral eradication defined as sustained viral response (SVR) which is defined by the absence of detectable HCV RNA in the serum as shown by a qualitative HCV RNA assay six months after the end of a period

of antiviral therapy, this will reduce progression to fibrosis and cirrhosis and prevention of HCC (Yoshida et al., 2004).

Treatment with interferon alone is less effective than if combined with ribavirin, a nucleoside analogue. This combination was reported to double the sustained virological response rates seen with interferon alone (Fried & Hadziyannis, 2004). Up to 80% of individuals with HCV genotypes 2 or 3 achieve a sustained virologic response with peg interferon alfa-2a and peg interferon alfa-2b combined with ribavirin, meaning 80% are cured of hepatitis C. Unfortunately, genotype 1 is more resistant to treatment, yet 40% to 45% of patients with genotype 1 achieve a sustained virologic response after treatment with peg interferon and ribavirin (Manns et al., 2001). Response to therapy is also influenced by compliance, duration of therapy, dosage, infecting viral load and disease stage.

1.7 Prevention

No vaccine is currently available. Research is in progress but the high mutability of the HCV genome complicates vaccine development and treatment for chronic hepatitis C is too costly for most individuals in developing countries to afford. Identifying the mode of HCV transmission in individual countries is important for effective preventive measures.

The complexity related to the geographic distribution of HCV infection, determination of its associated risk factors, regional and ethnic differences, lifestyles and even behavioural practices are known to influence exposure rates and underscore the difficulties in global prevention and control of HCV.

In the absence of a vaccine, all precautions to prevent infection must be taken as recommended by the center for disease control (CDC) including screening and testing of blood and organ donors of persons who have

injected illicit drugs in the recent and remote past, including those who injected only once and do not consider themselves to be drug users; with HIV infection, persons who were ever on hemodialysis, those with unexplained abnormal amino-transferase levels, prior recipients of transfusions or organ transplants before 1992, children born to HCV-infected mothers, health care workers after a needle stick injury, persons with high sexual behavior and current sexual partners of HCV-infected persons. Other measures include implementation and maintenance of infection control practices in health care settings, including appropriate sterilization of medical and dental equipment, promotion of behavior change among the general public and health care workers to reduce overuse of injections and to use safe injection practices; and risk reduction counseling for persons with high-risk drug and sexual practices. HCV positive persons should not donate blood, body organs, tissue, or semen, not share toothbrushes or razors, and keep cuts and skin lesions covered (CDC-2006).

The 10 principles of successful mass screening programs as proposed by Wilson and Jungner of the World Health Organization in 1968: is that the condition to be screened for must be an important health problem for the individual and the community, that there is an acceptable form of treatment, adequately understood natural history of the condition, including its development from latent to, declared disease and that there is a suitable screening test or examination that is acceptable to the population. Post screening facilities and an agreed policy on whom to treat as patients and the cost of the screening program (which would include the cost of diagnosis and treatment) must be economically balanced (Wilson & Jungner, 1968).

Many of the above principles are hard to apply in relation to HCV screening in most developing countries.

HCV is one of the notifiable diseases in Bahrain since 1998. Ministry of health (public health officials) rely on notification from health care providers and laboratories from both governmental and private sectors. Indications for HCV testing included routine blood donor screening, which was introduced since August 1991, intravenous drug users, clinical suspicion such as elevated liver enzymes, and high-risk individuals.

1.8 Premarital counseling

The kingdom of Bahrain has a population of 753,000 in 2007 and an area of 717 sq km (277 sq miles). Health services are provided through ministry of health which is the major governmental organization providing comprehensive health care for nationals and non nationals residents including screening, preventive programs and curative services. There are twenty-two local primary care health centers distributed according to the geographical areas of the kingdom (appendix 4.3).

The burden of genetic blood disorders including sickle-cell disease, Thalassaemias and glucose-6-phosphate dehydrogenase deficiency (G6PD) are among the major public health problems in Bahrain (Al-Arrayed, Hafadh, Amin, Al-Mukhareq, & Sanad, 2003). Patients with some hereditary blood diseases such as B-Thalassaemia require frequent blood transfusions and are exposed to the hazards of blood-borne diseases such as HCV, with reported seroprevalence of 33% among beta-Thalassaemia major patients in Kuwait (al-Fuzae, Aboolbacker, & al-Saleh, 1998) and 40% among multitransfused children with hereditary blood diseases in Bahrain (al-Mahroos & Ebrahim, 1995).

In an attempt to reduce the incidence of hereditary blood disorders the Bahrain Ministry of Health introduced a premarital counseling service in December 1992. All nationals were encouraged to undergo such screening,

however, eleven years after the initiation of the service (2003) only 25% of married couples attended this service, which was considered very low. Consequently in 2004 the parliament passed a law making it compulsory for all nationals to undergo premarital screening for hereditary blood diseases through primary health centers and, few private hospitals and clinics in order to provide screening and counseling to those at risk. Several countries such as Cyprus (Bozkurt, 2007), Palestine (Tarazi, Al Najjar, Lulu, & Sirdah, 2007), have adopted such measures that resulted in marked reduction in the prevalence of such diseases. In Saudi Arabia, the royal decree was implemented in February 2004 for identification and prevention of high-risk marriages for hemoglobinopathies (Al-Suliman, 2006).

The ministry of health expanded the program in addition to include assessment of high-risk couples for sexually transmitted diseases. The assessment included information about socio- demographic characteristics (age, education, occupation, sequence of marriage, and history of consanguinity), medical history including illness, surgical history, sexually transmitted diseases, and blood transfusions. Information on smoking, alcohol, and illicit use of drugs (appendix 2.1). Past obstetric history and contraception, if applicable, and pregnancy readiness were also included (Appendix 2.3). Investigations include a full blood count, blood group analysis, and screening for hereditary hemoglobin disorders (hemoglobin electrophoresis), rubella antibodies, syphilis, human immune deficiency virus (HIV) and hepatitis B virus (HBsAg) (appendix 2.2) and the final certificate given to couples after completion (appendix 2.4).

1.9 Statement of the problem

Hepatitis C infection is a leading cause of chronic hepatitis, cirrhosis, and hepatocellular carcinoma. The premarital screening committee discussed the inclusion of Hepatitis C virus testing in the PMC screening program, however that was not approved. The basis of the disagreement was the lack of data about the prevalence of HCV in Bahrain and the lack of data on evidence of sexual and vertical transmission. The prevalence of hepatitis C is considered to be very low in individuals without risk factors, therefore, despite the lack of data in Bahrain, the committee recommended only screening couples with high-risk history (blood transfusion and individuals with high risk behavior such as substance abuse, history of sexually transmitted disease or those who engaged in multiple sexual relations). However there is a problem in identifying those with high-risk behavior especially history of substance or injectable drug abuse and multiple sexual partners through routine interview for PMC.

Due to the lack of information on the prevalence of HCV in Bahrain, there is a need to study prevalence in the general population including HCV testing in premarital screening.

This study was designed to answer the following research questions:

1.10 The research question

What is the prevalence rate of HCV among couples attending premarital counseling?

What are the common possible risk factors among the candidates with HCV positive results attending premarital counseling?

1.11 Hypothesis

The prevalence of HCV among candidates attending for PMC in Bahrain is within the moderate level of endemicity, similar to neighboring countries

such as Kuwait, and it is important to screen all couples attending premarital screening for HCV.

1.12 Aims

The study aims to fill the existing data gap on prevalence of HCV among candidates attending PMC that will provide policy makers with reference database for the future.

To identify whether we need to include HCV screening as a mandatory test for all couples attending PMC in Bahrain.

1.13 Objective

To determine the sero prevalence of HCV infection among candidates attending premarital counselling in Bahrain.

Sub-objectives:

- 1- To find out, the profile of candidates with HCV.
- 2- To identify the most common associated risk factors for acquiring HCV among couples attending PMC in Bahrain.
- 3- To improve the current screening procedure relevant to HCV in PMC.

1.14 Significance of the study

This study is the first population-based survey on HCV among candidates attending PMC in Bahrain, which will provide data on HCV prevalence and the most common associated risk factors for the policy makers in order to evaluate the policy on screening couples attending premarital counselling.

CHAPTER 2

LITERATURE REVIEW

household National Health and Nutrition Examination Survey (NHANES) of 1988 to 1994, (Alter et al., 1999), while the second (NHANES) survey between 1999 and 2002 a prevalence of 1.6% was reported (Armstrong et al., 2006).

In a study to find out the outcomes of a screening program for HCV based on risk factors, 25,701 patients presenting for care in VA facilities medical department in USA, were assessed by a questionnaire, 8471 identified with a risk factor were offered anti-HCV testing. The prevalence among them was 7.3% (Mallette, Flynn, & Promrat, 2007).

A study aimed to assess the prevalence of HCV among normal healthy persons and high risk groups in the northern part of Kerala state in South India, found a prevalence of 0.24% among the normal population which was low compared to other areas of India (Sandesh et al., 2006).

While a higher rate was reported in a study aimed to evaluate the prevalence and risk factors of anti-HCV positivity in northeast Taiwan, the overall prevalence was 5.1%. Increase in age >60 years, surgical history and frequent usages of non disposable needles were identified as significant risk factors of HCV infection in the study (Lin et al., S2003).

In a community-based survey among the population of Catalonia- Spain, HCV prevalence was found to be 2.5%. Prevalence increased significantly with age and history of Tattoo, followed by blood transfusion and drug use (Dominguez, Bruguera, Vidal, Plans, & Salleras, 2001).

In a study aimed to determine the seroprevalence rates for HCV in residents of a city of Ayfon in west-central Turkey, a prevalence of 2.2% was found, and a significantly higher prevalence in older as compared to Younger age groups ($p=0.001$) (Demirturk, Demirdal, Toprak, Altindis, & Aktepe, 2006)

2.1.2 Prevalence in the Arab World

A population-based study describing the pattern of HCV infection in North-Western and in Southern Tunisia, reported a prevalence of 1.7% versus 0.2%, respectively. Advanced age was the only significant risk factors (Mejri et al., 2005).

In a cross sectional population- based national study aimed to find the prevalence of HCV and evaluate candidate risk factors among Lebanese population presenting to all laboratory units in the country over 2 weeks, out of 2982 individuals recruited in the study the overall seoprevalence reported was 0.7%. Blood transfusion, and haemodialysis were shown to be significant risk factors (Baddoura, Haddad, & Germanos, 2002).

In a study of low risk group of 266 healthy Libyan subjects, including 79 blood donors, positive HCV antibody found in 21(7.9%), five of whom were blood donors indicating major implications for blood transfusion (Saleh et al., 1994).

In a population based study in rural area in Egypt where intravenous treatment for schistosomiasis was given in the 1960s and 1970s, a total of 2,425 village residents aged 18-65 years were included, overall HCV prevalence was 18.5%, with 45% among males above 40 years of age, and 30% among females above 50 years (Mohamed et al., 2006).

In a study of the epidemiology of hepatocellular carcinoma and its relation to viral hepatitis among 1012 cases with HCC in Mansoura- Egypt, the prevalence of HCV among the cases was 76.6% (Abdel-Wahab et al., 2007).

A study done in Yemen comparing the prevalence of hepatitis among 143 patients with liver diseases and 120 healthy individuals, showed a prevalence rate of 37.1% in patients with liver disease and 4.2% in the control group (Al-Moslih & Al-Huraibi, 2001).

2.1.3 Prevalence in countries of the Gulf Cooperative Council (GCC)

In Hail region- Saudi Arabia, a prevalence rate of 5.09% was reported among 8862 subjects tested for anti-HCV antibodies, which was higher than those found in Riyadh and eastern province which could be due to their lower socio economic status, and it was a hospital based study (Mahaba, el-Tayeb Ael, & Elbaz, 1999).

Another study to determine the prevalence of HCV among different ethnic groups attended different outpatient clinics in Jeddah-Saudi Arabia, found an overall prevalence of 6.75% among the whole studied group, 5.9% among Saudi, which is close to the previous study, 22.5% among Egyptians and 2.1% among Yemenis, 3.4% among other Middle Eastern countries and 4.98% among Asian nationalities (Fakeeh & Zaki, 1999).

The non-random selection of samples in the two studies and the fact the studies are hospital based doesn't actually represent the actual prevalence for HCV in Saudi Arabia.

A population-based survey of Saudi children ages 1 to 10 years, reported a lower prevalence of 0.90%, which was lower than that of adults (al-Faleh et al., 1991).

A study aimed to determine Age-specific sero prevalence of HCV in Al - Baha region south-west Saudi Arabia, found that positivity to HCV gradually increases with age, reaching a peak of 5.3% in the 30-40 years age group (al Nasser, 1992).

A study aimed to find out the prevalence of HCV among bilharzias patients in Dammam, Kingdom of Saudi Arabia, reported an HCV prevalence of 17.9% among all patients with Schist-somaiasis with a prevalence of 26.7% among Egyptians and 11.8% among Saudis (Khan, Alkhalife, & Fathalla, 2004).

2.2 HCV prevalence among Blood Donor

Blood donors screening has a great implications on prevalence of HCV among blood recipient especially before the donor screening in 1990. Paid donors were considered a risk for HCV transmission.

A study in Bahrain aimed to find the prevalence of HCV infection among hemodialysis patients, found a prevalence of 0.3% among blood donors as a control group (Almawi et al., 2004).

In a study to assess the effect of blood donation modes on the prevalence of viral markers among Arab first-time blood donors in Kuwait, a total of 26,874 donors were screened, the prevalence of anti-HCV among Kuwaiti national first-time donors was 0.8% while non-Kuwaiti Arab was 5.4 % and it was only significantly higher among replacement (paid) versus volunteer first-time donors (Ameen et al., 2005).

A study aimed to find the prevalence among Omani patients with renal diseases reported a prevalence of 0.9% among blood donors as a control group (al-Dhahry, Aghanashinikar, al-Hasani, Buhl, & Daar, 1993).

The prevalence of HCV among 13,443 blood donors in the eastern province of Saudi Arabia were studied and showed that there was a steady decrease in the anti- HCV rates between 1998 and 2001 (1.04 and 0.59%, respectively) (Bashawri, Fawaz, Ahmad, Qadi, & Almawi, 2004).

A prevalence of HCV infection of 1.5% was reported among 4,818 blood donors at the Riyadh military Hospital, Saudi Arabia (al Karawi et al.,

1992), while a study in Hail region in Saudi Arabia found a prevalence of 4.3% among blood donors which was higher than that reported from other regions in Saudi Arabia (Mahaba et al., 1999).

A retrospective study on voluntary blood donor students at Mansoura University, Egypt, found that the prevalence of HCV positivity was 2.7% (El-Gilany & El-Fedawy, 2006).

In Syria 0.95% of blood donors were reported to be positive for HCV (Othman & Monem, 2002).

The prevalence of HCV infection among 16,084 blood donors in Lebanon was studied and found a steady decline from 1.22% in 1997 to 0.16% in 2003 (Irani-Hakime, Musharrafieh, Samaha, & Almawi, 2006).

Seropositivity of 0.44% was reported among 16,250 blood donors in India (Thakral et al., 2006).

2.3 Prevalence among Household contacts of HCV- infected individuals

A study in Al Baha region, south-west Saudi Arabia reported statistically significant association when comparing positivity in family members of HCV-positive index cases with those negative index cases and concluded that intrafamilial transmission might be a route of spread among the Saudi population (al Nasser, 1992), although the number of positive cases matched with negative index cases was very small to conclude while another study in Saudi Arabia aimed to evaluate the intrafamilial transmission of HCV, concluded that there was no significant route of transmission among Saudis (Arif, al-Swayeh, al-Faleh, & Ramia, 1996).

Similar findings were found in Tunisia where the prevalence among household contacts of HCV positives was not significantly higher than that in the whole study population (Mejri et al., 2005).

In a case-control descriptive study to determine whether HCV infection of index cases increases intrafamilial transmission of HCV in southern Iran, household contacts of positive HCV cases matched with blood donors as a control group, found only 1.33% positivity among household contacts and 1% among the control group which was not statistically significant (Hajiani, Masjedizadeh, Hashemi, Azmi, & Rajabi, 2006).

A study to determine sexual and intrafamilial transmission in family member (spouses and children) of Egyptian HCV patients found that HCV antibodies were detected in 14% of the spouses, all of whom were also positive for HCV-RNA and the serotypes were identical in HCV seropositive patient-spouse pairs. None of the children were found to be positive and a highly significant association was found between both the age of the spouse and the duration of marriage (Madwar, El-Gindy, Fahmy, Shueb, & Massoud, 1999). In a study, to find out the role of intrafamilial HCV transmission among families of 2,856 HCV positive cases in Italy, anti-HCV was detected in 2.1% of the members of their original families, 13.8% of sexual partners and 2.3% of their offspring (Minola, Baldo, Baldovin, Trivello, & Floreani, 2006).

A cross sectional study in Karachi-Pakistan, investigated non-sexual risk of intrafamilial transmission of HCV among seropositive Thalassaemic index patient living in the same household. Using multilevel logistic regression, it was found that seroprevalence of 20.5% among household contacts who were tested with high odds of being HCV RNA positive (OR=2.09; 95% CI: 1.02 to 4.28) (Akhtar & Moatter, 2007).

2.4 HCV prevalence among high-risk groups

2.4.1 Prevalence among patients with hereditary blood diseases:

A study on 129 beta-Thalassaemia major patients seen between 1965 and 1995 in Kuwait, found 33% were HCV seropositive (al-Fuzae et al., 1998).

In a study in Bahrain to determine the prevalence of HCV among 242 Bahraini children with hereditary hemolytic anemias, 40% were seropositive among the multi-transfused patients and only one of the non transfused group (al-Mahroos & Ebrahim, 1995).

In a cross sectional study of 559 Thalassaemic Iraqi children between the age 2-10 years who received repeated blood transfusions, the seroprevalence was found to be 67.3% (Al-Kubaisy, Al-Naib, & Habib, 2006).

A study in Israel, evaluated 239 hemophiliac Patients who received concentrated clotting factors before 1987, of which 179 (75%) were found to be HCV positive (Maor et al., 2006).

Concluded that patients with hereditary blood diseases who require repeated blood transfusions are at high risk of acquiring HCV.

2.4.2 Prevalence among Hemodialysis patients

Patients on hemodialysis belong to the high-risk group of HCV infection. The prevalence of HCV infection in dialysis patients ranges from 4% to more than 70% in some countries. The main reasons for such a high incidence of infections are, lack of standard infection precautions, inadequate disinfection procedures of dialysis machines and other medical equipment (Sulowicz, Radziszewski, & Chowaniec, 2007).

A study aimed to assess the prevalence among 81 Bahraini and 34 Saudi patients on hamodialysis, compared to 7,714, and 2,330 blood donors respectively found a prevalence of 9.240% vs. 0.3%, ($P < .001$). Compared

to Bahrainis, a higher prevalence of HCV was found among Saudi patients (7.4% vs. 14.7%) (Almawi et al., 2004).

In a study, to determine the prevalence among Omani patients with various renal disease, a prevalence of 26.5% was reported among patients on haemodialysis, 13.4% among kidney transplant patients, and 1% among non-dialyzed, non- transplanted renal disease patients, compared to none of the control group (healthy medical students and 0.9% of blood donors) (al-Dhahry et al., 1993).

A study in Saudi Arabia, found a prevalence of HCV infection of 55.7% among hemodialysis patients (Shobokshi et al., 2003), while in Hail region a prevalence of 6.9%, was reported which was lower than those from other regions in Saudi Arabia (Mahaba et al., 1999).

2.4.3 Prevalence among injectable drug users (IVDUs)

Injectable drug users are among the highest risk group for acquiring HCV worldwide.

The prevalence of anti-HCV among a population of IVDUs in Jeddah, Saudi Arabia, was found to be 74.6%, while in drug dependent patients who did not use the intravenous route was 10.5% (Njoh & Zimmo, 1997) while in another study in Saudi Arabia, a seroprevalence of 14% was found (Shobokshi et al., 2003).

Among Syrian IVDUs, the prevalence of HCV seropositivity was reported to be 60.5% (Othman & Monem, 2001).

In a community-based study in Tehran -Iran, using oral mucosal transdate for HCV detection, 52% of IVDUs were found to be positive (Zamani et al., 2007).

A cross-sectional study to determine the prevalence and the risk factors among injecting buprenorphine drug users in Singapore, found a rate of 42.5 % (Winslow et al., 2007).

In a cross sectional study in Australia to assess the prevalence of blood-borne viruses and associated risk factors among prison entrants at seven Australian prisons across four states, the seroprevalence of HCV antibody was found to be 34%, while it was 56% among injecting drug users. Concluded that the prisoner populations are vulnerable to blood-born virus infection particularly HCV and should be included in routine surveillance programs (Butler et al., 2007).

A study on street-recruited injecting drug users in Pakistan, found 60% Seroprevalences, with 20% HIV co-infections (Achakzai, Kassi, & Kasi, 2007).

In a study describing epidemiology of HCV among 1,380 selected injecting drug users, in Canada, the overall HCV prevalence rate was 60.4% (Roy et al., 2007).

A study in Switzerland to determine the prevalence of HCV and HIV among patients entering heroin- assisted treatment between 2000 and 2002, 78.3% of patients were HCV positive and 12.6% were HIV positive. Comparison to cohorts during 1994-1998, found no significant reduction in HCV and HIV prevalence (Gerlich et al., 2006).

2.4.4 Prevalence among non-injecting drug users (NIDUs)

A systematic review examined the evidence on the prevalence of HCV in NIDUs who sniff, smoke or snort drugs such as heroin, cocaine, crack or methamphetamine which included Twenty-eight eligible studies published from January 1989 to January 2006, found the prevalence in these

populations to range between 2.3 to 35.3%. The causal pathway to infection was reported to remain unclear (Scheinmann et al., 2007).

2.4.5 Prevalence among Tattooed individuals

In a study to determine the prevalence of HCV among 1897 young adult male military recruits in southern Taiwan, out of 25.1% who had tattoo, 2.5% were positive for HCV antibody, and 2.1% were positive for HCV RNA. The odds ratios for positive HCV infection status was 5.0 (95% confidence interval, 1.83-13.67), for those with tattoos, compared with those with no tattoos (Shi, Lee, & Lee, 2007).

2.4.6 Prevalence among health care workers

In a prospective study conducted between 1993 and 1996 on a cohort of 24 health care workers reported needle stick injuries from 25 HCV-RNA viremic patients in Kuwait, after a follow up of 6 months, none of the health care workers exposed acquired HCV (Hasan et al., 1999).

A study in Damascus-Syria found the overall prevalence of HCV among 186 health workers to be 3%, which was higher than among the general population (1%) (Othman & Monem, 2001).

A study investigated the occupational risk of HCV among Saudi medical staff at two university teaching hospitals. Three groups were involved, final year medical students, medical staff, and a control group. Results showed no significant difference in markers of HCV among the three groups investigated with a prevalence of 1.7% among the controls, 1.9% among the medical staff and 2.6% among medical students (al-Sohaibani, al-Sheikh, al-Ballal, Mirghani, & Ramia, 1995). Concluded that health care workers are not at significant risk for HCV transmission.

2.4.7. Prevalence among sexual contacts of HCV-infected individuals

The role of sexual transmission is still controversial.

In a study to detect the presence of HCV in the saliva or semen of 14 HCV RNA serum positive patients, using PCR, failed to detect HCV genome in their saliva or semen (Fried & Hadziyannis, 2004).

A study to determine the exact potential and risk factors of interspousal transmission in Thailand, tested 160 infected spouses with a mean duration of exposure of 23 ± 5 years, and found only 3 (1.9%) to be positive for anti HCV, while none had the same HCV strain, he couldn't determine evidence for interspousal transmission (Boonyarad et al., 2003).

In a prospective study to determine the risk of sexual transmission, 895 monogamous heterosexual partners of HCV-infected patients were included, all of them denied having anal intercourse or having sex during menstruation, or having injectable drug and sharing personal hygiene and denied using condom during the follow up period. Only 776 couples followed for ten years prospectively. The average weekly rate of sexual intercourse was 1.8. Only 3 spouses became HCV-RNA positive after 7, 8, and 9 years respectively, with the incidence rate of 0.37 per 1000 person-years. One had different genotype from that of the partner; two cases have similar genotype but sequence analysis of the genome, found different isolates. Interspousal transmission of HCV was ruled out in all three cases after genotyping (Vandelli et al., 2004).

In a study aimed to detect the role of sexual transmission of HCV among spouses of 600 positive HCV patients in Turkey, anti HCV was positive in 12 (2%) of the spouses, and none of the seronegative spouses developed seroconversion in the three year follow up period (Tahan et al., 2005).

On the other hand using data from surveys on HCV prevalence conducted in 1997 in Nile delta- Lower Egypt and Assiut- Upper Egypt using the available information on risk factors for community acquisition and

serological outcomes to estimate the risk of transmission between spouses. The probability of wife to husband transmission was estimated to be between 34% and 10% for anti-HCV-positive wives with and without detectable HCV RNA, respectively. The probability of husband- to-wife transmission was estimated to be 3% and 0% for husband with and without detectable HCV RNA, respectively at the time of the survey. The overall estimation of interspousal transmission was 6 % which is higher than other studies, could be due to higher prevalence in Egypt or other factors such as household transmission risk (Magder et al., 2005).

In a study to find out the prevalence of sexually transmitted diseases (STDs) among illegal, female sex workers in Israel, HCV was found in 9% of them (Cwikel, Lazer, Press, & Lazer, 2006), while in Syria a prevalence of 1.96% was found among the prostitutes group (Othman & Monem, 2002).

2.4.8 Prevalence among pregnant patients and the role of vertical Transmission

A study to determine the prevalence of HCV among pregnant women in three rural Egyptian villages in the Nile Delta- Egypt, found a prevalence of 15.8% (Stoszek et al., 2006), while a study in Saudi Arabia found a prevalence of 0.7%, the difference explained by the higher prevalence among rural Egyptian (Shobokshi et al., 2003).

In a study aimed to estimate the prevalence of HCV among pregnant women and rate of mother-child transmission in Ouagadougou, Burkina Faso, 4/200 (2%) of pregnant women were positive and one case of mother-child transmission was found with high titer of HCV RNA (Serme et al., 2006).

In a study in Brazil aimed to evaluate the prevalence of antibodies to HCV among pregnant women, and the rate of vertical transmission, among 1,090 mothers surveyed, 29 (2.66%) were found to be positive and the vertical

transmission rate was 5.56% after six months of follow up (Peixoto et al., 2004).

A study in Portugal, found a prevalence of 0.1% among pregnant mothers (Figueiro-Filho et al., 2007), while a study in Switzerland, found a crude Prevalence of 0.71 % (Prasad, Massery Spicher, Kammerlander, & Zwahlen, 2007).

In a study to determine the rate of mother-to-child transmission of HCV in Athens-Greece, the children were followed up for a minimum of 18 months for evidence of HCV infection, Vertical transmission was restricted to infants born to viraemic mothers and the rate was 3.6% (Syriopoulou et al., 2005).

A study on 3,491 pregnant Iraqi women, an HCV seroprevalence of 3.21% was found. It was significantly higher in those with history of previous miscarriages (Al-Kubaisy, Niazi, & Kubba, 2002).

A study in Italy evaluated the prevalence of the HCV infection among pregnant patients and the incidence of vertical transmission. Mothers and children were tested for the presence of HCV-RNA within one week after delivery. Out of 13,025 women, 110 (0.8%) were found positive for anti-HCV antibodies, 3 children were viremic at the end of follow up period at 18 months (Veronesi et al., 2007).

2.4.9 History of surgery as a risk of HCV transmission:

In a study aimed to detect HCV genome on digestive endoscopes, in their gastric juice and saliva and biopsy-forceps used in 48 HCV patients. HCV genome was detected by PCR in 13 (27%) of cases in the biopsy-suction channel and 3 (6%) biopsy forceps immediately after the endoscopic procedure, and was undetectable after completion of the disinfection procedure, concluded that the infected gastric juice may play a role in the

endoscopes contamination and the complete disinfection procedure, effective in eliminating the virus (Becheur et al., 2000).

Other possible modes of transmission during surgical procedures; in a study, a cluster of 33 patients with HCV infection was identified at a medical center in Israel, who had been anesthetized by an anesthesiologist who was an injection drug user. Results showed that all patients had HCV with similar genotype, suggesting that the anesthesiologist may have transmitted the HCV infection, and concluded iatrogenic cause of transmission (Shemer-Avni et al., 2007).

A retrospective study in Melbourne, Australia to determine the level of exposure to medical and surgical procedures among Australian patients whose mode of HCV transmission was unknown. 53 Out of 54 individuals had at least one medical/surgical procedure and/or invasive dental work, and a number of endoscopic procedures. It was concluded that disinfections and sterilization protocols, re-use of medical equipments such as multi-dose vials and anesthetic circuits have a role in HCV transmission (Trasancos, Kainer, Desmond, & Kelly, 2001)

CHAPTER 3
RESEARCH METHEDODOLOGY

3.1- Research design

This study is a cross-sectional descriptive conducted to find out the sero-prevalence of hepatitis C among couples attending the national premarital screening program at the primary health centers in Bahrain.

3.2- Target population

All Bahrainis intending to attend PMC services to get the health certificate prior to official marriage procedure.

3.3- Sample

All Bahraini couples undergoing premarital testing including non- Bahraini partners living in Bahrain and Bahrainis intending to marry from outside the country were included in this study during the period of April 1st to May 15th 2006.

All couples previously tested for premarital screening less than three months prior to our study were excluded from this study according to the policy of PMC not to test candidates who were screened less than 3 months as the incubation period of most of the blood born diseases within 12 weeks.

3.3.1- Setting

All the twenty-two maternal and child health units based in the local health centres in Bahrain.

All candidates intending to get PMC health certificate from all hospitals in Bahrain including the private should attend their local health centres. The community nurses, who were involved in this program, were informed about the study and a training workshop was conducted by the researcher for all participating community nurses to explain the criteria to be used for inclusion and exclusion, they were also trained on how to fill the PMC form and specifically add the place of birth to each form in addition to the nationality and the additional HCV serum assay for all candidates. On the

day of visit to the health centre, the Ministry of health form listing all physical examinations and blood tests required was shown to the couples, and an individual consent form explaining the agreement on the listed blood tests or any other tests found to be necessary were signed by each partner. At the same time, questions was completed by the nurse, which addressed various issues including Socio-demographic data, past medical history including blood transfusion, surgical history and risk behaviours such as history of sexually transmitted diseases, and substance abuse.

Blood was collected for routine testing requirements as well as a separate 5 ml serum for anti-HCV testing. The couples normally returned for another appointment 10-14 days later. At this time laboratory results were discussed with the couples separately then together, and the necessary counselling were given while referral to the concerned department was completed.

3.3.2- Sampling method

A convince sample was selected according to past records that showed the number of registered marriages at Bahrain court in the years 2004 and 2005 were 6000-7000 marriages yearly. Ministry of health Statistics showed that 7000 attended primary health care centres for premarital screening in 2005.

The study was conducted during the month of April and May 2006 based on expected high rates of marriages during these two months of 2006.

3.3.3- Sample size

The Sample size was calculated according to the estimated reported prevalence of HCV by WHO 1997 in some regional countries with a range between 0.9%-7.9% and in GCC countries 0.8%-3.3% and some studies in Saudi Arabia which reported prevalence of 5.1-5.9% (al Nasser, 1992; Fakeeh & Zaki, 1999; Mahaba et al., 1999) as well as unpublished studies, personal communication, study on prevalence of HCV among Kuwaiti pre-

employment was 3.5% and premarital screening in Abudabhi-UAE, which showed a prevalence of 3%.

The power analysis and sample size (PASS) statistical package which is part of the number Cruncher statistical system (NCSS 2000) was used for sample size estimation, using a base line proportion of 0.035, with 95% confidence interval, precision 0.01 and population of 7,000, the required sample size was estimated to be 1070 individual. Therefore the subjects included in this study (n=1070).

3.4- Determination of HCV positivity

3.4.1 Blood testing

Blood samples were sent to the Ministry of Health Public Health laboratory for the anti-HCV screening test. The screening test used either of two, enzyme immune Assays (EIA) third generation Kits: Hepanostika HCV ultra-Beijing-China, and ARCHITECT- Anti HCV (ABBOTT-Germany). Both kits are qualitative immunoassay to detect antibodies to Hepatitis C in human serum or plasma with a sensitivity of 99%, and a specificity of 99.8% and 99.1% and 99.6%, respectively.

Samples identified as negative with one EIA were, considered negative. Samples identified as weak positive, doubtful or positive in the screening EIA were retested with the alternate EIA kit as an internal quality assurance. Those still showing positive or doubtful were subjected to a supplemental confirmatory test using INNO-LIA HCV score (Innogenetics N.V Belgium) which is a third generation line immunoassay for detection of antibodies to HCV with a sensitivity of 100%, and a specificity of 92-94.5%. If the result was negative it was labeled as anti HCV negative, if positive was labeled as anti HCV positive after testing with the control kit as quality assurance.

Indeterminate samples were further subjected to amplification test with RNA reverse transcriptase polymerase chain reaction molecular testing RT-PCR. External quality assurance done twice a year on EIAs, Innolia and PCR testing.

3.4.2- The structured questionnaire

A questionnaire was designed to find out the associated possible risk factors of acquiring HCV infection among the positive cases based on a thorough literature review. The couples completed a questionnaire which included two components, socio-demographic information, and risk factors such as history of exposure to blood transfusion, IVDU, surgery, history of liver disease both personal and family, needle stick injury, sexual risk factors such as homosexuality, unprotected sex or multiple partners, history of tattooing, piercing and occupational risks (Appendix 1).

3.5- Data collection

During the period of data collection, the investigator obtained information on couples attending the health center for premarital testing on a weekly basis from the PMC forms that contains all data about socio-demographic characteristics and risk factors. Blood test results were obtained directly from the Public Health laboratory of the Ministry of health, on a daily basis. Addresses and contact number were obtained for all positive cases. The researcher contacted positive cases by telephone to request their attendance for an interview to complete a questionnaire that enquire about some possible risk factors of acquiring HCV infection. During the interview the candidate was informed about the result and the researcher filled the questionnaire form.

3.6 Validation of the questionnaire:

The questionnaire used for positive cases:

The questionnaire went through reliability testing.

Reliability of the tool could not be measured as it was only addressing socio-demographic characteristics and possible risk variable.

Reliability testing using statistical method was also difficult to be measured using Cronbach α .

To determine face validity, the questionnaire was established by the researcher based on a thorough literature review, reviewed and approved by two experts in the field of hepatitis C to identify relevance to the objectives of the study subject needed to be evaluated, while content validity was reviewed by an expert in the field to validate the content. The academic research committee at Arabian Gulf University approved the questionnaire.

The PMC form:

The ministry of health PMC form was reviewed and validated for its content as well as face content by two experts in the field. The sensitivity of questions related to STDs and substance abuse were verified and the training workshop was conducted to all concerned community nurses accordingly.

3.7- Data analysis and management

Data were coded and analyzed by the researcher using statistical product and service solutions (SPSS) version 15 for analysis. A comparison test with p-value less than 0.05 was considered statistically significant. Variables were presented as frequency for categorical variables and means with standard deviation (SD) for quantitative variables. Chi-squared (χ^2) test to determine the association between two categorical variables, the variables (gender, age, place of birth, marital status, occupation, level of education, and risk factors

and risk behaviors) that have an association with hepatitis C infection matched anti-HCV negative controls.

Age was grouped in 5 groups of 10 years interval while education level was grouped into 4 groups and working status was grouped in 7 groups.

3.8- Ethical consideration

The study proposal was approved by the academic Committee at the Master program of health policy and population studies at the Arabian Gulf University as well as Ministry of Health research committee. A permission letter was sent and agreement was obtained from the public health laboratory, Maternal and child health (MCH) Directorate, and Primary care Directorate (Appendix 3.2-3.5).

On the day of the visit to the health centre, a form listing all the physical examinations and blood tests required was shown to the couples, and an individual consent form for blood testing was signed by each. At the same time, the nurse filled a questionnaire. A separate candidate consent form for additional HCV testing was not found to be required.

Before interviewing HCV- positive candidates they were informed about the nature of HCV, its transmission and clinical consequences and ensuring confidentiality. Written consent was obtained from candidate for further interviewing to determine possible source of their HCV infection. (Appendix 3.1)

CHAPTER 4

RESULTS

In this study a convenience sample of 1,070 individuals who were attending the premarital screening were tested for HCV to determine its prevalence. This information is central to the reconsideration of screening policy and whether HCV poses a significant risk to couples planning to get married, and the society as a whole.

Based on the result of our study the prevalence of HCV among the 1,070 candidates attending premarital screening in Bahrain was 1.5%, with a higher prevalence among among males (1.8%), as compared to females (1.1%) which is considered a low prevalence according to the world health organization (NIH, 2002).

4.1 Socio-demographic characteristics of the sample

4.1.1 Age / Gender distribution

Of the 1,070 candidates screened over a six weeks period in 20 health centers, 546 (51%) were males ranging in age between 18 and 74 years and 524 (49%) were females ranging between 14 and 54 years with a lower mean age (table 1). A total of 1004 (93.8%) were born in Bahrain, 55 (5.1%) were born in another Arab countries and only 11 (1%) were born in non-Arab countries.

The age of the study sample was grouped into five groups each of ten years. The age distribution of females in the sample tended to be lower than that of the males. While the majority of females (60.3%) fell in the age range of 14 and 23 years, the majority of males (59%) ranged in age between 24 and 33 years. In addition differences were evident in the other age groups. Thus there was about three times (12.3%) the number of males in the age group of 34-43 as compared to females (4.6%) in the same age group. (Figure 3).

Table 1: The mean age / Gender distribution of the total sample

Gender	n (%)	Age (Years)	
		Mean $\pm$ SD	Range
Male	546 (51)	28.09 $\pm$ 7.641	18-74
Female	524 (49)	23.69 $\pm$ 5.633	14-54
Overall	1070	25.9 $\pm$ 7.1	14-74

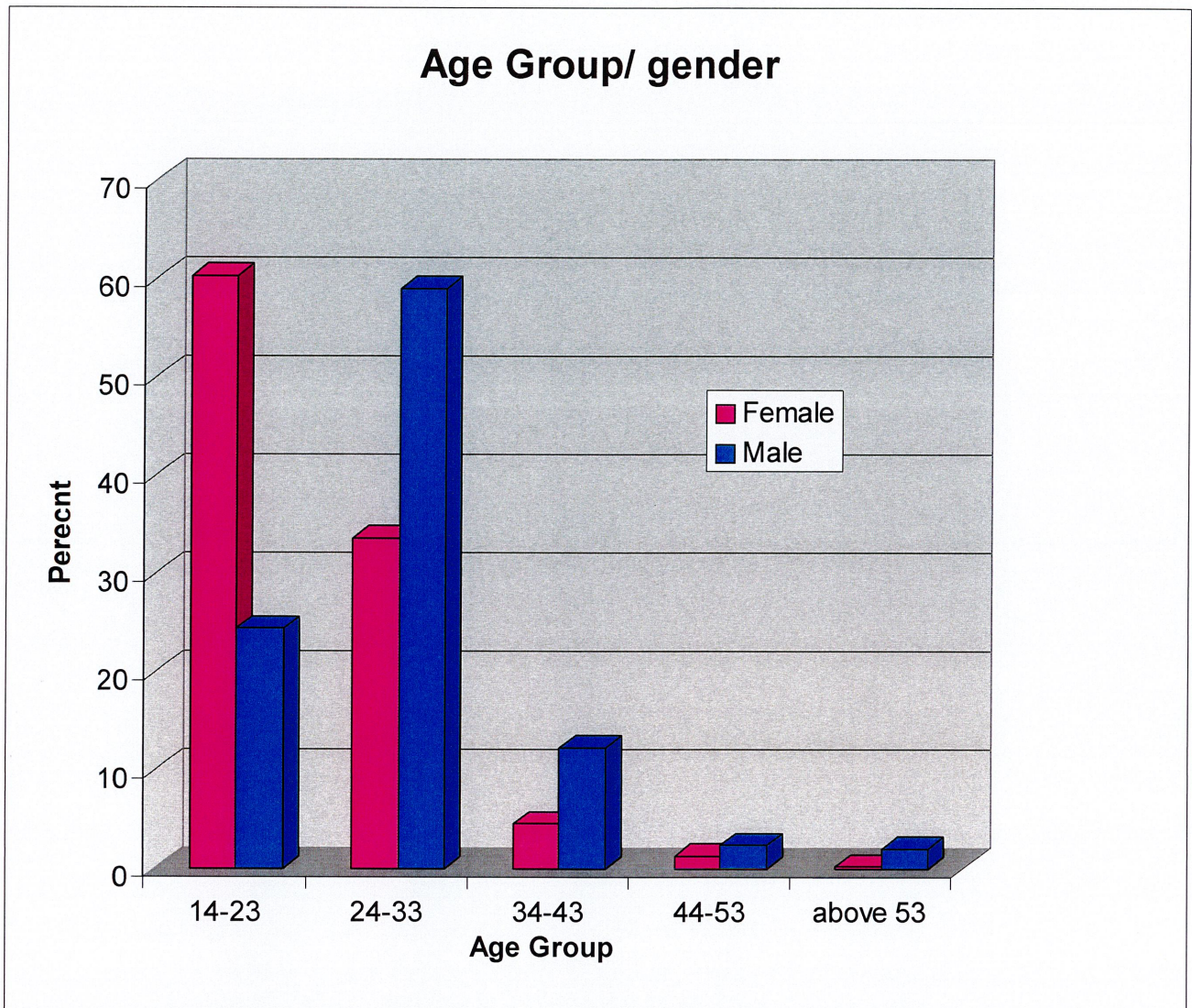


Figure 3 Distribution of Age group by Gender in the total sample

4.1.2 Education level

The majority of candidates in the study sample, both males (55.3%) and females (70.8%) had completed secondary and diploma degree only. It is also noted that a larger percentage of males (29.5%) had completed university or higher qualifications as compared to females (18.7%) in the sample. Differences between gender in educational level in other categories (read and write, and primary, intermediate were not notably different.

4.1.3 Working status

Over one third of the sample stated in the interview that they were employee (n= 380; 35.5%), which included all office jobs; there were 253 (23.6%) students studying in high school and university. Professional jobs such as physicians, Lawyers, engineer, bankers constituted only 83 (7.7%), laborers were 136 (12.7%) and 137 (12.8%) were unemployed.

4.1.4 Marital sequence

The majority of the candidates attended for their first marriage (n=926; 86.5%), only 133 (12.4%) attended for their second marriage. Eight candidates attended for their third marriage, only 2 candidates for the fourth and one only for his sixth marriage (Table 2).

Table 2: Sociodemographic distribution of the total sample:

Sociodemographic characteristics	N (%)	P value
Education:		0.494
Read and write	13 (1.2)	
Primary, intermediate	125 (11.7)	
Secondary	673 (62.9)	
University and higher	259 (24.2)	
Total	1070 (100)	
Working status:		1.000
Professional	83 (7.75)	
Employee	380 (35.5)	
Private business	18 (1.68)	
Laborer	136 (12.7)	
Military	63 (5.88)	
Student	253 (23.6)	
Unemployed	137 (12.8)	
Total	1070 (100)	
Sequence of marriage:		0.640
First	926 (86.5)	
Second	133 (12.4)	
Third	8 (0.7)	
Fourth	2 (0.2)	
Sixth	1 (0.1)	
Total	1070 (100)	

4.2 Risk factors identification

During the first visit, all individuals included in the sample were interviewed by the community nurse to collect data for the premarital examination form. These questions included information on high risk factors and behaviors for HCV infection, which included history of surgery, blood transfusion, history of STDs, and substance abuse.

Of the studied individuals only 15.3% admitted having history of surgery, while only (1%) had received blood transfusion.

Data concerning STD and substance abuse was more difficult to collect. In some instances the interviewing nurse was shy to pose the question to the candidate and in others, the candidate would not give an answer, thus in 22.6% of the interviewers, data relating to substance abuse was missing while 18.6% of candidates gave no answer to history of STD. Of those who answered, only 0.1% of candidates admitted a history of substance abuse and 0.7% had a history of STD (Table 3).

Table 3: Risk factors distribution among total sample:

Risk factors	History	N (%)
History of surgery	Yes	164 (15.3)
	No	906 (84.7)
History of blood transfusion	Yes	11 (1.0)
	No	1059 (99.0)
History of Substance abuse	Yes	1 (0.1)*
	No	827 (99.9)*
	Total	828
	Missing*	242
History of Sexually transmitted diseases (STDs)	Yes	7 (0.8)*
	No	864 (99.2)*
	Total	871
	Missing*	199

* Valid percent * No answer

4.3 Descriptive statistics of the positive cases of HCV

Initial screening of 1,070 candidates by the first EIA kit revealed 18 positive candidates. Only 16 were positive when tested with the alternate EIA kit, by INNO-LIA, and by PCR, which showed that only 16 candidates were confirmed to be positive for hepatitis C virus infection. Thus, the prevalence rate based on these numbers was 1.5%.

The mean age of the positive candidates was 31.5 ± 8.9 which was higher than the mean age of the study sample 25.9 ± 7.1 (Table 4).

A higher number of males were positive 10/16 (62.5%) in comparison to females, however the difference was not statistical significant ($P = .355$).

The mean age of positive male candidates was 34.7 ± 8 years while that of females was 26.1 ± 8.2 years. Both of these mean ages were higher than the mean ages of males and females, respectively in the total sample.

Table 4: Age/ Gender distribution of the positive cases n=16:

Gender	No (%)	Age (Years)	
		Mean $\pm$ SD	Range
Male	10 (62.5)	34.7 $\pm$ 8.138	22-43
Female	6 (37.5)	26.1 $\pm$ 8.232	18-40
Overall	16	31.5 $\pm$ 8.9	18-43

Frequency distribution of HCV positive cases among different age groups was constructed and the peak age group of positivity was found to be among 34-43 years for both males and females (Table 5, Figure 4).

Prevalence of hepatitis C infection among different age groups was analyzed by the chi-square test using the first age group (14-23 years) as a reference. There was a significant association between HCV and age groups, (χ^2 26.984, $P= 0.000$), with peak prevalence in the age group 34-43 for both males and females (χ^2 13.011 P .000) (Table 8).

Chi-square analysis showed no difference in the risk of HCV infection between males and females (χ^2 .855, $P= .355$) (Table 8). There was no significant association between HCV and gender.

Table 5: Distribution of positive cases in the total sample by age groups and Gender

Age group (years)	No. Examined Males	Positive cases		No. Examined Females	Positive cases	
		No	%		No	%
14-23	133	2	1.5	316	4	1.3
24-33	322	2	0.6	176	1	0.6
34-43	67	6	8.9	24	1	4.1
44-53	13	0		7	0	
> 53	11	0		1	0	

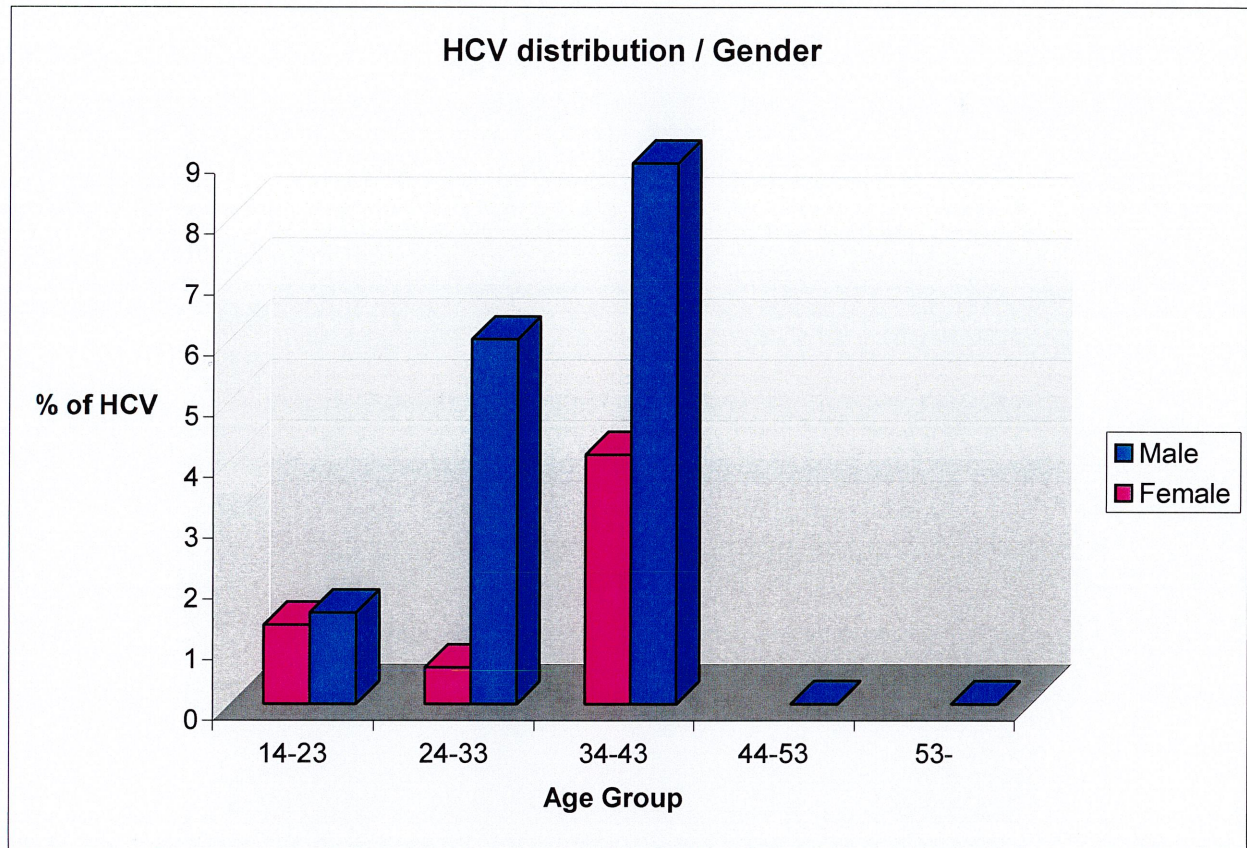


Figure 4 HCV distributions according to Age group and Gender

The majority of candidates with positive HCV antibodies, 14 (87.5%) were born in Bahrain the remaining two (12.5%) candidates were born in Egypt. However such finding was not statistically significant (χ^2 21.698 P =0.246) (Table 8).

When comparing the educational level of positive candidates the majority of cases (81.3%) had received up to secondary education. This was followed by that with university education (12.5%) only one of the candidates had intermediate level. These differences were shown not to be statistically significant (χ^2 2.397 P = 0.494).

When analyzing the working status of positive candidates it was apparent that non-professional employees (7/16; 43.7%) and students (5/16; 31.25%) constituted the majority of positive candidates. Among the positive, professionals (2/16; 12.5%), none were employed in a high-risk job. Of the remaining two positive candidates, one was a laborer and the other unemployed (Table 6).

Chi-square analysis showed no significant difference between professions in the prevalence of HCV infection (χ^2 34.188 P = 1.000) (Table8).

All the candidates with positive HCV attended for their first marriage (Table 6).

Table 6: Other socio-demographic characteristics distribution

		N (%)
Place of Birth	Bahrain	14 (87.5)
	Egypt	2 (12.5)
Level of Education	Primary, intermediate	1 (6.3)
	Secondary	13 (81.3)
	University and higher	2 (12.5)
Occupation	Professional	2 (12.5)
	Employee	7 (43.7)
	Laborer	1 (6.25)
	Student	5 (31.25)
	Unemployed	1 (6.25)
Marital status	First time	16 (100)

4.4 Risk factors distribution in relation to positive HCV candidates

Analysis of the risk factors and risk behaviors of candidates with positive HCV antibodies showed that history of surgery and blood transfusion were the main risk factors, 8 (50%) admitted history of surgery and 4 (25%) had received blood transfusion, two of them during surgery. Of the remaining positive candidates three denied any of the risk factors, while the other three gave history of risk factors; one admitting history of Tattoo, another of substance abuse, while the third unprotected multiple sexual encounters, STDs, and body piercing (Table 7).

Of the eight positive HCV candidates with history of surgery, five were performed in Bahrain, four of which were performed prior to 1991 the date blood donor introduced, the date at which HCV testing was implemented for blood donors in Bahrain. Two of these candidates had received blood transfusion during surgery. Of the three candidates operated on outside of Bahrain, two candidates were operated on in India and one in Syria; none of these candidates required a blood transfusion during surgery.

HCV positive candidates with a history of blood transfusion included two candidates who received their transfusions in Bahrain prior to 1992 during surgery; one who received a transfusion in Syria and the last received it in Egypt (Appendix 4.5).

Table 7: Risk factors distributions among the positive candidates:

Risk factor	Yes n (%)	NO n (%)
Surgery	8 (50)	8 (50)
Blood transfusion	4 (25)	12(75)
Sexually transmitted diseases (STDs)	1 (6.3)	15 (93.8)
Substance abuse	1 (6.3)	15 (93.8)
Tattoo	1 (6.3)	15 (93.8)

4.5 Risk factors association with HCV infection

There was significant association between HCV infection and history of surgery (χ^2 15.047 P = .000).

History of blood transfusion was significantly associated with HCV infection (χ^2 91.738 P =.000).

During initial premarital visit 199/1070 candidates an answer was not available to history of sexually transmitted diseases, while 7/871 answered yes, of those one found to be positive, and gave history of gonorrhea.

History of STDs was found to be significantly associated with HCV infection (χ^2 6.065 P =. 014).

During initial premarital visit 242/1,070 candidates including the candidates later found to be HCV positive did not have an answer to history of substance abuse while all others (828), answered no.

One of the HCV positive candidates gave history of substance abuse during interviewing the positive cases.

History of substance abuse was significantly associated with HCV infection (χ^2 50.811 P =. 000) (**Table 9**).

Statistical analysis of significance of other risk factors including family history of HCV, unprotected sex, homosexuality, tattooing, and body piercing could not be calculated due to the fact that information related to these factors was not available for all the individuals in the sample since the premarital examination form did not include questions related to these risk factors.

Table 8: Association between HCV infection and socio-demographic characteristics:

Chi Square- *P* value:

Socio demographic characteristics	HCV positive n	HCV negative n	Pearson Chi-Square x² (<i>P</i>)
Gender:			.855(0.355)
Male	10	536	
Female	6	518	
Total	16	1054	
Place of birth:			21.698(0.246)
Bah	14	990	
Non bah	2	64	
Education:			2.397(0.494)
Read and write.	0	13	
Primary and- Intermediate.	1	124	
Secondary.	13	660	
University and higher.	2	257	
Total	16	1054	
Working status:			34.188(1.000)
Professional	3	80	
Employee	6	374	
Laborer	1	135	
Unemployed	1	136	
Student	5	248	
Military	0	63	
Private-business	0	18	
Total	16	1054	

Socio demographic characteristics	HCV positive n	HCV negative n	Pearson Chi-Square x2 (P)
Age:			26.984 (.000)
14-23	6	443	
24-33	3	495	1.351 (.245)
34-43	7	84	13.011 (.000)
44-53	0	20	.271 (.603)
54 and above	0	12	.162 (.687)
Marriage:			2.526 (.640)
First	16	910	
Second	0	133	
Third	0	8	
Fourth	0	2	
Sixth	0	1	
Total	16	1054	

Table 9: Risk factors association with HCV infection

Risk factor	HCV Positive No	HCV Negative No	Pearson Chi-Square x2 (P)
History of blood transfusion:			91.738(.000)
Yes	4	7	
No	12	1047	
Total	16	1054	
History of surgery:			15.047(.000)
Yes	8	156	
No	8	898	
Total	16	1054	
History of substance use:			50.811(.000)
Yes	1	0	
No	15	812	
Total	16	812	
History of STDs:			6.065(.014)
Yes	1	6	
No	15	849	
Total	16	855	

CHAPTER 5

DISCUSSION AND CONCLUSION

5.1- Discussion

This study is the first health centre-based survey on hepatitis C in Bahrain. The study population cannot be considered representative for premarital population in Bahrain, as it was not randomly chosen. It involved all candidates attending for PMC in the period of study from all around the country including public and private sectors. Unfortunately there are no published data from other studies for premarital screening for HCV to compare.

The total sample of this study was 1,070 with 546 (51%) males and 524 (49%) females, the difference in the number being due to the fact that few of the males attended the screening with plans to marry from outside the country, while others did not attend because they had been screened three months prior to the study and thus the study exclusion criteria were applied to them.

The mean age of the sample was 25.9 ± 7.1 years, with a wide range of 14 to 74 years, with a younger mean age in females of 23.69 ± 5.6 years as compared to males, which is consistent with the norms for marriage in the society in Bahrain.

Our sample fairly represents the indigenous population of Bahrain with 93.8% of the sample who were born in Bahrain. In contrast 5.1% of the candidates are immigrants who were granted Bahraini citizenship. Those candidates were possibly exposed to possible risk factors in their countries of origin, which might not be relevant in Bahrain in relation to HCV infection. The remaining 1% of the sample was non-Bahraini.

In epidemiological surveys the marital status is usually included as a variable however considering the cultural norms in our society where

blood donors in Bahrain, and were consistent with prevalence rates reported by WHO for other GCC countries but lower than published studies from Saudi Arabia which are hospital based and did not involve couples attending premarital screening, that showed a range of prevalence between 5.1 and 5.9 % (al Nasser, 1992; Fakeeh & Zaki, 1999; Mahaba et al., 1999).

The low prevalence in our study may be due to the young age of population involved in the study, and the fact that they did not represent a cross section of the whole population.

The pattern of HCV positivity did not follow the expected rise with age as reported by other studies, such as in Turkey where the prevalence was found to be significantly higher in the age group above 50 years (Demirturk et al., 2006). Similar findings were reported among Catalonia population in Spain, (Dominguez et al., 2001). In Tunisia, advanced age was significantly related to HCV infection (Mejri et al., 2005), and in Taiwan, a study reported age more than 60 years was significantly independent risk factor for HCV infection (Lin et al., 2003). The above studies represent wider range of population than our study.

Alter suggested that most HCV transmission occurred in the last 20-40 years and primarily among young adults (Alter, 2007). Results of the current study showed a peak prevalence in the age group of 34 to 43 years old and is consistent with some studies reported in Saudi Arabia where the peak age of prevalence was 30-40 years (al Nasser, 1992). In the United States, a population-based serologic studies conducted during 1988 through 1994, reported that the prevalence was highest among persons who were 30-49 years old, who account for two-thirds of all infections, and lower than average among persons less than 20 and greater than 50 years old (Alter et al., 1999) while the same survey was conducted between 1999 and 2002,

reported a peak prevalence among persons 40-49 years old (Armstrong et al., 2006) and similar findings were also reported in Saudi Arabia where the peak prevalence was between 45 and 54 years (Fakeeh & Zaki, 1999). However a population based study in Lebanon found no significant age differences (Baddoura et al., 2002).

In the current study, when the various age groups were compared, the frequency among the youngest age group 14-23 years was two times higher than those in the age group (24-34 years). This could be due to presence of candidates with hereditary blood diseases (Sickle cell disease), which is common in Bahrain, who required multiple blood transfusions during their childhood, while the age group of 34-43 years was six times higher compared to the youngest age group of 14-23.

This study showed no significant difference in HCV distribution according to gender which was consistent with most reports worldwide (al Nasser, 1992; Alter et al., 1999; Baddoura et al., 2002; Demirturk et al., 2006; Mejri et al., 2005). However a study in Saudi Arabia reported a significant difference in gender distribution with a higher prevalence among males (Fakeeh & Zaki, 1999).

Considering some of the risk factors for acquiring HCV infection, which would be influenced by practices of personal hygiene, one would expect that a higher level of education would influence individual's practice of protective habits. Thus risks from the sharing of shaving razors, piercing and tattoo needles, beauty treatment utensils, and the practice of unprotected sexual contacts are minimized in individuals with the health awareness and educated individuals, this is supported by reports of population-based surveys (Alter, 2002). Interestingly however this study showed no significant correlation between HCV infection and level of education. Our

results showed that the majority of HCV positive cases in our sample had a history of surgery or blood transfusion, both of which are not related to personal health habits and are not subject to control by the candidates. While study in USA reported found having had 12 or fewer years of education was independently associated with HCV infection (Alter et al., 1999), similar findings reported in Taiwan (Lin et al., 2003).

This study showed that the two most significant risk factors were history of surgery (50%) of positive HCV candidates followed by blood transfusion (25%), which is consistent with the finding of a retrospective study done in Istanbul- Turkey, aimed to determine the risk factors of transmission among patients admitted with HCV infection (Karaca et al., 2006).

Although history of surgery was not included in the PMC assessment form, yet our results showed a significant relation between history of surgery and HCV infection.

Others have also reported surgical history as a significantly independent risk factors for HCV infection (Lin et al., 2003; Thakral et al., 2006).

Several studies have attempted to understand the mode of transmission associated with surgery and concluded that disinfections and sterilization protocols, re-use of medical equipments such as multi-dose vials and anesthetic circuits and iatrogenic cause also have a role in HCV transmission (Becheur et al., 2000; Shemer-Avni et al., 2007; Trasancos et al., 2001).

HCV is known to be transmitted by exposure to infected blood; however implementation of HCV screening in blood banks has gradually eliminated the risk of HCV transmission in most countries. Shortage of blood is a global problem, and is more common in developing countries, where transfusion services face difficulties in mobilizing blood and its products at short notice. Since the introduction of anti-HCV screening of blood

donations in 1990 in most countries, the incidence of this infection in transfusion recipients has significantly declined (Schreiber et al., 1996).

In our study 25% of the positive cases gave a history of receiving blood transfusions, half of them had their transfusion in Bahrain prior to 1992, the others had it outside Bahrain later than 1992 when donor screening was implemented. Our results are in agreement with the medical literature, that history of blood transfusion is one of the major risk factors of HCV infection. A study in Lebanon reported blood transfusion as the second risk factor after haemodialysis (Baddoura et al., 2002), in another study it was found to be the second significant factor after Tattoo (Dominguez et al., 2001), while some found it the third after IVDU and high sexual behaviour (Armstrong et al., 2006).

Statistics from Ministry of health blood bank showed that the prevalence of HCV among donors in Bahrain ranged between 0.2% and 0.3% found in the study done on Bahraini donors as control group compared to patients on hemodialysis (Almawi et al., 2004). Our present prevalence rate is almost similar to those reported for developed countries in Europe (Grob & Joller-Jemelka, 1990).

Other studies in the neighboring Arab countries reported variable rates such as Saudi Arabia, between 0.59-4.3% (Bashawri et al., 2004; Mahaba et al., 1999).

Most of the HCV burden in developing countries is related to receipt of unscreened or contaminated blood and unsafe therapeutic injections while in developed countries most of the burden resulted from injectable drug use (Alter, 2007).

A single-institution look back study in Washington, DC to determine the prevalence of HCV infection in children who received transfusions between

1982 and 1992 reported a prevalence of (1.6%) among the 2,758 children tested (Luban, Colvin, Mohan, & Alter, 2007). In contrast to studies from Eastern Mediterranean countries which found high prevalence of HCV among patients with history of blood transfusion due to hereditary blood diseases which might be attributable to the need for repeated transfusion and on emergency basis. In Kuwait a prevalence of 33% was found among β -Thalasemic patients (al-Fuzae et al., 1998), in Bahrain, among multi transfused children with hemolytic anemia's, a prevalence of 40% was found (al-Mahroos & Ebrahim, 1995), and a higher rate (67.3 %) was reported among Iraqi children with β -Thalassaemia (Al-Kubaisy et al., 2006) and an even higher rate of 75% reported in Israel among Hemophilic patients (Maor et al., 2006).

A study among Libyan population, found that 27.8% of the positive cases were registered blood donors which concluded major implications of blood transfusion in high prevalence of HCV (7.9%) (Saleh et al., 1994).

Seven candidates in our study gave a history of STDs of which only one was HCV positive, while only one candidate who was HCV positive admitted history of multiple unprotected sexual encounters and homosexuality.

Long term monogamous heterosexual partners of HCV infected patients are at low risk of acquiring HCV while persons with multiple sexual partners, who engage in unprotected sex, and in those with sexually transmitted diseases, IVDUs, and HIV positive are at higher risk (NIH, 2002).

Alter et al found that high sexual behaviour was the second independent factor associated with HCV (Alter et al., 1999), while Armstrong et al found 20 or more lifetime sex partners were the second significant risk factor for HCV (Armstrong et al., 2006).

Interspousal transmission of HCV is very rare as studies showed (Boonyarad et al., 2003; Tahan et al., 2005; Vandelli et al., 2004). In contrast multiple sexual encounters were reported as high risk for transmission (Cwikel et al., 2006).

HCV is the most common infectious disease among injecting drug users. More than 60 % of IVDUs were shown by some studies to be HCV positive (Backmund, 2007).

In our study 22.6% of surveyed individuals did not answer the question pertaining to substance abuse; however one admitted history of IVD use in the past and was found to be HCV positive. Population based studies in the USA found the illegal drug use was the strongest factor independently associated with HCV infection (Alter et al., 1999; Armstrong et al., 2006). Data from Bahrain drug unit showed prevalence of 30.4% among IVDU users (Health data base system MDIS-HID 2006).

Studies in Arab and Islamic countries found variable rates of prevalence among IVDUs, 14- 74.6% were reported in Saudi Arabia (Njoh & Zimmo, 1997; Shobokshi et al., 2003), 52% in Iran (Zamani et al., 2007), 60% in pakistan (Achakzai et al., 2007), and 60.5% in Syria (Othman & Monem, 2002).

A review of literatures released between 1998 and 2005 on evidence of HCV prevalence among injecting drug user's, showed 50% prevalence rate in 49 countries(Aceijas & Rhodes, 2007).

It is estimated that, in the United States and Europe, 15-30% of people with HIV are also co-infected with HCV. Among those patients, approximately 80% are IVD users, 71% are hemophiliacs, and around 20% are homosexual/bi-sexual men (Pellicano, Fagoonee, Repici, & Rizzetto, 2007).

Using percutaneous procedures such as Tattoo is a known risk factor for HCV transmission especially if needles are inadequately sterile, or frequently shared. In this study one candidate who was HCV positive denied history of other risks except for a tattoo, which she did in India in 1996.

Studies reported evidence implicating tattooing as a risk factor for HCV infection, such as a survey among Catalonia-population in Spain reported the strongest factor associated with HCV was history of Tattoo with OD=6.2.

(Dominguez et al., 2001). Similar findings were reported in Italy, and Brazil (de Nishioka, Gyorkos, Joseph, Collet, & MacLean, 2003; Mariano et al., 2004).

In contrast a study in Houston (USA), concluded no increased risk for HCV infection in low-risk adults based solely on history of cosmetic procedures including tattooing and body piercing (Hwang et al., 2006).

Three candidates denied any history of risk factors, two were from Egypt, cannot remember parentral treatment of Bilharziasis in childhood as some studies showed higher prevalence among those who received treatment for Shistosmiasis and the possibility of shared needles (Khan et al., 2004; Mohamed et al., 2006).

One HCV positive candidate was a young Bahraini female; the possibility of household transmission or beauty treatment could not be excluded.

The prevalence of HCV among candidates attending for PMC who were born in Egypt (2/11) was 18.2%. Similar to a prevalence among Egyptians in rural areas reported in Egypt (Mohamed et al., 2006). Studies in Saudi Arabia have also shown evidence of high rate of HCV infection among resident Egyptians (Fakeeh & Zaki, 1999; Mahaba et al., 1999).

5.2- Conclusion

In conclusion, this study stated the following: the prevalence of hepatitis C virus infection among couples attending premarital counselling in Bahrain in the study period is considered low.

The results clearly demonstrate that with the current screening policy. Risk factors identification only 5/16 (31%) of the positive cases were identified. This urges modification of the policy regarding, high-risk identification in the routine PMC set-up.

This study provides the first local data on possible risk factors identification in this group and can be used for disease prevention and health planning. It enhances further community-based studies to give clearer picture of the magnitude of the problem in Bahrain.

CHAPTER 6

LIMITATIONS, RECOMMENDATIONS AND

POLICY IMPLICATIONS

6.1 Limitations of the study

- 1- The convinces method of sampling, is not representative for as random sampling, that's limit the generalization of data on all candidates attending PMC.
- 2- Lack of local studies on HCV prevalence among population in Bahrain, the sample size was estimated using the prevalence in other neighboring GCC countries.
- 3- The fact that the mean age of our sample 25.9 ± 7.1 years makes generalization of our results and conclusion on all Bahrainis very difficult, as HCV prevalence in most studies in the region increases with age.
- 4- The number of missing answers for STDS question pertaining to substance abuse made the statistical analysis difficult to interpret.
- 5- The number of positive cases was very small, making it difficult for proper statistical analysis.
- 6- Scarcity of references available on screening for HCV in general population, as the majority studied the prevalence among high-risk groups.
- 7- Limited number of studies, on HCV prevalence done in the region.
- 8- Lack of studies on premarital screening of HCV infection for comparison.
- 9- Lack of population based studies to compare, especially in Arab countries, the majority of available studies are either hospital based and non randomly selected and generalization of their prevalence rates are limited.
- 10- The difficulty in obtaining reliability as well as validation of the PMC form.

With all the above limitations, our results should be interpreted with caution.

6.2 Recommendation

This study provides the first local data on hepatitis C in Bahrain that can help in disease prevention.

1- History of Surgery and blood transfusion found to be the most significant risk factors especially if it is done in Bahrain before 1992 or in other developing or under developed countries. Detailed questioning should be included in the risk assessment form including the date and the country.

3- High percentage of missing answers to questions related to history of sexually transmitted diseases and substance abuse, the premarital screening forms should be designed to be filled by the client for sensitive questions and ensure confidentiality.

4- Careful history taking by the community nurses and physicians should be stressed on as with careful questioning, an HCV risk factor can be identified in more than 90% of cases, while in this study the risk factors were identified in 31% of cases only.

5- The PMC form should include other risk factors such tattooing, body piercing, family history of HCV.

6.3 Policy implications

Implications on policy from this study results should be carefully interpreted.

The policy is to continue our current screening protocol for hepatitis C which is screening only those individuals with high risk history.

Revise and evaluate our current premarital assessment forms to optimize the identification of cases with possible risk factors.

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APPENDICES

Appendix 1: Questionnaire▪ **Gender:**

- 1- Male
- 2- Female

▪ **Age:-----**▪ **Place of Birth:-----**▪ **Marriage sequence:**

- 1-First
- 2-Second
- 3-Third 4-More

▪ **Education level**

- 1- Read and write
- 2- Primary, intermediate
- 2- Secondary
- 4- University and higher.

▪ **Occupation:**

- 1- Past -----
- 2- Current -----

▪ **History of blood transfusion:**

- 1- Yes
- 2- No

If yes: When? -----
Where? -----

▪ **History of surgical procedures:**

- 1- Yes
- 2- No

If yes: When? -----
Where? -----

▪ **History of unprotected sex:**

- 1- Yes
- 2- No

If yes:

- 1- Single partner
- 2- Multiple partners.

History of sexually transmitted diseases:

- 1- Yes
- 2- No

- **Homosexuality**

1- Yes

2- No

If yes:

1- One partner

2- Multiple

- **Substance abuse:**

1- Yes

2- No

If yes: 1- Inject able drug use (IVDU)

2- Others

If IVDU: 1- Shared needles:

1- Yes

2- No

- **Family history of hepatitis:**

1- Yes

2- No

If yes:

1- Mother

2- Father

3- Sibling

4- Spouse

5- Others

- **History of tattoos:**

1- Yes

2- No

If Yes

When? -----

Where? -----

- **History of body piercing:**

1- Yes

2- No

If yes:

When? -----

Where? -----

Appendix 2.1 PMC form

Kingdom of Bahrain Ministry of Health Premarital Counseling Services		 مملكة البحرين وزارة الصحة خدمات الفحص قبل الزواج				
Premarital Counseling Form		استمارة الفحص الطبي قبل الزواج				
CPR	الرقم الشخصي	Name	الاسم			
هاتف	هاتف	الجنسية	الجنس			
Phone	Phone	Nationality	Sex			
المنطقة	مجمع	طريق	بنائية			
Area	Block	Road	Bldg			
			شقة			
			Flat			
توقيع مقدم الطلب	أقر بما يأتي على إجراء الفحص الطبي قبل الزواج والذي يشمل فحص أمراض الدم الوراثية (فقر الدم المنجلي والثلاسيميا) والكشف عن أمراض تناسلية معدية مثل (التهاب الكبد ب والإيدز) وأي فحص آخر تكون ضرورية بمعددها الطبيب. هذا وإني على علم بأن الفحص محدود في طبعه كما أن الفحص لا يشمل القدرة على الإنجاب أو ضمان عمل أطفالي من الأمراض. وإني أعطي وزارة الصحة وموظفيها من أي تبعات ناتجة عن هذا الفحص، كما أوافق على مناقشة النتائج مع الطرف الآخر.		إقرار			
Signature of applicant	I hereby give my consent to undertake the premarital examination and counseling which includes genetic blood diseases such as sickle cell and thalassemia, some sexually transmitted diseases and any other test that may be necessary. I understand that the test is limited and will not cover all problems; also, it will not test my ability to have children. I understand that the Ministry of Health will not be responsible for any failure of the results; and the results will be discussed with me and with my spouse.		Consent			
Education Occupation Consanguinity to the partner Sequence of marriage						
Medical / Surgical / Psychological History	H/O Sys. diseases & Surgeries	☐ No ☐ Yes (specify)				
	H/O Blood transfusion *	☐ No ☐ Yes (specify)				
	H/O STD *	☐ No ☐ Yes (specify)				
	H/O Current medications	☐ No ☐ Yes (specify)				
	H/O Family & Genetic problems	☐ No ☐ Yes (specify)				
Risk Behaviour	Smoking	☐ No ☐ Yes	Alcohol	☐ No ☐ Yes	Substance Abuse*	☐ No ☐ Yes
Others						
IF PREVIOUSLY MARRIED Did he/she have any children ☐ No ☐ Yes (specify) Previous child with congenital anomalies ☐ No ☐ Yes (specify)						
LABORATORY INVESTIGATIONS						
HPLC Hb. & indices Blood Grouping and Rh G6PD ☐ Reduced Activity ☐ Normal Activity Rubella (Female) ☐ Immune ☐ Non-immune		VDRL / TPHA ☐ Reactive ☐ Non Reactive HbsAg (Hepatitis B) ☐ Positive ☐ Negative HIV ☐ Positive ☐ Negative Anti HCV Antib. (Hep. C) * ☐ Positive ☐ Negative Others				
* and/or if H/O Haemoglobinopathies or High risk person - Do Anti HCV Antibodies						
CHN Name & Signature	Date	Health Centre				

Appendix 2.2 PMC Lab Tests

Kingdom of Bahrain Ministry of Health DEPARTMENT OF PATHOLOGY		 مملكة البحرين وزارة الصحة		HC NUMBER:	
				C.P.R. NUMBER:	
				PATIENT'S NAME:	
LAB NO.		DOB:	Sex:	Nation:	
CPR checked (Lab tech): ☐ Yes ☐ No		LOCATION:			

CLINICAL SUMMARY:

DATE:

Prenatal Code No:

Doctor's Stamp:

Doctor's Signature:

☐	TEST	RESULT
	Haemoglobin	
	MCV	
	MCH	
	MCHC	
	Blood Grouping and Group Rh	
	HPLC	
	G6PD	

☐	TEST	RESULT
	HBsAg	
	Rubella Antibod. (IgG)	
	VDRL / TPHA	
	HIV Antibodies	
	High Risk Group	
	Anti HCV Antibodies	

COMMENTS:

Signature:

Date:

PREMARITAL COUNSELING

Appendix 2.3 PMC Findings & Signature

CPR		الرقم الشخصي	Name	الاسم
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FAMILY HISTORY				

PHYSICAL EXAMINATION																										
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td>• Height</td> <td>cm</td> </tr> <tr> <td>• Weight</td> <td>kg</td> </tr> <tr> <td>• BMI</td> <td></td> </tr> <tr> <td>• Blood Pressure</td> <td></td> </tr> <tr> <td>• Pulse</td> <td></td> </tr> </table>	• Height	cm	• Weight	kg	• BMI		• Blood Pressure		• Pulse		<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td>• General Appearance</td> <td>☐ Normal</td> <td>☐ Abnormal</td> </tr> <tr> <td>• Thyroid Gland</td> <td>☐ Normal</td> <td>☐ Abnormal</td> </tr> <tr> <td>• Cardio Vascular System</td> <td>☐ Normal</td> <td>☐ Abnormal</td> </tr> <tr> <td>• Respiratory System</td> <td>☐ Normal</td> <td>☐ Abnormal</td> </tr> <tr> <td>• Abdomen</td> <td>☐ Normal</td> <td>☐ Abnormal</td> </tr> </table>	• General Appearance	☐ Normal	☐ Abnormal	• Thyroid Gland	☐ Normal	☐ Abnormal	• Cardio Vascular System	☐ Normal	☐ Abnormal	• Respiratory System	☐ Normal	☐ Abnormal	• Abdomen	☐ Normal	☐ Abnormal
• Height	cm																									
• Weight	kg																									
• BMI																										
• Blood Pressure																										
• Pulse																										
• General Appearance	☐ Normal	☐ Abnormal																								
• Thyroid Gland	☐ Normal	☐ Abnormal																								
• Cardio Vascular System	☐ Normal	☐ Abnormal																								
• Respiratory System	☐ Normal	☐ Abnormal																								
• Abdomen	☐ Normal	☐ Abnormal																								

ASSESSMENT & COMMENTS	
☐ Normal ☐ At Risk (specify)	

MANAGEMENT and INTERVENTION PROGRAMME	
• Contraceptive Methods Discussed	☐ Yes ☐ No
• Health Education Booklet Given	☐ Yes ☐ No
• Vaccination	
• Treatment	
• Scheduled for Revisit	☐ No ☐ Yes, specify the Date
Results were discussed in presence of other party ☐	تم مناقشة النتائج مع كلا الطرفين مجتمعين ☐
Results discussed separately ☐	تم مناقشة النتائج مع مقدم الطلب على حدة ☐
اسم وتوقيع الطرف الآخر والرقم الشخصي Name, signature of other partner and CPR	اسم وتوقيع مقدم الطلب Name & signature of applicant

ADVISE	☐ REVISIT	☐ REFERRED (specify)
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Revisit Date	Name & Sign.
Revisit Notes	

FINAL DECISION					
☐ Certified (Certificate No.: /) Date:	☐ Not certified				
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 30%;">Doctor's Name & Stamp</td> <td style="width: 70%;"></td> </tr> </table>	Doctor's Name & Stamp		<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 30%;">Doctor's Signature</td> <td style="width: 70%;"></td> </tr> </table>	Doctor's Signature	
Doctor's Name & Stamp					
Doctor's Signature					

Appendix 2.4 PMC certificate

KINGDOM OF BAHRAIN
MINISTRY OF HEALTH



مملكة البحرين
وزارة الصحة

Certificate No.	رقم الشهادة	
According to the law No. 11 for 2004 issued on June 22, 2004 on mandatory premarital examination for both genders before getting married, the following partners were examined:	استنادا إلى المرسوم بقانون رقم (١١) لسنة ٢٠٠٤م الصادر بتاريخ ٢٢/٦/٢٠٠٤م بشأن الفحص الطبي للمقبلين على الزواج من الجنسين، فقد تم فحص كل من:	
NAME	الاسم	
C.P.R	الرقم الشخصي	
NAME	الاسم	
C.P.R	الرقم الشخصي	
This was done upon their request and according to the regulations issued by the Ministry of Health. The results were discussed in the presence of both parties, and they were advised accordingly. The decision to get married is solely their own. This certificate was given to them on their request for the formalities of marriage.	وذلك بناء على طلبهما وحسب ما تقتضيه الإجراءات المتبعة لمل هذا الفحص، وبناء عليه فقد تم مناقشة نتائج الفحص مع كلا الطرفين مجتمعين، وتم تقديم النصائح الضرورية والملائمة حسب ما تقتضيه حالتهما، وقرار الارتباط يعود إلى الطرفين. وقد أعطيت لهما هذه الشهادة بناء على طلبهما لإتمام إجراءات عقد النكاح.	
ختم جهة الفحص Examining Facility	ختم وتوقيع الطبيب Doctors' signature & stamp	التاريخ Date
Distribution: ☐ White copy: Ministry of Justice ☐ Blue copy: Husband ☐ Pink copy: Wife ☐ Yellow copy: Examining facility ختم وزارة الصحة للتوزيع: ☐ النسخة البيضاء: وزارة العدل ☐ النسخة الزرقاء: الزوج ☐ النسخة الورديّة: الزوجة ☐ النسخة الصفراء: جهة الفحص		

Appendix 3.1 Consent Form for Candidates with Positive HCV for Interview

مدى انتشار التهاب الكبد الوبائي (ج) لدى المقبلين على الزواج في البحرين بحث ماجستير السياسات الصحية

أجريت هذه الدراسة لمعرفة مدى انتشار التهاب الكبد الوبائي (ج) لدى المقبلين على الزواج في المراكز الصحية في البحرين وذلك لتوفير المعلومات اللازمة لوزارة الصحة لاتخاذ الإجراءات التي تساعد على توفير العلاج وطرق الوقاية من الإصابة.

كما أظهرت نتائج الدراسة إصابتك بعدوى التهاب الكبد الوبائي (ج) سوف أقوم أنا (الباحث) بعرض الأسئلة التالية، وأرجو منك الإجابة وعند وجود أي استفسار لمعرفة السؤال بوضوح لا تتردد في السؤال.

وكما تم الاتفاق مسبقاً بأن هذه الإجابات سوف تدون بدون أسماء والمعلومات تكون سرية لغرض البحث.

شاكرين تعاونك معنا، و تمنياتنا لك بالصحة.

أوافق على إعطاء المعلومات.

التوقيع

الدكتورة فهيمة المطوع
استشاري طب العائلة

Appendix 3.2

سعادة الدكتور الفاضل/ د. فوزي عبد الله أمين المحترم

الوكيل المساعد لشئون التدريب و التطوير- وزاره الصحة

السلام عليكم و رحمة الله و بركاته،،،،،

الموضوع: دراسة مسحية لفحص المقبلين على الزواج لمعرفة مدى انتشار التهاب الكبد

الوبائي س: تداعياته على السياسات الصحية

يسعدني أن أتوجه إلى سعادتك بخطابي هذا متمنيه موافقتكم بشأن الموضوع أعلاه و ذلك بعمل فحص دم لمعرفة مدى انتشار التهاب الكبد الوبائي س للمقبلين على الزواج و تداعياته على السياسات الصحية، إذ إن هذا المسح هو جزء من رسالة الماجستير في السياسات الصحية و الدراسات السكانية و الهدف المرجو من المسح هو معرفة مدى الانتشار حتى يتسنى لوضعي السياسات الصحية إمكانية إضافة الفحص من عدمه للمقبلين على الزواج في مملكة البحرين و تزويد وزارة الصحة بأحدث الإحصائيات من أجل تطوير الاستراتيجيات ووضع الخطط حسب الاحتياجات. متمنيه من سعادتكم التكرم بالموافقة على تنفيذ هذه الدراسة.

و تفضلوا بقبول فائق التقدير و الاحترام.

دكتورة فهيمة المطوع

استشاريه طب العائلة

Appendix 3.3

الدكتورة الفاضلة/ عواطف شرف المحترمة

رئيسة الخدمات الطبية للرعاية الصحية الأولية- وزاره الصحة

السلام عليكم و رحمة الله و بركاته،،،،،

الموضوع: دراسة مسحية لفحص المقبلين على الزواج لمعرفة مدى انتشار التهاب الكبد الوبائي س:

تداعياته على السياسات الصحية

نعلمكم برغبتنا بالقيام بمسح على المقبلين على الزواج لفحص الدم لمعرفة مدى انتشار التهاب الكبد الوبائي س ، تداعياته على السياسات الصحية و إن هذا المسح هو جزء من رسالة الماجستير في السياسات الصحية و الدراسات السكانية و الهدف المرجو من المسح هو معرفة مدى الانتشار حتى يتسنى لوضع السياسات الصحية إمكانية إضافة الفحص من عدمه للمقبلين على الزواج في مملكة البحرين و تزويد وزارة الصحة بأحدث الإحصائيات من أجل تطوير الاستراتيجيات ووضع الخطط حسب الاحتياجات. إن هذا المسح يتطلب استخدام المراكز الصحية التابعة لوزارة الصحة لأخذ المعلومات من المقبلين على الزواج لأقسام الامومه و الطفولة. لذا نرجو منكم التكرم بمخاطبه رؤساء المجالس بالمراكز الصحية لمساعدتنا على القيام بهذه المهمة بكل يسر .

و لكم منا جزيل الشكر و الامتنان

دكتورة فهيمة المطوع
استشاري طب العائلة

Appendix 3.4

الدكتورة الفاضلة/ منى الشيخ.....المحترمة
رئيسة رعاية الأمومة و الطفولة للرعاية الصحية الأولية- وزاره الصحة

السلام عليكم و رحمة الله و بركاته،،،،،

الموضوع: دراسة مسحية لفحص المقبلين على الزواج لمعرفة مدى انتشار التهاب الكبد

الوبائي س: تداعياته على السياسات الصحية

نعلمكم برغبتنا بالقيام بمسح على المقبلين على الزواج لفحص الدم لمعرفة مدى انتشار التهاب الكبد الوبائي س ، تداعياته على السياسات الصحية و إن هذا المسح هو جزء من رسالة الماجستير في السياسات الصحية و الدراسات السكانية و الهدف المرجو من المسح هو معرفة مدى الانتشار حتى يتسنى لواضعي السياسات الصحية إمكانية إضافة الفحص من عدمه للمقبلين على الزواج في مملكة البحرين و تزويد وزارة الصحة بأحدث الإحصائيات من أجل تطوير الاستراتيجيات ووضع الخطط حسب الاحتياجات.إن هذا المسح يتطلب استخدام أقسام الامومه و الطفولة في المراكز الصحية التابعة لوزارة الصحة لأخذ المعلومات من المقبلين على الزواج و أخذ عينة دم لفحص التهاب الكبد الوبائي س. لذا نرجو منكم التكرم بمخاطبه مشرفي خدمات الأمومة و الطفولة لمساعدتنا على القيام بهذه المهمة بكل يسر .

و لكم منا جزيل الشكر و الامتنان

دكتورة فهيمة المطوع
استشاري طب العائلة

Appendix 3.5

الدكتور الفاضل/ بدر الحسن.....المحترم
رئيس مختبر الصحة العامة- وزارة الصحة
السلام عليكم و رحمة الله و بركاته،،،،،

الموضوع: دراسة مسحية لفحص المقبلين على الزواج لمعرفة مدى انتشار التهاب الكبد
الوبائي س: تداعياته على السياسات الصحية

نعلمكم برغبتنا بالقيام بمسح على المقبلين على الزواج لفحص الدم لمعرفة مدى انتشار التهاب
الكبد الوبائي س ، تداعياته على السياسات الصحية و إن هذا المسح هو جزء من رسالة
الماجستير في السياسات الصحية و الدراسات السكانية و الهدف المرجو من المسح هو معرفة
مدى الانتشار حتى يتسنى لواضعي السياسات الصحية إمكانية إضافة الفحص من عدمه للمقبلين
على الزواج في مملكة البحرين و تزويد وزارة الصحة بأحدث الإحصائيات من أجل تطوير
الاستراتيجيات ووضع الخطط حسب الاحتياجات. إن هذا المسح يتطلب استخدام عينات من
لعدد 1070 عينة للمراكز الصحية و من ثم فحص العينات بمختبر الصحة Diagnostic Kits العامة و تزويدنا بالمعلومات اللازمة.

و لكم منا جزيل الشكر و الامتنان
دكتورة فهيمة المطوع
استشاري طب العائلة

**Appendix 4.1: Hepatitis C estimated prevalence and number infected
by WHO Region**

WHO Region	Total Population (Millions)	Hepatitis C prevalence Rate %	Infected Population (Millions)	Number-of countries by WHO Region where data are not available
Africa	602	5.3	31.9	12
Americas	785	1.7	13.1	7
Eastern Mediterranean	466	4.6	21.3	7
Europe	858	1.03	8.9	19
South-East Asia	1 500	2.15	32.3	3
Western Pacific	1 600	3.9	62.2	11
Total	5 811	3.1	169.7	57

Wkly Epidemiological Record. N 49,10 December 1999, Hepatitis C global prevalence- World Health Organization.

Appendix 4. 2: Number of positive cases among screened candidates in Bahrain 2005, 2006- Public Health laboratory- Ministry of health

Population	Year	No screened	No (%) positive HCV
Blood Donors	2005	12,673	27 (0.2%)
	2006	14,209	32 (0.2%)
High risk	2006	13997	802 (5.7%)
IVDU	2006	474	144 (30.4%)
Pregnant	2006	199	2 (1%)
Premarital	2005	146	8 (5.5%)

Appendix 4. 3: Distribution of health centers in the Kingdom of Bahrain according to regions.

Government Health centers Ministry of Health	Governorate	No
1- Muharraq 2- Shaikh Salman 3- National Bank of Bahrain- Arad. 4- National Bank of Bahrain- Dair	Muharraq Governorate	1
5- Hoorah 6- Ibn Sinna 7- Al-Razi (Worker H.C). 8- Naim 9- Sh. Sabah Al-Salem 10- Bilad Al-Kadeem	Capital Governorate	2
11-Jidhafs 12-Budaiya 13-Hamad town 14-Kuwait 15-Mohammed Bin Jassim Kanoo	Northern Governorate	3
16-A'Ali 17-Isa town 18-Sitra 19-Hamad Kanoo	Central Governorate	4
20-East Riffa. 21-Jaw, Askar clinic 22-Zallaq clinic	Southern Governorate	5

Source: Ministry of health Website. Kingdom of Bahrain
[http:// www.moh.gov.bh](http://www.moh.gov.bh). Ministry of Health

Appendix 4. 4: Incidences Rate per 100,000 populations of notifiable communicable diseases 2002-2006

HCV	2006	2005	2004	2003	2002
	0.9	0.6	1.6	2.0	-

Table 7.6. page 8, Public health , Health Statistics 2006. kingdom of Bahrain
Ministry of Health. Health Information Directorate (HID).

Appendix 4.5: Description of positive cases characteristics

Age	Gender	Birth place	Education	Occupation	Blood transfusion	Surgery	Year	STDs	Unprotected sex	Homo-sexuality	Substance. non IVDU	IVDU	Piercing	Tattoo
21	F		Diploma	Student										
30	M		Secondary	Unemployed		Yes-Bahrain	1992							
41	M	Egypt	Secondary	Salesman										
22	M		Secondary	Laborer	Yes /SCD Syria		2004							
41	M		Diploma	Employ				Yes	Yes	Yes			Yes	
23	F		Secondary	Student		Yes-Syria	2003							
32	F		Secondary	Student	Yes	Yes-Bahrain	1987							
43	M		Diploma	Employ		Yes-India	1994							
41	M	Egypt	Secondary	Secretary										
22	M		Secondary	Student		Yes-India	2000							
36	M		Diploma	Employee								Yes		
41	M		University	Banker	Yes-Egypt		1995							
40	F		Secondary	Employee			1996							Yes-India
18	F		Secondary	Student		Yes-Bahrain	1990							
30	M		University	Engineer		Yes-Bahrain	1986							
23	F		Secondary	Secretary	Yes/ SCD	Yes-Bahrain	1989							

Arabic Abstract

الانتشار المصلي للالتهاب الكبد الوبائي (ج) و عوامل الخطورة عند المُقبلين

على فحص ما قبل الزواج و تداعياته على السياسات الصحية في مملكة البحرين

خلفية البحث يعد التهاب الكبد الوبائي (ج) مشكلة صحية عالمية ومن العوامل المؤدية للالتهاب المزمن للكبد والتليف وسرطان الكبد. ولا تعرف بدقه أبعاد الإصابة عالميا بهذا المرض نظرا لانعدام الأعراض في حالة الإصابات الحادة بالمرض. وقد قدرت منظمة الصحة العالمية في 1999م أن ما يقارب 3% من سكان العالم مصابين بالتهاب الكبد الوبائي ج المزمن، ولا تتوفر في الوقت الحاضر أية معلومات دقيقة عن مدى انتشار المرض في مملكة البحرين. منذ عام 2005م تم تطبيق قانون إلزام فحص المقبلين على الزواج وذلك للكشف عن حالات أمراض الدم الوراثية والأمراض الجنسية المعدية. وتهدف هذه الدراسة إلى تحديد نسبة الانتشار المصلي لالتهاب الكبد الوبائي ج لدى المقبلين على فحص ما قبل الزواج وتحديد عوامل الخطورة المرتبطة بالعدوى مما قد يفيد في إعادة النظر في السياسة المتبعة في فحص ما قبل الزواج وإمكانية إدخال تعديلات تشمل إضافة فحص التهاب الكبد الوبائي (ج) لجميع المقبلين.

منهجية البحث الدراسة مقطعية وصفية شملت 1070 شخصا من المقبلين على فحص قبل الزواج (546 ذكر=51%، 524 أنثى=49% ومتوسط العمر 25.9 ± 7 سنة، مابين 14-74 عاما) في أقسام رعاية الأمومة والطفولة في المراكز الصحية في البحرين بعد مطابقتهم لشرط الإدماج في الدراسة وهي أن أحد أو كلا الطرفين من البحرينيين في الفترة ما بين الأول من أبريل -15 مايو 2006م تم أخذ عينة مصلية واحدة حيث تم تحليل المصول المأخوذة لالتهاب الكبد الوبائي (ج) باستخدام EIA3 وتم تأكيد الإصابة باستخدام PCR, INNOLIA. تم إعداد وملئ الاستبيان لمعرفة عوامل الخطورة للإصابة بالالتهاب الكبد الوبائي (ج) من قبل الباحث.

نتائج البحث وجد أن متوسط عمر الحالات المصابة 31.5 ± 8.9 سنة مابين 18-43 عاما. و إن مجمل الانتشار المصلي لأضداد فيروس التهاب الكبد الوبائي (ج) يبلغ 1.5% للأشخاص المشمولين في الدراسة. لم توجد علاقة بين الإصابة و كلا من الجنس، المستوى التعليمي، الوظيفة، و الزواج ولكن وجدت علاقة بين الإصابة و العمر حيث تركز عمر الحالات المصابة بين 34-43 عاما. ومن أهم عوامل الخطورة ذات العلاقة التي يعتد بها إحصائيا هي: عمل

عمليات جراحية (50%) ($P=0.000$, $\chi^2=15.047$) و نقل الدم (25%) ($\chi^2=91.738$, $P=0.000$)

خلاصة البحث استنتج من الدراسة بأن نسبة الانتشار لالتهاب الكبد الوبائي (ج) للمقبلين على الفحص قبل الزواج في البحرين منخفضة وفق تعريف منظمة الصحة العالمية وأن نسبة مقدرة من المصابين بالمرض، لهم عوامل خطورة يمكن التعرف عليها بدقة عند ملئ بيانات إجراء المشورة الطبية. كما إن نسبة الانتشار تتناسب مع باقي الدراسات والتقارير في منطقة الخليج العربي، ولكن لا يمكن تعميم هذه النتائج على سكان مملكة البحرين. حيث أن الدراسة قد وفرت معلومات مدخلية ابتدائية لدراسات مستقبلية أعمق تساهم في التخطيط الصحي للحد من العدوى. **توصيات البحث** مواصلة السياسة المتبعة حالياً في فحص المقبلين على الزواج لالتهاب الكبد الوبائي (ج) و تحديداً للذين توجد لديهم عوامل خطورة مع التركيز على إضافة بعض التعديلات للتعرف أكثر على عوامل الخطورة عند الفحص الروتيني لقبل الزواج.

جامعة الخليج العربي

برنامج السياسات الصحية
والدراسات السكانية



كلية الطب والعلوم
الطبية

الانتشار المصلي لالتهاب الكبد الوبائي (ج) وعوامل الخطورة عند المقبلين على فحص ما قبل الزواج وتداعياته على السياسات الصحية في مملكة البحرين

رسالة مقدمة كجزء من متطلبات الحصول على درجة الماجستير في
السياسات الصحية والدراسات السكانية

إعداد

فهيمه جعفر سلمان المطوع

بكالوريوس في الطب والجراحة، جامعة الملك عبدالعزيز، المملكة العربية السعودية، ١٩٩٨م

إشراف

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والمناعة والأمراض المعدية
جامعة الخليج العربي

د. فيصل عبداللطيف الناصر

أستاذ في طب العائلة
جامعة الخليج العربي

مملكة البحرين

يناير ٢٠٠٨م

محرم ١٤٢٩هـ