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Risk factors of Hepatitis C in Gaza strip; Palestine

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Risk factors of Hepatitis C in Gaza strip; Palestine

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بسم الله الرحمن الرحيم

﴿ يرفَعِ اللهُ الذِينَ آمَنُوا مِنكُم والذِينَ أُوتُوا العِلْمَ دَرجَاتٍ واللهُ بِمَا تَعمَلونَ خَبِيرٌ﴾

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Risk Factors Of Hepatitis C In Gaza Strip, Palestine

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Jerusalem- Palestine

1426/2005

Dedication

I dedicate this work to the spirit of my father & sister

To my mother

To my wife

To my children

To my brothers

Rushdi Rusrus

Declaration

I certify that this thesis submitted for the degree of Master is the result of my own research, except where otherwise acknowledged, and that this thesis (or any part of the same) has not been submitted for a higher degree to any other university or institution.

Signed …….

Rushdi Rashad Rushdi Rusrus

8/1/2006

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Abstract

Hepatitis C virus infection is a global public health problem. An estimated 3% of the world population is chronically infected with hepatitis C virus (HCV). It accounts for approximately 20% of cases of acute hepatitis and 70% of cases of chronic hepatitis. Chronic hepatitis C is a major cause of cirrhosis and hepatocellular carcinoma.

Preliminary studies show that prevalence of HCV among blood donors in Gaza Strip is 0.3%.

The main objective of this case control study is to define the risk factors of HCV among Gaza Strip, population.

Variables studied include demographic status (sex, age, governorate, locality, maritual status, education level, occupation), and another risk factors for HCV transmission (travel abroad, health workers, blood transfusion, blood donation, having surgery, having insulin injection, having caesarian, having tattooing, visiting dentist, using un sterile injection, hemodialysis, using analgesics, making sure that barber changing the razor, practicing illegal sex, sharing family in teeth brush, sharing family with razor, sharing family with nail cutter).

The study population is a sample of all reported positive cases in the records of blood banks and central laboratories in Gaza Strip for the year 2004.

Two controls are chosen for each positive case, one from neighboring and the other from negative HCV-blood donors. The reported cases are coming from the five districts in Gaza Strip. At the time, controls are selected from the same localities.

Number of cases reaches sixty eight (68) cases, and the number of controls is one hundred thirty six (136).

This step is followed by designing an entry model using computer software "Statistical Package for Social Sciences" (SPSS) where data was entered and analyzed.

It is found that males are more exposed to HCV than females. According to age it is clear that people of 35 years and above has more chance to get HCV than those of less than 35 years. While there is no difference between villages, camps, and cities in chance of getting HCV. For education level, secondary level is at higher risk than elementary (OR= 3.47). It is also found that people who are working as employee and workers are more exposed to HCV than those who has no definite work (students, house keepers, police, un employee). In case of risk factors that could affect the chance of getting HCV in Gaza Strip.

It is found that the main risk factors have statistically significance are: Travel abroad especially to Egypt, blood transfusion, having surgery, having tattooing, dentist visit for treatment, using un sterile injection.

while risk factors which is not statistically significant in Gaza Strip were: blood donation, health organization workers, having insulin injection, having caesarian, using analgesics, hemodialysis, making shore that barber changing the razor, practicing illegal sex, sharing family with teeth brush, razor, and nail cutter.

This study could be a model to define the risk factors associated with hepatitis C in a developing community as Gaza. Such study and similar studies will be a base for a successful intervention program to reduce prevalence rate of hepatitis C in Gaza, and in similar countries.

ملخص

يعتبر مرض الالتهاب الكبدي الفيروسي (C) مشكلة صحية عالمية . ما يقارب 3 % من سكان العالم مصابين بهذا المرض بصفة دائمة . ويشكل هذا المرض حوالي 20 % من حالات الالتهاب الكبدي الحادة و 70 % من الحالات المزمنة. وتعتبر الإصابة المزمنة بالمرض سبب رئيسي لتليف وسرطان الكبد . الدراسات السابقة على مستوى قطاع غزة تشير إلى أن نسبة الإصابة بالمرض من المتبرعين بالدم هي 0.3 %.

تهدف هذه الدراسة أولا : لتحديد عوامل الخطر للإصابة بالالتهاب الكبد الفيروسي (C) في قطاع غزة ، فلسطين . حيث سيتم دراسة العوامل الديمغرافية (الجنس، العمر ، السكن ، الحالة الاجتماعية ، مستوى التعليم ، نوع الوظيفة). وعوامل خطر أخرى تساهم في نقل المرض (السفر للخارج ، العاملين في الصحة ، نقل الدم ، التبرع بالدم ، إجراء العمليات الجراحية ، استعمال حقن الأنسولين ، إجراء القيصرية ، الوشم، زيارة طبيب الأسنان للعلاج، استعمال الحقن الغير معقمة، الغسيل الكلوي، استعمال المهدئات ، التأكد أن الحلاق يغير موس الحلاقة ، ممارسة الجنس الغير مشروع ، مشاركة العائلة في فرشاة الأسنان ، موس الحلاقة ، وقصاصة الأظافر).

وتهدف الدراسة ثانيا : توضيح العلاقة بين كل عامل خطر والإصابة بالمرض و كما تهدف ثالثا لاقتراح توصيات لصانعي القرار والمسئولين في القطاع الصحي لتطبيق وسائل للحد من نسبة الإصابة بالالتهاب الكبد الفيروسي (C) .

اشتملت عينة الدراسة على جميع الحالات الإيجابية المسجلة في بنوك الدم والمختبرات المركزية على مستوى قطاع غزة لعام 2004 م. وتم اختيار شخصين غير مصابين كعينة ضابطة لكل حالة ايجابية. تم اختيار الشخص الأول من العينة الضابطة من بين الذين تبرعوا بالدم وكانت نتائجهم سلبية، أما الشخص الثاني من العينة الضابطة فقد تم اختياره من نفس المحافظة التي سجلت فيها الحالة الايجابية. تم التأكد من خلو العينات الضابطة من المرض عن طريق فحص الدم. وصل عدد الحالات الإيجابية 68حالة وعدد الحالات الضابطة 136 حالة. حيث تم جمع البيانات عبر استبيان يحتوي على جميع المتغيرات الديمغرافية، الاجتماعية، الاقتصادية و كل المتغيرات التي لها علاقة بالإصابة بالمرض.

قام الباحث بإدخال البيانات وتحليلها.

حيث أظهرت النتائج الآتية: الأشخاص من ذوي الأعمار 35 سنة فما فوق أكثر عرضة للإصابة للمرض من غيرهم من فئات الأعمار الأخرى. لايوجد فرق في نسبة الإصابة بين القرى والمدن والمخيمات. على مستوى التعليم تبين أن الأشخاص من المستوى الثانوي أكثر عرضة للإصابة بالمرض من المستوى الابتدائي حيث كان الفرق ذو دلالة إحصائية واضحة. وتبين أيضا أن الأشخاص العاملين أكثر عرضة للإصابة بالمرض من أولئك الذين ليس لهم عمل محدد (الطلاب، ربات البيوت، العاطلين عن العمل)

عوامل الخطر للإصابة بالمرض والتي لها دلالة إحصائية هي: السفر للخارج خصوصا إلى مصر، نقل الدم، إجراء العمليات الجراحية، الوشم، زيارة طبيب الأسنان للعلاج، استعمال الحقن الغير معقمة.

عوامل الخطر التي ليس لها دلالة إحصائية هي: التبرع بالدم، العمل في المجال الصحي، استعمال حقن الأنسولين، إجراء العمليات القيصرية، استعمال المهدئات، الغسيل الكلوي، ممارسة الجنس الغير مشروع، مشاركة العائلة في فرشاة الأسنان، وقصاصة الأظافر.

إن هذه الدراسة ممكن أن تكون مثالا لتحديد عوامل الخطر الت ي لها علاقة بالإصابة بمرض الالتهاب الكبدي الفيروسي (C) في الدول النامية مثل فلسطين.

كما وان هذه الدراسة وأمثالها ستكون أساسا لوضع برنامج ناجح لتقليل معدل الإصابة بحالات المرض في فلسطين ومثيلها من الأقطار.

Table of contents

Chapter 4 Methodology

Chapter 5 Results and discussion

List of Tables

List of figures

List of Appendices

List of Abbreviations:

WHO	World health organization
OR	Odds ratio
CI	Confidence interval
HCV	Hepatitis C virus
ELISA	Enzyme linked immunosorbant Assay
HD	Hemodialysis
PCR	Poly Chain Reaction
HCC	Hepato cellular carcinoma
NGOs	Non governmental organization
NANB	Non A- Non B
PNA	Palestinian National Authority
CDC	Control Disease Center
PCBS	Palestinian Centre Bureau of Statistic
GHSRC	Gaza Health Service Research Center
MOH	Ministry of health
(CDSR)	Communicable Disease Surveillance & Response
Unicef	United Nations Children's Fund
IDUS	Intra Drug Users

Chapter One

Introduction

Chapter one

Introduction

1.1 Background

Hepatitis C is caused by infection with the Hepatitis C virus (HCV), an enveloped, single strand positive sense RNA virus. The virus infects the liver cells and can cause sever inflammation of the liver with long term complications (WHO, 2005) [a].

Hepatitis C virus is a leading cause of liver failure and for transplantation in adults. Infection with HCV may lead to disabling symptoms, cirrhosis and hepatocellular carcinoma, and is said to account for a significant proportion of end-stage liver disease among HCV-infected individuals. HCV may lead the loss of 1.83 million years of life among those under 65, at a societal cost of billions of dollars (Leiand J, et al, 2001)[a]. An estimated, 4 million individuals in the United States and 200 million people worldwide are infected with the hepatitis C virus. HCV is a relatively a common disease.

An estimated 3% of the world population is chronically infected with hepatitis C virus (HCV). It accounts for approximately 20% of cases of acute hepatitis and 70% of cases of chronic hepatitis. One chronic hepatitis C is a major cause of cirrhosis and hepatocellular carcinoma. The severity of HCV related liver disease is extremely variable but may, in some cases, induce progressive liver fibrosis which evolves to cirrhosis and then to hepatocellular carcinoma, in time frame ranging from few years to many decades (Marcellin P., 1999).

In Gaza Strip, blood donation services are provided by governmental blood banks which are located in the main three general hospitals distributed in Shifa hospital in Gaza city, Naser hospital in Khanyonis and Gaza European hospital in south of Gaza Strip. In addition, three NGOs blood banks are located in North, Center, and South areas of Gaza Strip (MOH, 2003).

In 2003, GHSRC held a surveillance to detect the prevalence of HCV and its risk factors. Cases were determined among blood donors where 73 cases identified out of 23,718 donors with a prevalence rate of 0.3%.

The differences between localities were average below (0.2-0.5) except in locality in the south where prevalence reached 0.9%. During 2003 investigations, two controls from neighborhood people were selected for each of the cases. Blood sample collected from the controls used for the cause to prove absence of the HCV infection, and the data were collected by using the same questionnaire (GHSRC, 2004) Unpublished

For many years hepatitis C related cirrhosis may be silent. Clinical symptoms of portal hypertension or hepatic failure appear late. In patients with HCV related cirrhosis, mortality related to portal hypertension, hepatic failure or hepatocellular carcinoma is 2% to 5% per year. End- stage HCV related cirrhosis is the most prevalent indication for liver transplantation. The incidence of hepatocellular carcinoma is high (3% to 10% per year) and justifies systematic monitoring (Alberti A, et al, 1999).

Most people with chronic infection are not aware that they are infected, owing to the symptoms onset of acute HCV infection and the insidious progression of chronic infection. Infected persons serve as a source of transmission to others and at increased risk for chronic liver disease and other HCV-related chronic systematic disorders. The lack of a prophylactic vaccine or a universally effective therapy has made prevention extremely important in this chronic infection. Identification of infected persons and of risk factors associated with acquiring HCV may allow us to develop strategies to reduce the incidence of HCV infection (National institutes of health, 2002).

In 1989, after successful isolation of major non A, non B (NANB) agent by recombinant DNA technology, radioimmunoassay, and later enzyme linked immunosorbent assay (ELISA), were subsequently developed for detection of antibody in patients with chronic

NANB hepatitis (HCV). Hepatitis C virus is usually spread by sharing infected needles with a carrier, from receiving blood, and from accidental exposure to infected blood (WHO, 2005)[b].

Identified risk factors of HCV infection include intravenous (IV) drug use, exposure to infected blood products, intranasal drug use. High risk sexual activity (multiple sexual partners, history of sexual transmitted disease, tattooing, and skin piercing have also been suggested to be associated with increased risk for HCV (Murraq.K, et al, 2003). Risk factors have been studied with patients of NANB hepatitis, and approximately 40-50% has no known factor for viral acquisition. A significant undefined source of viral transmission has been suggested. We sought to clearly delineate the factors in a population of patients with documented chronic HCV infection to assess the magnitude of HCV transmission without known risk factors **(**Murraq.K, et al, 2003**)**

1.2 Statement of the problem

Examining the distribution of risk factors for hepatitis C virus acquisition among patients chronically infected with HCV in Gaza Strip is considered to be the key indicator in evaluating the transmission of hepatitis C in GAZA strip. The study findings might help in developing creative ways in decreasing prevalence of HCV in Gaza Strip. It also might help in giving clear idea about our situation in Palestine. This study of HCV risk factors in Palestine will help us to explore the main risk factors of the disease, and how to be awarded of them.

Knowledge of these risk factors and following preventive procedure will also help in decreasing the cases of the disease in our country Palestine.

1.3 Justification of the study

Hepatitis C virus (HCV) is an emerging global public health issue with particular relevance in recurrent transfused renal dialysis patients, pregnant women, blood donors, intra drug

users, sex contact, house hold, and others. It is with chronicity impacting the well being of an estimated 200 million people worldwide. The disease spectrum ranges from mild to sever chronic hepatitis with cirrhosis and hepatocellular carcinoma developing in some patients after average of 21 and 29 years.

This disease is associated with morbidity and mortality. It is also considered as insidious and silent disease. Many of millions infected with this disease will not know about their case unless they do laboratory serological investigations.

Although Palestinians enjoy low prevalence rate of HCV, we decide to study the risk factors of this disease. This is due to the seriousness of the problem associated with liver cirrhosis and liver carcinoma.

1.4 Objectives

1- To review the reported cases of HCV and exploring the main risk factors of HCV in Gaza Strip.

2- To examine the relationship between the disease and each of the identified risk factors.

3- To suggest recommendations to the policy makers and health professionals for adopting creative ways to decrease prevalence rate of HCV in Gaza Strip.

1.5 Demography

Palestine is situated on the Eastern coast of the Mediterranean Sea. It is of an ancient and of strategic important location. Palestinian National Authority (PNA) formed over 2 parts (Gaza Strip and West Bank) and this is called the territories. These compromise two geographically separated areas.

Gaza is a narrow zone of land stretches along the Mediterranean sea, with an area of 360 square kilometers. It is 50 kilometers long and 5 to 12 kilometers wide and divided to five provinces, Rafah, Khanyounis, Mid Zone, Gaza, and North (MOH, 2003).

The West Bank is a hilly region with an area of approximately 5,800 square kilometers and is divided to ten provinces. West Bank is divided into four geographical regions. The northern area includes the districts of Nablus, Jenin, and Tulkarrm, the center includes the districts of Ramallah and Jerusalem, where the south includes Bethlehem, Al-Khaliel district, and the sparsely populated Jordan valley including Jerico. In the Palestinian territories, there are observable differences in life styles and living conditions not only among classes or socio-economic levels and religious affiliations, but also among urban, rural and refugee camp communities (MOH, 2003).

According to the Annual Report of MOH, 2003 the estimated number of Palestinians all over the world by the end of 2003 is 9.7 millions distributed as follows: 3.7 million in Palestine (38.7%), 2.3 million (63.3%) in West Bank and 1.4million (36.7%) in Gaza Strip. One million (11.1%) live beyond the green line, 2.8 million (29.0%) in Jordan, on the other hand, 436,000 Palestinians (4.5%) live in Syria, 415,000 (4.3%) Palestinians live in Lebanon and 62,000 (0.6%) live in Egypt of the total Palestinians living all over the world. The number of Palestinians living in the other Arab countries was 595,000 (6.2%). There are 236,000 in the United States of America, and 301,000(3.1%) in other foreign countries. Those distributed in 15 governorates, in West Bank and Gaza, with a higher population density in the Gaza Strip than in the West Bank (MHO, 2003).

Gaza Strip is an over crowded place, the population is mainly concentrated in the cities, small village, and eight refugee camps that contain two thirds of the population. Gaza Strip is also characterized by the highest density compared with neighboring countries which shows density of about 2,933 people per square kilometer, while in West Bank 342 people per square kilometer. Refugees make up a much larger percentage of the population in the Gaza Strip than in the West Bank, and most refugees still live in over crowded camps with substandard housing and sanitation conditions which have a negative

impact on health status. Refugees in Gaza represented 65.5 % while in West Bank they represented 29.4%(MOH, 2003).

According to figures reported by MOH, 2003, the natural increase of population in Palestine was 2.4% in 2003. Although, the growth rate is decreasing still the projections that based on the reported fertility rate at 2003 showed that the population will continue to grow.

Also MOH, Annual report, 2003 showed that 51.1% of Palestinian are males and 48.9% are females. Gender predominance toward males below the age of 50, then there is predominance toward females.

According to the report of MOH in 2003, 46.0% of the population in Palestine is under 15 years, 44.1% in West Bank and 49.0% in Gaza Strip. The percentage of Palestinians who are above 65 years in Palestine is 3.1%, this figure reaches 3.3% in West Bank and 2.7%in Gaza Strip.

There is a slight increase in the median age for male population in Palestine between 1997 and 2003, where it increased from 16.4 years in 1997 to 16.7 years in 2003 (MOH, 2003). The decline in mortality rate in Palestine led to longer life expectancy to reach 70.7years for males and 73.8 years for females in 2003.

1.6 Socio-economic context

Employment is the main source of household income and the majority of Palestinian labor force still depends on daily earning of low wage due to the lack of enough jobs in Palestine. Israel still has the upper hand over Palestine borders, movement of goods and control of trades, so it still holds the economy. The over all adult literacy rate stands at 91% in Palestine (PCBS. 2002).

This figure is higher than the rates in Egypt (56 %) and still similar to those in Jordan (91%) and Kuwait (93%). Also male literacy doubled over the past 30-40 years, and the

female rate have increased 8- fold over the same period, so there is no gender gap in this regard (PCBS, 2002).

PNA area is ranked as middle income country, with Gross National product per capita of 1,806 US$ in 1999 and decreased to 1,020 US$ in 2003. Product (GDP) per capita ranging from 1,496 US$ per capita in 1999 and decreased to 896 US$ in 2003.

According to the PCBS, 2003, the number of workers in Israel decreased from 135,000 workers in 1999 to 50,000 in 2003, and decreased more in the last year. The workers in Palestine also increased from 453,000 in 1999 to 474,000 in 2003 due to the political situation and recurrent crisis in Palestine. Furthermore, the Gaza Strip families represented the lowest average of consumption and expenditure in Palestine.

Despite the economic importance of employment still there is no reliable data about the actual size of labor force in Palestine as unemployment is a major socio-economic problem due to constant unrest in the political situation which results in frequent closure of borders between the Gaza Strip and the West Bank. Unemployment registered high increase from 11.8% in 1999 to 31% in 2003 with constant fluctuation during the last five years due to the political situation, and the occupations practices including closure of Palestinian regions and cities and other constraints activities (PCBS, 2003).

Unemployment causes unique stress on the individual and the family which is leading to an increase in health problems and demands to the health care settings at the time when income is low. Also, when income is low, the preventive and non-urgent services are delayed and this leads to deterioration of the health status. The present situation places a stressful condition for the Palestinians who are suffering from difficult economic situation due to Al-Aqsa Intifada's political climate.

1.7 Overview

In the first chapter we have browse general introduction about HCV disease,

its discovery, its transmission, its significance as a global public health problem, and the general objectives of the research questions.

In chapter two we will concern the main theories of the study and the main studies that related to risk factors of HCV and the main intervention polices to the decrease the prevalence rate of this disease.

In chapter three we drew the main conceptual framework of HCV risk factors controls and non controls and the way to prevent this disease.

Chapter four mention the main methodological approaches that used in completing this study by some details about sample, sampling, data collection, entry and analysis procedures.

Chapter five we describe the main results that achieved about risk factors of HCV, then we analyzed these results and interpreting the results. Also, these finding supported by previous literature.

Chapter six containing conclusion of the main finding and the importance of this study. Also, the recommendation that suggested to [policy makers to decrease the prevalence of HCV in our country.

Chapter two

Literature Review

Chapter 2

Literature Review

2.1 History of HCV

According to WHO, Communicable Disease Surveillance and Response (CSR), Hepatitis C is defined as a disease caused by infection of hepatitis C virus (HCV), an enveloped, single strand positive sense RNA (Ribo Nucleic Acid) virus of the Flaviviridae family. This virus infects liver cells and can cause sever inflammation of the liver with long term complications (WHO, 2005) [b].

This Virus has a high propensity to mutate. The discovery of HCV was first reported by Choo and coworkers in 1989. Since its discovery, the development and application of serological tests for HCV have shown that this virus is the primary etiologic agent of parentally transmitted non-A non-B hepatitis and an important cause of acute and chronic hepatitis worldwide (Choo QL, et al, 1989).

The natural history of Hepatitis C is best presented in five prospective studies from the United States and Europe involving persons with transfusion-associated NANB hepatitis, predominantly and not exclusively due to hepatitis C virus (HCV) infection (Hop U, et al, 1990. Di Bisceglie AM, et al, 1991. Trmolada F, et al, 1992. Koretz RL, et al, 1993. Mattson L, et al, 1993). The mean duration of follow up was 8-15 years. About 10 percent of study subjects were reported follow up to have clinical symptoms, histological cirrhosis was noted in 15-20 percent, and HCC was identified in two of the studies (0.7 percent and 1.3 percent, respectively). Mortality ranged from 1.6-6.0 percent. These studies, somewhat small numbers and relatively short durations of follow up, demonstrated an unequivocal but modest frequency of mortality and morbidity over their limited time course (Crowe J, et al, 1995).

More benign data come from a study reported from Ireland of HCV-Infection following receipt of HCV-contaminated immunoglobulin products. In Ireland study a follow up of 232 infected persons over a 17- year period showed that about over quarter had mild fatigue, none were jaundiced or had hepatosplenomegally, and about 60 percent had modest enzyme abnormalities. Liver biopsies reveal presence of chronic hepatitis, mostly mild, in the majority of instances, only: 1.8 percent showing sever fibrosis. The authors concluded from these data there was minimal evidence of progressive disease (Power JP, et al, 1994).

In one study from Japan, involving a follow up of transfusion associated chronic NANB/C hepatitis cases, HCC development was found to be common. (Kiyosawa K, et al, 1990). There are many uncertain issues regarding hepatitis C virus (HCV) infection, the main issue is the question of its natural history (Alter MJ, 1995). Outcome data are needed for two obvious reasons. First the need to inform hepatitis C virus (HCV) carriers of what to anticipate in their future and, if possible to reassure them about potential sequelae. Second the need to make rational decisions regarding treatment with drugs that currently described with only limited therapeutic value.

The problem is compounded by the conflicting views held with respect to the natural history, some regarding chronic HCV infection as a universally progressive disease that will inevitably be responsible for serious chronic liver disease or liver disease related demise provided other disease entities do not intervene first. Mansell, CJ, and others in 1995, described the disease as a progressive disease limited to a minority of infected individuals, its course dictated by as yet not fully defined factors that might promote liver disease progression.

What is recognized is that persons who develop acute HCV infection rarely recover completely, more than 80% of them remaining HCV infected. The result is progression to

chronic hepatitis, generally defined by persistence of serum enzyme abnormalities for at least six months, advancement in a proportion of instances to cirrhosis, and culmination among a few in the development of HepatoCellular Carcinoma (HCC). What is not well established is the frequency of these changes, the tempo of advancement, and whether or not there are existing factors that curb or promote diseases progression (Steeff LB, 1959).

In 1995, Crowe J, and others, talked about the difficulties inherent in attempting to define the natural history of HCV infection is numerous. First, a natural history study requires knowledge of onset of acute disease in order to establish frequency and rate of progression. Second full knowledge of natural history must include long term evaluation of the entire spectrum of the acute disease, ranging from the mildest to the most severe illness. Third a valid study requires equally intense evaluation of a non-infected control group. Again, the lack of symptoms inhibits selection of such a group thus foiling conduct of a case-control study. Fourth the extraordinary indolent nature of the disease process in chronic hepatitis C coupled with its highly extended course makes study of the natural history a daunting task is difficult to accomplish.

Tong MJ, and others from United States in 1995, studied symptoms of HCV, involving an initial and follow up evaluation of 131 transfusion associated cases of chronic hepatitis C, initial evaluation revealed fatigue among 67.2 percent, hepatomegaly among 67.9 percent histologically defined “chronic active hepatitis” in 22.9 percent, and HCC in 5.3 percent.

The rapid development of sensitive serologic assays for antibodies to HCV led to a large reduction in the incidence of transfusion associated hepatitis, but it raised many important questions about the epidemiology, socioeconomic, and natural history burden of this viral infection (Zein NN, 1997). In Zein study during the follow up of period of 3.9 years, an additional 5.3 percent developed HCC, and 15.3 percent died.

These studies demonstrate two important points. First serious outcomes are common in study that begins with already established end stage or near end stage chronic liver disease. Second the rate of progression is exceptionally slow. Therefore, satisfactory information regarding the natural history of chronic hepatitis C can come only from longer-term prospective studied. Then follow up studies beginning with already established chronic liver disease. Among three such studies with mean follow up periods of 9-15 years, cirrhosis was reported to develop in 8 percent, 30 percent, and 42 percent, and HCC percent and 19 percent. The high frequency of cirrhosis was noted in the two studies from Japan. (Takahashi .M, et al, 1993. Yano M, et al, 1993. Roberts JM, et al, 1993). It is more than passing interests that is strikingly high frequency of HCC among persons infected in Japan.

In a recent examination records in Hawaii over a 25- year period seeking information on HCC among descendants of Japanese immigrants, 28 HCC cases were identified, 24 of which sera available for serologic evaluation (Nomura A, et al, 1996). Fifteen of the 24 had hepatitis B virus markers, while none had HCV markers. This implies either an extremely low prevalence of HCV in Hawaii, or that another factor-cultural, nutritional, environmental-exists in Japan that help promote carcinogenesis among HCV carriers residing in that country.

2.2 Magnitude of HCV problem

After studying history of HCV, we now firmly recognize that HCV infection is associated with sub-stantial morbidity and mortality and that it clearly represents a global public health challenge.

Hepatitis C is an insidious and often silent disease for many years. The early quiescent nature of chronic hepatitis C is one of the most fundamental reasons it poses such a perilous public health threat.

The vast majority of the people currently infected with the HCV virus are unaware they are infected. Without screening, many of the millions infected will not be diagnosed until they develop serious complications. And these millions of infected people run the risk of unwittingly infecting countless others with this potentially life-threating virus.

Chronic HCV ultimately leads to cirrhosis in 20-30%of those infected with 10% progression to liver-failure or liver cancer for which liver transplantation is the only proven life saving measure available. Over the past decade, the incidence of liver cancer has increased greatly, as the number of people in need of liver transplantation. Most experts attribute these alarming trends to the current HCV (Jees. A.N., 1998).

HCV and human immunodeficiency (HIV) share routes of transmission; therefore their co infection is relatively common. Nevertheless, the clinical relevance of this event has been minimal until few years ago when due to the increased survival of HIV infected individuals, morbidity and mortality caused by pathologies not strictly related to HIV (such as HCV infection) raised sharply. Despite differences in their general characteristics including life cycle, target cells, and type of persistence in the infected host, a remarkable level of interaction exists between HCV and HIV, this makes the progression of both liver diseases immunological damage easier and more rapid (Balestra E, et al, 2003).

The magnitude of HCV/HIV co-infection is clear among infants. The average rate HCV infection among infants born to women co- infected with HCV and HIV is 14% to 17%, higher than among infants born to women infected with HCV alone. Therefore children should be referred to a pediatric pathologies or similar specialist for management and for determination for eligibility in clinical trials. (SulkoWski MS, et al, 2000).

It is necessary to do genotyping when managing a person with chronic hepatitis C. It helps in detecting type of the newly replicated virus. The term genotype refers to different

genetic variations or strains of hepatitis C. The variance in genetic differences is approximately 1/3 between the different genotypes.

There are six major groups or genotypes numbered 1 to 6 although may as 11. Within each genotype are further divisions called subtypes, and quasispecies. Scientists believe there are literally millions of different HCV quasispecies in every one infected with HCV, which are unique to every individual. In addition, it has been suggested that quasi-species play a role in disease progression and treatment response, but this is still very controversial and more studies are needed to full appreciate the role of quasi-species (Berenguer M, et al, 1996).

Tkada N, and others in 1993 talked about the differences in the virus genotypes in different countries. The study showed out genotype 1-3 is widely distributed through out the world. subtype 1a is prevalent in North and South America, Europe, and Austrailia. Subtype 1b is common in North America and Europe, and also found in part of Asia. Genotype 2 is present in most developed countries, but is less common than genotype 1.

Some studies suggest that different types of HCV may be associated with different transmission routes. Okamoto, and others in 1995, clarified that Hepatitis C virus genotyping among people from different regions of Brazil shows eleven types, including at least 80 subtypes, have already been described and shown to have different geographical distribution.

Comparative study among Thailand, Indonesia, the Philipines, and Japan is done to differentiate distribution of HCV subtypes in Asia. It is found out that HCV is currently classified into at least six major genotypes, each of which is further divided into number of subtypes. It has been reported that each subtype varies among different geographical regions of the world, and severity of liver disease and sensitivity of treatment varies with different subtypes (Hotta. H, et al, 1997).

2.2.1 International magnitude of the problem:

Chronic liver disease, including cirrhosis, represents the 10th most common cause of death in the U.S.A. Viral hepatitis is the commonest cause of chronic liver disease with an estimated 1.25 million, 2.7 million and 70,000 individuals with hepatitis B virus, HCV, and hepatitis D virus infection, respectively (Quillan MC, et al, 1999).

In the U.S.A, chronic HCV infection is common in males than females and the peak prevalence is in those aged 30-39 years. HCV alone or in the combination with alcohol accounts for about 60% of newly diagnosed cases of chronic liver disease. Based on the data from the centre for disease control and prevention (CDC) National centre for health statistics captures trends in the death rates in the U.S.A. In 1997, chronic liver disease including cirrhosis ranked as the 10th most frequent cause of death. Mortality varied by age with a rate of 16.7 per 100,000 among those 45-54 years, 24.1 per 100,000among those 55-64 years, and 31.4 per 100,000 65-74 years. Death rates among men were twice as higher than among women and rates among blacks and hispanics were higher than whites.

Risk factors for HCV in U.S.A are, transfusion of infected blood or Blood products, use of contaminated dialysis equipment, transplantation of infected organs, and sharing of contaminated needles among injection Drug users are well-recognized modes of HCV transmission. Sexual contact and perinatal exposure are associated with HCV infection but HCV transmission by these routes is relatively inefficient (Alter M, 1995).

In Western Europe the prevalence of chronic infection is low, although it increases from about 0.1% in the north to more than 1% in the south . Prevalence of HCV is greater in the eastern Europe (median 2%). In Western Europe blood transfusion and intravenous drug use are the two main transmission modes, while in Eastern Europe, iatrogenic transmission and intravenous drug use mainly involved. The public health impact of this long-time

silent epidemic is now becoming visible in the most communities (organization Mondiale de ia Sante, 1999).

The surveillance of acute infection, as undertaken in Italy gives some insight on the current transmission pattern. However, HCV acute infections are not often symptomatic (Spada E, et al, 2001).

In France, the surveillance of newly diagnosed chronic hepatitis has been implemented in some hospital wards, mostly hepatology and gastro- enterology centers. Its objectives are to assess the changes in the epidemiological and clinical characteristics of chronic hepatitis patients during the first treatment and therefore, to evaluate the national screening and treatment program (Dearocque-astageau. E, et al, 2001). .

In Austria, where hepatitis is notifiable by law, data on HCV infection poorly reflected the true magnitude and trends of HCV infection when compared to hospital discharge data by region. This evaluation of the notifiable system in Austria stressed the need for a clear case definition, and a use of an electronic reporting system which should facilitate gathering of data (Struss. R, et al, 2003).

Unlike acute symptomatic infectious diseases for which case definitions are quite standardized at the European level, the surveillance of HCV chronic infectious remains a methodological challenge. The solution stands less in a universal notifiable system, but rather in an approach with well identified objectives ranging from the evaluation of the burden of the problem, the definition of people at risk, or the evaluation of a national prevention and control programme. HCV surveillance systems will need to be adjusted and remain flexible according to these objectives, which may change over time.

When anti-hepatitis C virus (anti-HCV) antibody was tested sera from 410 adults living in Tunisia, Senegal, Burun, Madagascar, and in 209 Tunisia and Senegalese patients suffering from liver diseases. Anti-HCV antibodies were detected in 4.2% of the adult population

from Africa, and 7% of patients suffering from primary liver cancer (Coursaget P, Bourdil C, et al, 1990).

Following a survey of HCV infection recently carried in central Africa (Gabon), showed that HC-G genotype is highly prevalent in the HCV RNA-positive Gabonese population (Larzul D, et al, 1994).

HCV infection is wide spread through Asia. Unusual futures of HCV in

Asia includes a nove genotype distribution with. This particular important as genotype 3. (Morrow. AW, 2000).

2.2.2 Magnitude of HCV problem in surrounding countries:

HCV is recognized as a health priority by Mediterranean countries Algeria, Egypt, Tunisia, Turkey, And Palestine). The population of Egypt has a heavy burden of liver disease, mostly due to chronic infection of HCV. Overall prevalence of antibody to HCV in the general population is around 15-20%. Egypt has one of the highest prevalence rates of HCV infection in the world, however the risk and attribution related to HCV in Egyptian patients with hepatocellular carcinoma (HCC) remains unknown (Zaghloul. H, et al, 2001).

A case control study was undertaken to estimate the risk oh HCC in relation to HCV in Egypt. Thirty-three patients with HCC and 35 healthy controls who had a similar socioeconomic status were prospectively enrolled at the University of Cairo National Cancer Institute. The result was: Anti-HCV antibodies were present in 75.8% of the patients and in 42.9% of the controls ($p=0.01$). This leads to the conclusion that HCV infection increases the risk of HCC in Egyptians, whereas isolated Schistosoma infection does not. Because of the very high prevalence rate of HCV in the general Egyptian population, it accounts for most HCC cases in Egypt (Zahloul. Hassan, 2001).

To simulate the epidemic history of HCV in Egypt, sera were obtained from 3608 blood donors from 13 governorates in or surrounding the Nile valley during 1999. The

prevalence of anti-HCV genotypes was determined in them, the neutral theory was: isolation of 4a genotype of HCV, which is prevalent in Egypt and indigenous there (Tanaka.Y, et al, 2004). The response of this subtype 4a is less successfully to interferon therapy than other subtypes.

Furthermore, HCV is less prevalent in countries neighboring Egypt that have similar socio-medical conditions and similar HCV strains. (Shabokshi, et al, 1999). When, then, is Egypt so seriously affected? previous research has suggested that Egyptian HCV epidemic results from the use of unsterile injection equipment during mass treatment of the general population with parenteral antischistosomal therapy (PAT) (Frank, et al, 2000).

In Jordan, five hundred and seventy- eight individuals in two hospitals in the Amman area were screened for anti hepatitis C virus. The result of this study indicates the prevelance of HCV in the hospital population ranged from 0.65 to 6.25% depending on the sub population studied (Quadan A, 2002).

In Syria Abdulkarim AS, and others in 2002 studied HCV prevelance, clinical significance among hemodialysis patients from Syria. It was found that high prevelance of HCV has been reported among hemodialysis patients (75%).

2.2.3 Magnitude of HCV problem in Palestine:

Hepatitis C virus (HCV) has been emerged, as a serious public health problem world wide since it has been isolated in 1990. In Palestine, surveillance of HCV stared in 1994.

According to the Annual report in 1997 (prepared by Preventive Medicine Department Ramallah) and supported by Unicef, declared That in year 1995 there were no cases of HCV in West Bank Governorates except two cases in Tulkarm. In the same year cases of HCV are not found in Gaza Strip. In year 1996, there were no cases in West Bank, and only four cases in Gaza Strip. Finally in year 1997, there were one case of HCV in Jerico,

three cases in Salfeet, and one hundred and fifty six cases in Gaza Strip. That can reflect under reporting of HCV cases in the West Bank

In 2000, over all prevalence rate of HCV was 0.3% in Palestine. The results showed Palestinians enjoys very low prevalence rate of HCV infection (MOH, 2003).

Screening of HCV was carried out among 44,990 blood donors with a prevalence rate of 0.3 %. In addition, 12,398 blood samples were examined for patients of Gaza hospitals with a prevalence rate of 4.8% (MOH, 2003).

2.3 Risk actors of HCV

Department of medicine, north Memorial Hospital Northwestern university Medicine School, Chicago conducted a study in which risk factors of 301 consecutive patients with chronic HCV infection. Patients were calculated and comparisons were made between groups to detect differences in mode of HCV acquisition. Results shows 196 men and 105 women were infected. From the 1999 United States youth Risk Behavior Surveillance Survey, 1.8% of students in grades 9-12 had injected illegal drugs, and 49.9% had had sexual intercourse, with 8.3% initiating sexual intercourse before 13 years of age (Karen. F, et al, 2003).

A case serious and potential implications for disease Surveillance, 2001 in USA showed that Patients exposed to blood products tended to be older while Intra Drug Users (IDUs) and patients with sexual exposure or tattoos tended to be younger. Women reported more risk factors than men. Exposure to blood products was considerably more common in women than men and exposurte to intravenous drugs and intranasal cocaine more common in men than women. Neither race nor education was associated with the number of risk factors (Alter. MJ, 1999).

Recently there are several reports have documented the effect of HCV infection on the development of hyperglycemia. HCV infection has been independently associated with

diabetes mellitus in nearly 30 studies. Shruti, and others in 2000 studied the prevalence and incidence of hyperglycemia according to HCV infection. The researchers observed an increase prevalence of hyperglycemia among persons with HCV co infection compared with those without HCV infection. This effect was independent of the risk factors hyperglycemia including age, race, and body weight.

HCV infection can be classified into two different groups according to the route of transmission and type of risk factor – parenteral or non- parenteral. Parenteral transmission includes of blood and blood products, nosocomial infection, intra venous illegal drug use, and the hemodialysis treatment. Non parenteral transmission includes perinatal, sexual, and interfamilial transmission (Brechot C, 1997).

2.3.1 Risk Factor of HCV among blood donors:

Before 1992, the blood donors were not tested for HCV. In fact in the 1980s, more than 200,000 new hepatitis C cases were diagnosed every year and the chances of getting HCV from a blood transfusion were high as 1 in 100. But thanks to the development of blood screening programs for the hepatitis C virus, by 1992 the risk of infection was reduced to 1 in 100,000. As of 2001, the risk of getting HCV from a unit of transfused blood is less than 1 per million transfused units (Mujeeb SA, et al, 1994). However, there is still a risk of hepatitis C for people who received a transfusion before 1992, when these screening programs were instituted. We need to know that in case of family blood donors viral markers show a higher prevalence than that among healthy subjects (non donors). Family blood donors are those who donate blood when the need for blood transfusion arises in their family or their circle of friends. It may be directed or undirected donation. After paid donations, family blood donations are the most common kind of blood donations in many countries .

In the absence of proper screening facilities of blood for HBV, HCV, HIV infections and growing awareness of the high blood donors, the number of family blood donations is increasing in these countries, with the belief that it is a safer kind of blood to be transfused, so no family donor, knowing of high risk behavior or history of blood transmitted infections, will ever donate his blood to his relatives or friends.

The Blood Bank transfusion Services, Jinnah Postgraduate Medical Centre, Karachi conducted a study in 1994. This study showed that blood donation is one of the risk factors. The researcher collected 839 healthy blood donors who donated blood at the Blood from 1 August 1995 to 30 September 1995. Out of 83 family blood donors, 20 (24%) HCV reactive. Among 20 HCV reactive, 19 (95%) were males and one (5%) was female, with a mean of 29.3 years. This high prevalence of HCV among those family donors is possibly due to the use of low socioeconomic conditions (Mujeeb SA, et al, 1994).

The prevalence of HCV among blood donors differs from country to other. The prevalence of HCV among blood donors in USA now is only 0.3%, low prevalence than in the general population because blood donors are a highly select group of individuals that have been screened for risk factors and serologic markers of other infectious agents. This study demonstrates that blood donation is not more a high risk factor for HCV transfusion (Conry-Cantilena C, et al, 1996).

The prevalence of specific risk factors in persons with HCV-infection has changed over the past 10 years. Although transfusion of HCV transmission in the past, this currently represents a rare mode of transmission (Conry-Cantilena C, et al, 1996).

Glynn, Simone A at 2000, studied the U.S.A blood supply and said that it is the safest ever, due to donor screening and lab testing of donated blood.

The data on HCV infection among blood and plasma donors in Germany is presented for the second half of 1998 and 1999. A decreasing trend was observed in the HCV prevalence in the first time Whole-blood donors since 1997. In 1999 the prevalence per 100,000 donations were 101.3 for HCV. The number of incidence per 100,000 repeat whole-blood donations in 1999 were 2.9 for HCV. The incidence in repeat whole-blood donations did not vary significantly between 1996 and 1999. The results demonstrate the highly safety of blood products in Germany (Stark. K, et al, 2002).

Prevalence of chronic HCV among blood donors has been assessed in a few West African countries, most recent estimates range from 1.1% to 6.7% (Ruggieri. A, 1996). A recent meta-analysis of studies, including a confirmation test, yielded an average prevalence of HCV infection of 3.0% (Madhara V, et al, 2002).

The prevalence of HCV antibodies in blood donors in Dakar in 2001 appears to be one of the lowest in West Africa, close to published estimates for Mauritania and Benin (1.1% and 1.4% respectively) and lower than in other West African countries such as Ghana or Guinea, where prevalence ranges from 2.8% to 6.7%. This finding is in keeping with results of a hospital case-control study on HCV infection and liver cirrhosis or cancer, conducted in 1995 in Dakar (Mbaye P, et al, 2000).

Blood transfusion is one of the main risk factors in Brazil. The prevalence of anti-HCV among blood donors was 1.1%. Most of the donors were white and males (Ajacio BM, et al, 2002). A sample of blood donors was randomly selected from eight blood centers in Porto Alegre, state of Rio Garande do Sul, Brazil, out of 11 centers available in the city. This case- control study shows that first-time blood donors, as well as 30 to 59 year-old donors and less educated donors were at high risk for HCV seropositively (WHO, 1997).

Researchers reported the prevalence of seromarkers of HCV among blood donors in eastern Saudia Arabia. Between 1998 and 2001, 13,443 donors (10,778 Saudi and 2,665 non-Saudi) were screened for anti HCV antibody using commercial kits. There was a steady decrease in the anti HCV (1.04 and 0.59%) rates between 1998 and 2001, respectively (Bashawri, 2004).

In Karachi, Pakistan, a case-control study design was implemented to select cases and controls between 15 October 2001 and 15 March 2002. The overall seroprevalence of HCV in these blood donors was 1.8%. Trend analysis revealed a significant linear increase in proportions of HCV-seropositive donors from 1998 to 2002 (Akhtar S, et al, 2004).

2.3.2 Risk factor of HCV among Drug users:

Intra venous (IV) drug use accounts for about two thirds of all hepatitis C in the world. People who have infected drugs, even once, are at highest risk for hepatitis C (Garfein Rs, 1996).

In fact, the risk of getting HCV through IV drug users much higher than the risk of getting HIV-about 60% to 80% of IV drug users are infected with the hepatitis C virus versus 30% infected with HIV. The HCV virus is easily spread by sharing IV needles, syringes, or other equipment used to inject drugs (Garfein Rs, 1996).

Drug users are a heterogeneous group. Within all populations, but particularly vulnerable populations, power and control cannot be underestimated as co-factors in disease transmission. Street-based youth and women can be particularly vulnerable to lack of control over their environment. Without question, some people will inevitably begin to inject drugs. Some will use only once or twice, others will use periodically and a small Proportion will use over long, sustained periods of their lives. Early studies forecast a bleak prognosis of a brief, 1-year period from onset of injection (Garfein Rs, 1996).

High-risk drug behaviors occur more frequently in certain groups, due to complex social, economic and cultural factors. Prisoners have high rates of HCV infection (28 to 40%) and injection drug use with shared needles in the main risk factor underlying their higher risk (Patrick D, et al, 200)

Worldwide estimates of HCV infection range from 50% to 100% among drug injecting populations. It is estimated that 63% of new HCV infections in Canada each year are related to sharing needles, syringes, swabs, filters, spoons, tourniquets and water related to injection drug use **(**Canadian liver Foundation, 2000).

It has been estimated that there are up to 125,000 people in Canada who inject drugs (Wiebe J, et al, 2000). A 1996 study of injection drugs in British Columbia showed that 88% were infected with HCV. The results also revealed high levels of needle sharing, with 40 of participants having used needles and 40% of participants having borrowed used needles (Van Beek I, 1998).

A study was designed in rural south-east England as an opportunistic screening to estimate the prevalence of blood-borne viral infection among drug users in treatment in the rural population and to investigate related risk factors and use of general health services. A total of 102 patients aged 18years and over with problematic self reported use, recruited between February 1996 and end of January 1997, in a mixed urban-rural population in south-east England, were interviewed for information on socio-demographic status, drug use history. There was 55.8% (48/86) had HCV antibodies (Edeh J, et al, 2000).

In Rio de Janeiro, Brazil, injection drug users (IDUs) constitute a group of frequent exposure to many viral infections, since they usually engage in high risk sexual and injection behavior (Telles PR, et al, 1997) Furthermore, these subjects play a role as a reservoir and source of viral transmission in the inter-and extra-exposure categories.

Epidemiological data indicate that IDUs represent the largest risk group for HCV infection (Ebeling F, 1994).

2.3.3 Risk factor of HCV among Sexual Behavior:

Sexual transmission of HCV is not as common as transmission of HBV through this route. However, high-risk sexual behavior is associated with increased risk of getting hepatitis C include: multiple sex partners, prostitute use, traumatic sex, inadequate vaginal lubrication may increase the risk of exposure to infected blood , and sexual intercourse during menstruation.

Among married couples, the risk of transmission increases with the duration of marriage. It is not known whether transmission occurs through sexual intercourse or the sharing of household items (eg, toothbrushes, razors, etc.). If you have a sexual relationship with anyone who has any of the risk factors for HCV infection, you may want to get tested for HCV too (Terrault NA, 2002).

Gastroenterology Division, Department of Medicine, University of California, San Francisco, declared accumulated evidence indicates that HCV transmitted by sexual contact but much less efficiently than other sexual transmitted viruses.

Risk of HCV transmitted by sexual contact differs by the difference of the type of sexual relationship. Persons in long term monogamous partnerships are of a lower risk of HCV acquisition 0% to 0.6% than with multiple partners or those at risk for sexually transmitted disease 0.4% to 1.8% per year (Terrault NA, 2002)[a].

Couples can decide whether to use barrier methods. It is important that the HCV-infected person inform his or her partner when making this decision, however. Those who engaged in high risk behavior, such as having multiple sexual transmitted diseases, screening of HCV may be cohort and case control studies of acute HCV infection from 1995 to 2000

linked newly acquired cases to risk factors associated with exposure to infected blood or blood-derived body fluids (Alter MJ, 2002).

Although the risk of acquiring HCV by sexual contact remains less defined than the risk by exposure to infected blood, there is some evidence that HCV can be transmitted via this route. However, compared with other sexually transmitted viruses such as HIV and HBV, HCV seems to be transmitted less efficiency through sex (Terrault NA, 2002)[a].

In five studies in the United States the average prevalence of HCV infection among people who had no other risk factors except for being long term spouses of patients with chronic HCV infection was 1.5%. The estimated annual risk of sexual transmission of HCV from people with chronic HCV infection varies from 0 to 0.6% in monogamous relationships to 1% in relationships with multiple partners (Terrault NA, 2002)[b].

HCV seems to be transmitted more efficiently from men to women than from women to men. A study at a clinic for sexually transmitted diseases found that women with HCV-infected male partners had a seroprevalence rate of 10%, compared with 3% in women with no infected female partners was 7% compared with 8% among men with no infected female partners. (CDC, 1998) [a]. Other factors that seem to increase the risk of sexual transmission of HCV reasonable but is not universally recommended.

2.3.4 Risk factor of HCV among Hemodialysis Patients:

The prevalence of HCV positively among hemodialysis patients varies between 10 and 70%. Few previous surveys revealed high frequency of seroconversion of HCV negative patients over the years of hemodialysis. Only few studies reported HCV genotype variability (Zamir, Doron, et al, 1999).

An evaluation for all 65 patients on chronic hemodialysis in on big dialysis unit in Israel. All sera positive to anti-HCV on ELISA were retested by reverse transcriptase polymerase chain reaction (PCR) to HCV. Sixteen patients were found anti-HCV positive on ELISA,

and 8 of them were also PCR positive. Three of these eight patients seroconvert during the year 1995. Four patients had both 1a and 1b genotypes of HCV, coexistence of genotypes 1b and 4a in one patient and genotypes 1a, 1b and 2a in the remaining three patients. Genotype 1a and1b, as is true for the general population in Israel, were also the predominant genotype among hemodialysis patients (Zamir, Doron, et al, 1999).

This HCV prevalence, however, varies from country to country. In Turkey, according to European Dialysis and transplant Association (EDTA) data, HCV prevalence was 17.7% in 1993. A number of factors account for the increased risk of HCV infection among hemodialysis patients. These include blood transfusions, and duration of hemodialysis.

Othman B, and Monem F, 2001 published a study with a title of prevalence of HCV among hemodialysis patients in Damascus, Syria. Results of the study shows that the overall prevalence of HCV among hemodialysed patients was 88.6%. There was a significant correlation between prevalence of anti-HCV and duration of hemodialysis. The prevalence was 36.7% for patients on hemodialysis for one year, and 65% in patients on hemadialysis for > 3 years. So the author recommended an intensive education program for staff members and proper evaluation of the situation in the units of Hemadialysis (Othman B, Monem F, 2001).

The prevalence of HCV of seropositivity to hepatitis C, hepatitis B virus, and HIV in Haemodialysis patients was assessed in sera from 235 patients from 6 dialysis units in Tunisia. Anti-HCV antibodies were found in 106 patients (45.10%), hepatitis B surface antigen was found in 19 patients (8%) and no case of HIV infection was found. Anti-HCV positively was correlated with duration of dialysis ($P < 0.01$). There was no correlation between anti-HCV positively and the number of transfusion (Hmida S, et al, 1996).

A survey was conducted in the hemodialysis population of the Tocantins, Brazil. During January and March 2001, all patients (n=100) were interviewed at the unique dialysis unit

in Tocantins. All samples are tested for HCV. An overall HCV positive was 2%. Regarding HCV infection in Hemodialysis patients, studies showed rates ranging from 304% in the Netherlands, to more than 70% in Eastern Europe. In Brazil HCV rates 20.3%, 23.8%, and 33.4% and 39% were recently in some places (Karla P, et al, 2003).

2.3.5 Risk factor of HCV from Tattoos:

Tattooing as a risk factor for HCV infection has been controversial. Robert Haley and colleagues reported that individuals who had received a tattoo in a commercial tattoo parior were nine times more likely to be infected with HCV than people who had not been tattooed, and a study of prisoners in Norway found that tattooing was significantly associated with drug use. The data showed that people who reported having a tattoo had higher rates of HCV infection. However the risk of HCV was greatly increased if the tattoos had been done in jail. Since tattoo compounds in comparison to cosmetics are not officially controlled, the origin and chemical structure of these coloring agents are hardly known; even the tattoo manufacturers do not know which substances are punctured into the skin. There is no disclosure of the ingredients of these coloring agents. A variety of tattoo pigments has been analyzed recently (Baeumler W, et al, 2000).

Baeumler W, and others in 2000, showed that pigments are mainly industrial organic pigments with high microbiological and impurities load. The resulting health effects are numerous and to some extend documented as single case reports. On the basis of the cases reports collected in the literature we organised the present review along the axes: Infection risks and non-infection risks.

Transfusion- Transmitted- Diseases (TTDs) that can be transmitted by tattooing has been recently reviewed systematically (Nishioka S, et al, 2001). TTDs include viral, infections and diseases, bacterial infections and diseases and, fungal infections. Viral infections and

diseases potentially transmitted by tattooing include the following: HBV, HCV, HDV, HIV, Papilloma virus causing continuous infection, and Vaccinia.

Nishioka S and others in 2002 declared that, there is strong evidence for transmission of HBV infection, and HCV infection by tattooing. Tattooing may also transmit HIV.

Nishioka S de A, and others in 2002, conducted epidemiological studies which have shown a large variation in odds ratio estimates of the association between tattooing and HBV, HCV, and HIV infections. Another study tried to define risk factors associated with HCV transmission in patients without a previous history of infection drug use or blood transfusion before 1990. In this case control study, two independent risk factors of HCV were identified. These included a history of sexually transmitted disease, and presence of a tattoo. 88% of the cases of HCV had an identified risk factor for their HCV infection (Balasekaran R, et al, 1999).

In a recent study in the United States risk factors for blood-born infection were assessed by physician's interview of 626 consecutive patients undergoing medical evaluation for spinal problems in 1991 and 1992 while unaware of their HCV status. Later all were screened for HCV infection with ELIZA method, and positive were confirmed with second generation recombinant immunoblot assay (RIBA). Forty-three patients were seropositive for HCV, 91% of HCV infections, with tattooing explaining. It was clear also that Tattooing may have responsible for more HCV infections than drug use (Balasekaran R, et al, 1999).

2.3.6 Risk factor of HCV in the Dental office:

Thousands of people infected with the life-threatening hepatitis C virus may have caught it during routine dental treatment. Health campaigners warned that current practices in dental surgery, including the way tools are sterilized, may not be rigorous enough to remove the risk of transmion of highly infectious virus between patients. The hepatitis

viruses of most concern to the dentists are the blood borne HBV, HCV, and HIV. HDV can occur only as a co-infection with HBV. Seroprevalence studies indicate that oral surgeons are at increased risk of HCV infection, especially in areas of high prevalence (Thomas DL, 1996).

There is also evidence that dental treatment is strongly associated with the presence of antibodies to HCV in patients who don't have a history of blood transfusions or intravenous drug abuse (Mele A, et al, 1994).

2.4 Health education and communication for HCV

Achieving high levels of awareness concerning hepatitis C prevention and maximizing the number of infected persons identified require education and communication directed at health care and public health professionals, persons on groups at risk for infection, and the general public (CDC, Viral Hepatitis, 2005).

There is need for education and training initiatatives for HCV. Eighty-seven percent of city and country health departments provide education about HIV/AIDS while less than 50 percent provide hepatitis C education and training initiatives (CDC, 2001)[a].

Health education should concentrate on prevention messages and medical evaluation. HCV-specific information and prevention messages should be provided to infected persons and individuals at risk by trained persons in public and private health-care settings. Health education materials should include: General information about HCV infection. Risk factors for infection, transmission, disease progression, and treatment are main points in health education. Health education also includes detailed prevention messages appropriate for the population being tested. Written materials might also include information medical evaluation and social support, as appropriate (Nation Institutes of Health Consensus, 1997). Education can take different forms including videos, brochures, and formal class

room presentations repeated face to face sessions have been determined the most effective means.

2.5 Vaccine for HCV

HCV is a global epidemic, since 3% of the world's population was estimated to carry the virus. However preventive vaccine is not available yet and only a portion of the treated patients (genotype 1a and 1b) responds to the current therapy, co-administration of riba-interferon- a alpha. There are many challenging obstacles appear to develop HCV vaccine (Martin L, et al, 2000).

The hepatitis C virus, being RNA virus, can mutate rapidly in adaptation to the environment, thus contributing to the high sequence divergence of multiple viral isolates in the world. The highest heterogeneity has been found in the hyper variable region of the envelope glycoprotein 2, which contains a principal neutralization epitope. HCV also causes persistent infection in a high percentage of immunocompetent hosts despite active immune response. The lack of an efficient tissue culture system for propagating HCV and testing neutralizing antibodies adds further complexity to the task of vaccine development (Martin L, et al, 2000).

In order to develop an HCV vaccine, Researchers must learn more about how the immune system fights the virus-a process that is not completely understood. The immune system's response to HCV involves both antibodies against the virus (humoral immunity) and helper and killer T-cell activity (cellular immunity) (Liz Higheyman, 2003). Vaccines may work either by stimulating the production of antibodies or by promoting T-cell activity. Since naturally produced HCV antibodies do not seem to completely eradicate the virus, researchers don't hold out much that artificially induced antibodies alone will keep HCV under control. Studies suggest that killer T-cell activity is more strongly associated with

the protection than antibodies, and many vaccine candidates aim to stimulate both types of immune response (Liz Higheyman, 2003).

There are actually six major genotypes-of HCV. It also has further divisions known as subtypes, and even smaller variations called quasispecies. In order to be effective, an HCV vaccine will have to provide protection against all of these different strains to protect the body from infection or re-infection. Currently, many companies are developing and testing an HCV vaccine. It is believed that an effective vaccine will be developed within the next 10years (Alan F, 2000)

Chapter 3

Conceptual Framework

Chapter 3

3.1 Conceptual frame work for HCV risk factors

When I try to think about conceptual frame work for risk factors of HCV, I find out that it is necessary to review these risk factors that could affect the occurrence of HCV. Then find out ways of control for these risk factors.

Because HCV is spread from person to person through exposure to HCV-infected blood, activities that increase chance of exposure are considered risk factors. Risk factors of HCV are factors that do not seem to be a direct cause of the disease, but seem to be associated with occurrence of the infection in some way.

Having a risk factor for Hepatitis C makes the chances of getting a condition higher but does not always lead to Hepatitis C. Also, the absence of any risk factor does not necessarily guard you against getting Hepatitis C.

The list of risk factors mentioned for Hepatitis C in various sources includes: 1) People who had blood transfusions before June 1992, when sensitive tests for anti-HCV were introduced for blood screening. 2) People who have frequently exposured to blood products, these include patients with hemophilia, solid-organ transplants, chronic renal failure, or cancer requiring chemotherapy. 3) Health care workers who suffer needle- stick accidents, or exposed to blood contaminated material. 4) Injection drug users, including those who used briefly many years ago, and infants born to HCV-infected mothers **(**Leland. J, etal, 2001)[b].

These risk factors are described by authors, and details are mentioned in the literature review chapter. But I will try to put them all in the research. After collecting data and doing the necessary analysis, I will be able to identify these relevant factors which are considered as highly risk for getting the disease in Gaza.

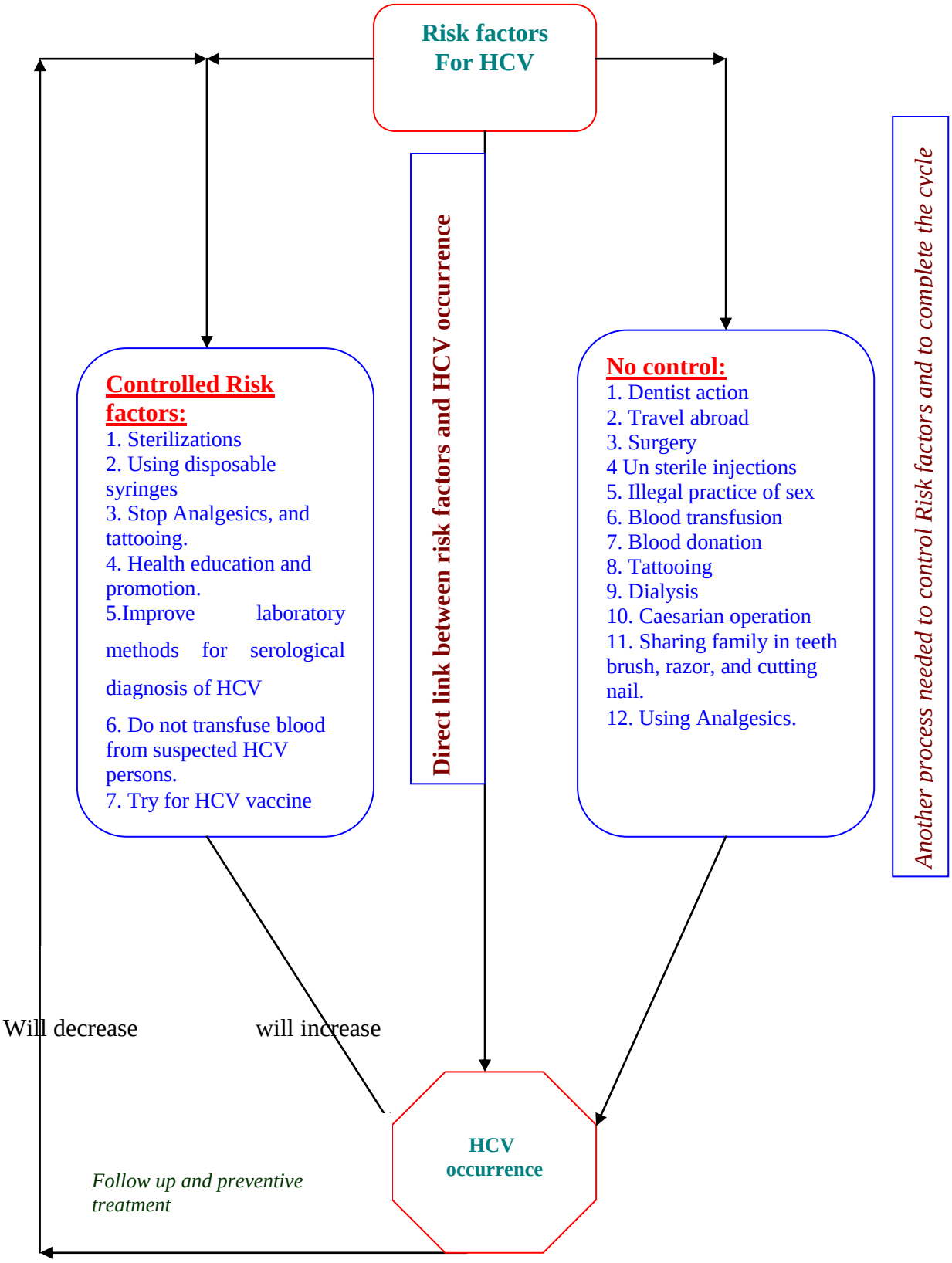
Based on experience, and local investigations, the most common risk factors are: blood transfusion, and blood donation, traveling abroad especially to the places of high risk of HCV, using unsterile injections, Drugs abuse , practicing illegal sex, tattooing, having surgery, doing caesarian operations, sharing families in brush, razor, and nail cutter. These risk factors are considered to increase the chance of getting HCV.

The magnitude of residual risk of getting the disease may differ within countries depending on group of factors. Firstly the sensitivity of the assays used for screening, secondly the level of HCV endemicity when prevalence is more, then risk is higher and thirdly on the prevalence of the risk factors in the countries.

Exploring the risk factors for HCV is important to set up methods used to control occurrence of HCV in the community. Setting up these methods depends on the Knowledge about the natural history of this virus, including its way of transmission, and identification of the most prevailing risk factors in the community

3.2 Conceptual frame work (Diagram)

3.1 Theoretical Diagram of Conceptual Framework



Since the discovery of HCV in 1989, significant advances have been made in our understanding of this important viral pathogen (Alter MJ, 1997).

Most of the infected persons are chronically infected and might not be aware of their infection, because they are not chronically ill. Infected persons serve as a source of transmission to others and are at risk for chronic liver disease or other HCV-related chronic diseases during the first two or more decades following initial infection (Alter MJ, 1997).

Reducing the burden of HCV infection and HCV-related disease requires implementation of primary prevention activities to reduce the risk of contracting HCV infection and secondary prevention activities to reduce the risk for liver and other chronic diseases in HCV-infected persons, by identifying HCV-infected persons through diagnostic testing and by providing appropriate medical management and antiviral therapy.

These primary prevention activities include: - Screening and testing of blood, plasma, organ, tissue, and semen donors, Virus inactivation of plasma-derived products, Risk reduction counseling and service, Implementation and, maintenance of infection-control practices (Williams& Wilkins, 1996).

It is known that screening is not recommended for general population, because it is costing too much money, and makes it non sense, where treatment is not available for the discovered cases. In cases of Hemophiliacs, intra venous drug users, hemodialyzed patients, blood donors and children born to mothers with HCV should also be screened for HCV. This screening will help in preventing transmission of HCV.

Secondary prevention activities include: - Identification, counseling, testing of persons at risk, and medical management of infected persons (Williams& Wilkins, 1996).

Professional and public education is considered as one of the important elements of comprehensive strategy to prevent and control HCV. Also another element is Surveillance

and research to monitor disease trends and the effectiveness of prevention activities and to develop improved prevention methods.

CDC report in 1998 has put recommendations provide guidelines for: a) the prevention of transmission HCV; b) the identification, counseling, and testing of persons at risk for HCV infection; and c) The appropriate medical evaluation and management of HCV-infected persons. Surveillance and evaluation activities are required to determine the effectiveness of the prevention programs in reducing incidence of disease. Identifying persons infected with HCV, providing appropriate medical follow-up and promoting health life styles and behaviors.

There are different elements of a comprehensive strategy to prevent and control hepatitis C virus (HCV) infection and HCV-related disease. (CDC, 1998)[b]. The control measures of HCV are different, sterilization of the instruments used in surgery is one of the most important ways used to prevent infection of this virus, and decrease the transmission between the people. The use of correct procedure for sterilization will also help in decreasing the number of HCV cases after visiting the dentist.

Scientists developed blood tests to identify hepatitis B (1963 of blood sample) and Hepatitis A (1973of blood sample) many of the blood samples taken for post-transfusion illness tested negative for hepatitis A and hepatitis B. Given that the mode of transmission (blood transfusion) was the same, scientists classified the unidentified cases as NANB hepatitis. It is now believed that approximately 90-95% of cases previously classified as (Non A, Non B) were actually hepatitis C (Steeff LB, 1995).

Improving laboratory method for serological diagnosis of HCV also help in early discovery of HCV cases, which will help in increasing the safety of blood supply, and decreasing the chance of transmission of the virus. This improvement includes the development of the procedure for testing HCV, and the development of the reagent used. Nowadays the

reagent used has high sensitivity and specificity than the other used in the few years ago. This new reagent helps in detecting the true positives, and the true negatives.

It is necessary to stop the bad happits during life such as using practicing illegal sex, and using tattooing. Stopping these bad happits also help in decreasing this public health problem. Tattooing makers must follow infection control procedures Using gloves, cleaning and disinfecting surfaces.

The incidence of HCV infection is higher among patients in the dialysis centers than the general population, despite strict protocols for infection control in the centers. The same dialysis equipment is used for many patients at a given hemodialysis center. If this equipment is not adequately sterilized, there is the possibility of transmitting the hepatitis C virus from one patient to another. So, Hemodialysis patients, they should have assigned specific dialysis stations. Clean and contemned areas should be separated. People who undergo regular hemodialysis should be tested for HCV because of their increased exposure to blood patients.

The transmission of HCV can occur via improper handling and cleaning of dental instruments. Although the risk is small it is a proven source of infection. In many developed countries, drug use is the major source of HCV infection.

In Europe up to 60-70% of IVDUs living in urban areas of the major cities, are anti-HCV positives. The rate of infection depends on the length of the time of drug abuse. To reduce the risk of getting HCV through IV drug use. The literature describes a set of preventable measures to ensure disserve prevention of the communities. First, prevent initiation of drug use, secondly, reduce harm-behaviors, and thirdly, avoid sharing of syringes and needles. For IV Drugs which can not or will not stop injecting drugs, we need to follow some instructions like: - Easy access to sterile syringes and, Safe disposal of used syringe.

Nonsocial transmission of HCV through unsafe injections and other medical practices or through unscreened blood remains a mjor problem in developed countries.

It is known that there is still no vaccine used for HCV. But it is necessary to continue the research to discover the suitable vaccine. This vaccine will help effectively in decreasing the chance of getting this virus. Absence of Hepatitis C vaccine at this stage will call for extensive primary prevention to minimize the hazards of getting the infection.

Finally, I think it is also important to search for treatment for this virus. It is clear that health care providers are doing efforts in this field to control the number of communicable diseases, including hepatitis. Setting up this conceptual frame work for my research with the title: Risk factors of HCV in Gaza. Palestine, is useful to avoid wasting time in thinking about these factors, and helpful in establishing good beginning to reach for the actual risk factors those are statistically significant in Gaza Strip. Palestine.

Chapter 4

Methodology

Chapter 4

Methodology

4.1- Introduction

This study is based on data collected by Gaza Health Service Research Centre in year 2004, through a project funded by European Union (E.U.), and part of regional study including Egypt, Algeria, Tunisia, and Turkey. In my study I am dealing only with the year 2004 data.

All the field work was conducted by specialized qualified nurses, who gathered the information about the reported cases of HCV. These nurses were subsequently trained by GHSRC how to select the controls for each positive case of HCV.

All positive cases for Hepatitis C in the year 2004 from the records of non governmental blood banks in Gaza, Khanyounis, and Rafah. Also the positive cases for HCV in the central governmental laboratories in Gaza Strip (Shifa, Naser, and Europian Gaza hospital) has been followed up by a group of public health seniors, lab specialists, and Health management information system specialists, to determine and monitor changes in the public health impact of HCV infection in Gaza Strip in order to optimize prevention strategies.

4.2 Design

This study is a quantitative, case control, retrospective study. Study population is the positive cases of HCV during the year of 2004.

In a case control study, it is very important to decide how the controls will be selected. The controls should be similar to the cases, except that they do not have the disease (HCV). GHSRC group followed this strategy in collecting the controls.

4.3 Sample and Sampling

All the reported positive cases are considered as cases for the study, and two controls were selected for each case. The study population include the reported cases (68 cases), and 136 control of blood banks and central laboratories in Gaza Strips, for year 2004.

According to GHSRC, two controls have been chosen for each positive case, one from neighboring, or community and the other from blood bank donors. Both controls were tested for HCV, and they were negative.

4.4 Selection of cases

Hepatitis C positive case is the one who has anti-HCV antibodies in the blood, and/or has HCV RNA or HCV core antigen detected.

This can be detected by Enzyme Linked Immunosorbent Assay (ELISA) method, but Polymerase chain reaction (PCR) method now is the choice of early diagnosis of HCV (Communicable Disease Surveillance and Response (CSR), WHO, 2005). Specially for this ELISA method was used to detect and diagnose the positive cases.

4.5 Selection of controls

According to GHSRC, two controls for each case have been selected. One control from the negative donors and the second from the same community.

4.6 Criteria of inclusion

Positive cases of blood donors recorded of blood banks and central laboratories in Gaza Strip in year 2004

4.7 Criteria of Exclusion

Prisoners, Heamodialysis patients, and Health workers (since there is no screening for these groups).

4.8 Setting

The reported cases are coming from the five districts in Gaza Strip. There are cases from Rafah, Khanyounis, Midde region, Gaza, and North region. At the time, controls are selected from the same localities.

4.9 Ethical consideration

According to GHSRC, discussion with the responsible people in the Ministry of Health (MOH), and the general directory of laboratories has been done before collecting the data.

In this study, the data is obtained from Gaza Health Service Research Centre as filled questionnaire. Discussion is done with the supervisor before using this data. The thesis study is self funded.

All the administrated procedures before data collection were completed by GHSRC administration. This includes Helsinki Committee agreement, and other administration procedures agreements. Attached Helsinki agreement for the project as a whole (annex number 4). Also attached some information about GHSRC (annex number 3).

The time of the implementation of the study is within Al Aqsa Intifada (2004), where difficult socio-political situation. M.O.H and School of Public Health support during this difficult time is necessary and appreciated.

4.10 Tool of the study

The cases and controls were been interviewed by using a questionnaire, designed by Gaza Health Service Research centre. The questionnaire was including demographic, socioeconomic, and other determinant variables to determine the risk factors associated with HCV infections.

4.11 Data collection

Data is collected by Gaza Health service Research Centre as filled questionnaires including demographic, socio-economic and other variables associated with the risk of getting HCV. Cases and Controls have the same chance to fill the same questionnaire.

4.12 Data entry

Over viewing of the questionnaires was the first step, prior to data entry. This step followed by designing an entry model using the computer Software Statistical Package for Social Sciences (SPSS).

Then the coded questionnaires were entered into the computer by the researcher. Data cleaning is done through checking out a random number of the questionnaires and through exploring descriptive statistics frequencies for all variables.

All suspected or missed values were checked by revising the available sheets.

4.13 Data analysis

It is done through frequency of the study variables. Description of the study population was done also.

Frequency Tabulation and Pie Chart are used to present the study variables.

A comparison between controls and cases for the risk factors. Chi square test, Odds Ratio, and P value are calculated. Statistically significant values are considered at P value is equal or less than 0.05.

4.14 limitations

1- Road closure and movement restrictions by Israel occupation forces resulted in difficulties to gain regular supervision and consultation.

2- Lack of literature review locally that we found difficulty in literature collection especially from local resources.

Chapter 5

Result & Discussion

Chapter 5

Results & Discussion

5.1 Distribution of subjects (Cases & Controls)

5.1.1 Distribution of subjects (Cases & Controls by Demographic Status:

Table No (5.1)

Subjects (Cases & Controls) and Demographic Status

Demographic Status		Subject				Total	
		Case		Control			
		No	%	No	%	No	%
Sex	Male	60	88.2	98	72.1	158	77.5
	Female	8	11.8	38	27.9	46	22.5
Total		68	100.0	136	100.0	204	100.0
Governorates	North	8	11.8	16	11.8	24	11.8
	Gaza city	32	47.1	64	47.1	96	47.1
	Mid zone	5	7.4	10	7.4	15	7.4
	Khan younis	15	22.1	30	22.1	45	22.1
	Rafah	8	11.8	16	11.8	24	11.8
Total		68	100.0	136	100.0	204	100.0
Living Area	Village	1	1.5	3	2.2	4	2.0
	Camp	25	36.8	39	28.7	64	31.4
	City	42	61.8	94	69.1	136	66.7
Total		68	100.0	136	100.0	204	100.0
Marital Status	Single	12	17.6	21	15.4	33	16.2
	Married	54	79.4	112	82.4	166	81.4
	Divorced			2	1.5	2	1.0
	Widow	2	2.9	1	.7	3	1.5
Total		68	100.0	136	100.0	204	100.0
Job level	Employee	12	17.6	11	8.1	23	11.3
	Worker	45	66.2	82	60.2	127	62.2
	House keeper	7	10.3	33	24.3	40	19.6
	Student	3	4.4	10	7.4	13	6.4
	Unemployed	1	1.5	--	--	1	.5
Total		68	100.0	136	100.0	204	100.0
Education level	Primary	13	19.1	11	8.1	24	11.8
	Preparatory	26	38.2	60	44.1	86	42.2
	Secondary	16	23.5	47	34.6	63	30.9
	Diploma	2	2.9	1	.7	3	1.5
	University	11	16.2	17	12.5	28	13.7
Total		68	100.0	136	100.0	204	100.0

5.1.2 Distribution of Cases and Controls by Governorates:

Table No (5.2)

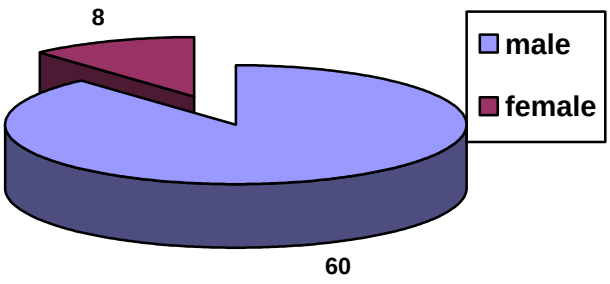
Distribution of Cases & Controls By governorates

overnorate	mber of Cases	Number of Controls	
		Blood Bank	Community
North	8	8	8
Gaza City	32	32	32
Midzone	5	5	5
hanyounis	15	15	15
Rafah	8	8	8
Total	68	68	68

Table number (5.2) shows that there were (68) cases from all the governorates in Gaza Strip. These cases are distributed as shown in table (5.1). Two controls are selected for each case (as shown in table 5.2). As total there are sixty eight controls taken from blood bank donors, and equal number of controls selected from the community.

5.2 Distribution of Cases by Demographic Status

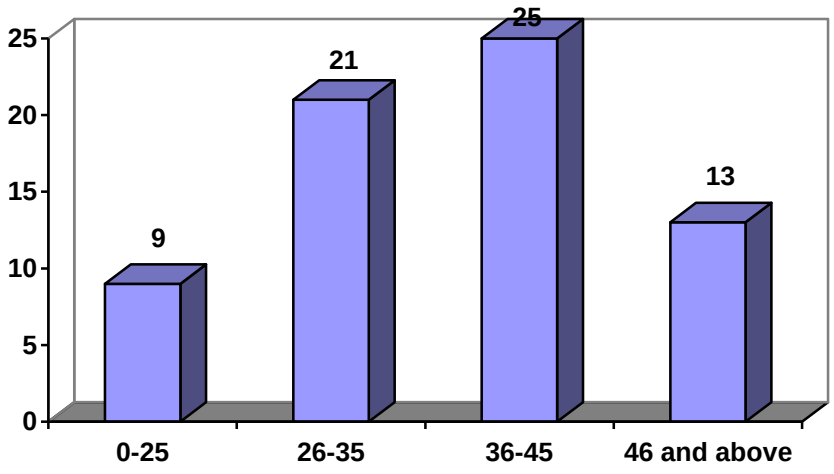
5.2.1 Distribution of cases by sex:



5.1 Distribution of cases by sex

It is clear from graph No (5.1) that most of the cases in Gaza Strip in year 2004 (60) are from males, while (8) cases only are females.

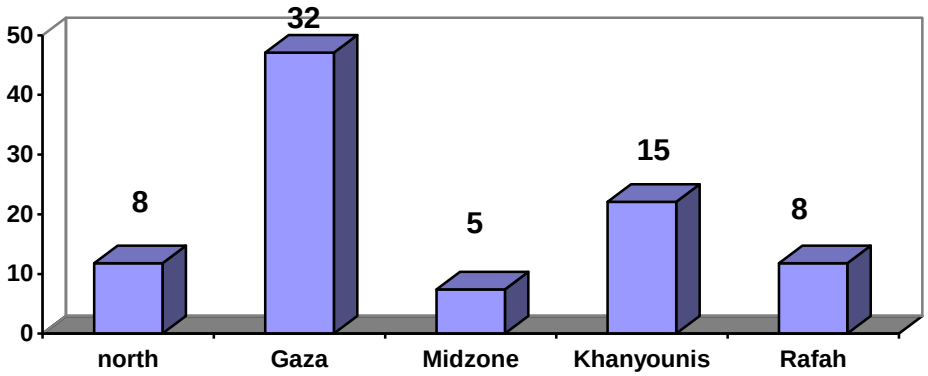
5.2.2 Distribution of cases by Age Group:



5.2 Distribution of cases by Age Group

It is clear from graph (5.2) that, number of cases up to 25 years old is equal to (9 cases). While it is (21 cases) in the age group of (26-35 years old). In the age group (36-45 years) it is (25 cases). The Last age group (46 and above), number of cases is (13).

5.2.3 Distribution of Cases by Governorate:

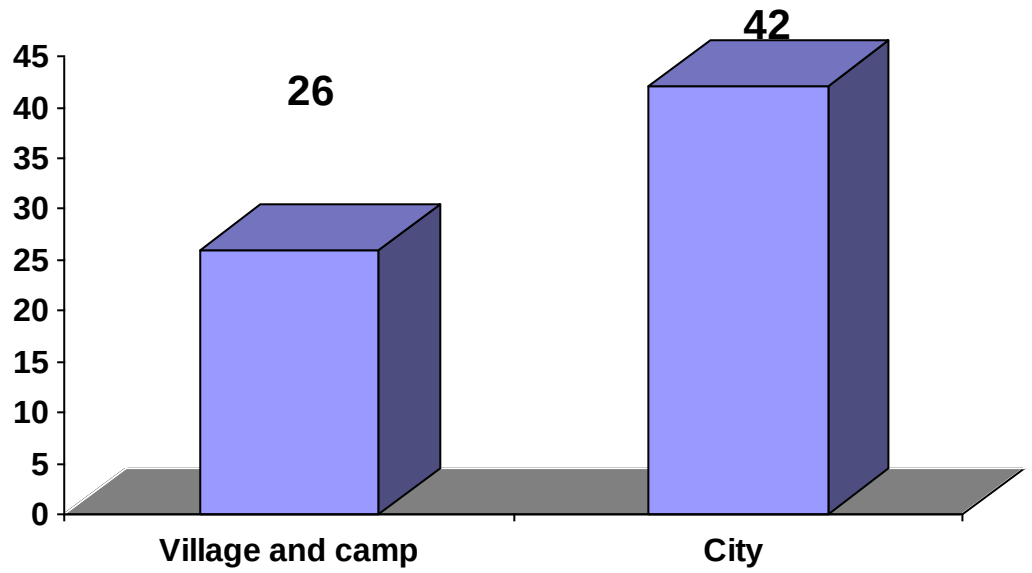


5.3 Distribution of cases by governorate

According to graph No. (5.3), number of cases in Gaza City is the highest (32), while it is 15 cases in Khanyounis. In North, and Rafah, the number of Cases is the same (8). The lowest number of cases (6) is in Midzone.

We have to state that these are the reported cases and that does not reflect the prevalence rate where there is variation in the number of population in each governorate.

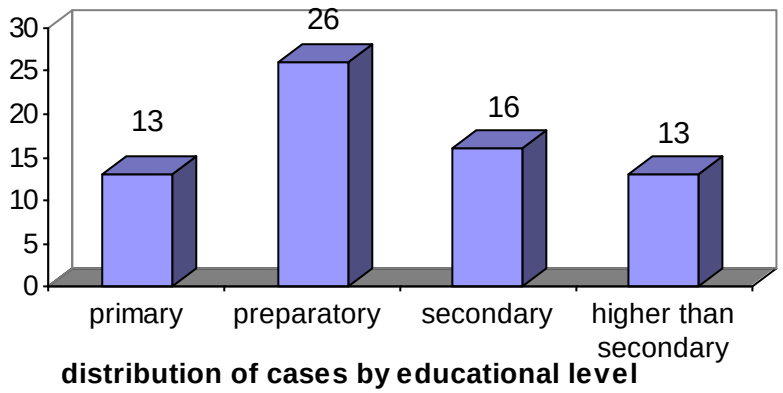
5.2.4 Distribution of Cases by Living area:



5.4 Distribution of Cases by Living Area

Graph No (5.4) shows that most of the cases are from the city (42 cases), while there are 26 cases from the village and camp.

5.2.5 Distribution of Cases by Education Level:



5.5 Distribution of Cases by Educational Level

From this graph No (5.5), we can conclude that most of the cases (26) are from Prep level, then (16) of the cases are from the Secondary level of education. Higher than Secondary, and Primary level of education have the same number of cases (13).

5.2.6 Distribution of Cases by Job Level:

From table No (1.5), we can conclude the distribution of cases by job level. It is clear that number of cases from the employees reached twelve (12), while from workers was forty four (44). From the other levels of job it was one (1) from police, seven (7) from house keeper, three (3) from students, and one (1) from unemployed.

Graph No 6 indicates that, fifty six of the cases are from employees and Workers, while twelve cases are from the other group (Police, Unemployed, House Wives, and Students).

5.3 Risk Factors

After studying the distribution of HCV cases by demographic statues, we will also explore the main risk factors that may affect HCV occurrence in Gaza Strip. These risk factors

could be demographic variables such as sex, age governorate, locality, job level, and education level.

Other risk factors that can affect HCV occurrence, are traveling abroad, health organization working, blood transfusion, blood donation, having surgery, having insulin injection, having caesarian section, having tattooing, dentist visit for treatment, use unsterile injection, use analgesics, making sure barber changing razor, practicing illegal sex, sharing family with teeth brush, sharing family with razor, sharing family with nail cutter and kidney dialysis.

We will explore each of these risk factors and its effect in HCV infection. It is clear that some of these factors will increase the chance of getting HCV, while others will not.

The difference between cases and controls will reach statistically significant level in some of these risk factors. While in others it will not reach that statistically level. This will depend on different situations. We will discuss each situation alone, and explain the reason of increasing or decreasing the chance of getting HCV.

5.3.1 Sex:

Table (5.3)

Hepatitis C and Sex

Sex	Subject				Total	
	Case		Control			
	No	%	No	%	No	%
Male	60	88.2	98	72.1	158	77.5
Female	8	11.8	38	27.9	46	22.5
Total	68	100.0	136	100.0	204	100.0

OR = 2.91 CI = 1.27 - 6.652 P Value < 0.01

As we have seen in table (5.3) that: 88.2% of the cases are of males, compared to72.1% of the controls, while in the females, the percentage of the cases are 11.8%, compared to the controls that reach 27.9%. The difference between the males and females reached highly statistical Significant level (P value <0.01).

This means that the chance of getting HCV in the group of males is higher than that in the group of females.

This finding can be explained that males are more exposed to risk factors such as traveling abroad, transfuse & donate blood, using tattooing, unsterile injections & using razor with barber, and practicing illegal sex. It is also clear that the percentage of working groups from males is higher than that of females, which make them more exposed to these risk factors than females.

These finding come in accordance with Texas Hepatitis C Surveillance, which was held in 2000-2003 showed that: Males were infected twice than females (1.8 to 1.0, as females). This result is also approved in the national data in USA, which indicate that the African –

American and Hispanic communities, males in particular, are disproportionately burdened by Hepatitis C infection (Alter MJ, 2002).

5.3.2 Age:

Table (5.4)

Hepatitis C and Age

Age	Subject				Total	
	Case		Control			
	No	%	No	%	No	%
less than 35	30	44.1	80	58.8	110	53.9
35 and Above	38	55.9	56	41.2	94	46.1
Total	68	100.0	136	100.0	204	100.0

OR =0.55 CI= 0.31 - 0.99 P value= 0.04

As we have seen in table (5.4) that: 55.9% of the cases are above 35 years old, compared to 41.2% of the controls, while in the group up to 35 years old, the percentage of the cases are 44.1%, compared to the controls that reach 58.8%. The difference between the groups reached statistical significant level (P value = 0.04).

This means that the chance of getting HCV in the group above 35 years is higher than that in the group below 35 years.

We can explain this result that older people due to time factor had more chance of getting HCV than the younger people, where chance of exposure is higher than young.

According to WHO Communicable Disease Surveillance & response, 2003 in Italy, the prevalence of HCV is greater than 5% in some communities. In one region, prevalence was 12.6% overall, the rate among persons younger than 30 years only 1.3% compared with 33.1% in those above 60 (WHO, 2003)[a].

As mentioned in literature review, Karen. F, and others in 2003 showed out that United States youth Risk Behavior surveillance which is held up in 1999, declared that Students of age 9-12 had injected illegal drugs. While those of age less than 13 years old are initiating sexual intercourse. Actually according to this study, we can conclude that our Palestinians in Gaza Strip are more exposed to HCV risk factors in age 35 and above, while the risk factor of practicing illegal sex is not significant.

5.3.3 Governorate:

Table (5.5)

Hepatitis C and Governorate

Governorate	Subject				Total	
	Case		Control			
	No	%	No	%	No	%
North	8	11.8	16	11.8	24	11.8
Gaza	]32	47.1	64	47.1	96	47.1
Mid Zone	5	7.4	10	7.4	15	7.4
Khan younis	15	22.1	30	22.1	45	22.1
Rafah	8	11.8	16	11.8	24	11.8
Total	68	100.0	136	100.0	204	100.0

This table shows that, the percentage of cases and controls are the same in all the Governorate.

This is exactly right, since we have done matching between cases and controls in all governorates. For each case, we have selected two controls, from the same Governorate.

5.3.4 Living Area:

Table (5.6)

Hepatitis C and living area

Living Area Group	Subject				Total	
	Case		Control			
	No	%	No	%	No	%
Village& camp	26	38.2	42	30.9	68	33.3
City	42	61.8	94	69.1	136	66.7
Total	68	100.0	136	100.0	204	100.0

OR = 1.39 CI = 0.75 - 2.55 P value = 0.29

This table shows out that 38.2% of the cases of HCV are of village and camp compared to 30.9% of the controls, while in the city the percentage of the cases is 61.8% compared to 69.1 of the controls.

Here we need to say that matching was done for the Governorate, but not for the Localities. This means that the study results showed that people who live in villages and camps are exposed to HCV more than those who live in city.

That could be explained by; the idea that area of village and camp is with low to moderate socio-economic level. Any how the difference between the groups did not reach statistical significant level (P= 0.29).

This result is supported by a study lasted in the area of Piraeus from January 1993 until December 1996. It showed out that the area with the low to moderate socio-economic level has highest percentage of HCV (Moyer LA, ét al, 1999).

5.3.5 Education Level:

Table (5.7)

Hepatitis C and Education Level

Education Level	Subject				Total		OR CI	P Value
	Case		Control					
	No	%	No	%	No	%		
Primary	13	54.2	11	45.8	24	100.0	**1.00**	**1.00**
Prep	26	30.2	60	69.8	86	100.0	**2.7 (1.00-1.76)**	**0.03**
Secondary	16	25.4	47	74.6	63	100.0	**3.47 (1.1710.46)**	**0.01**
Higher than secondary	13	41.9	18	58.1	31	100.0	**1.64 (0.49-5.53)**	**0.37**
Total	68	33.3	136	66.7	204	100.0	------	-------

This table shows the distribution of cases and controls by education level. We consider primary level as a base line for comparison with other educational levels. When we compare primary level with preparatory level, we found out the risk is higher among perpetrators where it is 2.7 fold higher than primary. The difference between the two groups is statistically significant (p value = 0.03).

This means, group of preparatory are more exposed to HCV infection than group of primary. They are more exposed to risk factors of HCV (travel abroad, blood transfusion …etc), and work hazards than group of elementary. When we compare between the group of elementary education level and secondary level group, we found out the risk is higher among secondary people, where it is 3.47 fold, higher than elementary.

The difference between the two groups is strong statistically significant (p value = 0.01). This means group of secondary is highly exposed to HCV than elementary group. We can

also explain the foundlings due to education level. Increasing education level means more exposure to HCV risk factors, and work hazards.

5.3.6 Job Level:

Table (5.8)

Hepatitis C and Job Level

Job Level	Subject				Total	
	Case		Control			
	No	%	No	%	NO	%
Employee & Worker	56	37.6	93	62.4	149	100.0
Others	12	21.8	43	78.2	55	100.0
Total	68	33.3	136	66.7	204	100.0

OR = 2.16 CI = 1.05 – 4.43 P value = 0.03

This table show's that 56 of the cases are from the group of Employees and workers, while 12 cases are from other group (house keeper, students, and unemployed). Also 37.6% of the cases are from the first group of Employee and worker, while 62.4 % of the controls from the same group. While 21.8% of the cases are from the second group, House keeper, --- etc). The difference between the two groups showed statistical significant level (p value = 0.03).

This indicates that, first group of workers and employees have more chance to get HCV than other group. We explain this result that group of workers and employees is more exposed to risk factors of HCV virus than the other group during their work. We join employee and workers together since this group is more exposed to the work hazards than the second group of unemployed.

5.3.7 Traveling Abroad:

Table (5.9)

Hepatitis C and Travel Abroad

Travel Abroad	Subject				Total	
	Case		Control			
	No	%	No	%	No	%
Traveled	39	57.4	33	24.3	72	35.3
Did not Travel	29	42.6	103	75.7	132	64.7
Total	68	100.0	136	100.0	204	100.0

OR = 4.19 CI= 2.26 - 7.81 P value < 0.01

The finding of this table shows that 57.4% of the cases are from the group who travel abroad, compared to 24.3% of the controls. The difference between the groups reached highly statistically significant level (P value <0.001).

This means that traveling abroad is considered as one of the strongest risk factor that increases the chance of getting HCV, especially when we know that this group has traveled to Egypt which is considered as one of the countries that have high prevalence rate of HCV among the world. And most of people have been referred to Egypt for treatment. Many of them has done surgeries their. Others visited barbers for shaving during their stay their.

This does not mean that people should not travel, but it means that when people are traveling to endemic localities have to be aware of exposure to risk factors such as shaving, blood transfusion,----etc.

According to WHO communicable Disease Surveillance & Response (CSR), Egypt has a

very high prevalence of HCV and a high morbidity and mortality from chronic cirrhosis, and hepatocellular carcinoma (WHO, 2003)[b].

5.3.8 Years of Travel:

Table (5.10)

Hepatitis C and Years of Travel

years of travel	Subject				Total	
	Case		Control			
	No	%	No	%	No	%
up to 2000	8	21.1	5	15.2	13	18.3
2000 and after	30	78.9	28	84.8	58	81.7
Total	38	100.0	33	100.0	71	100.0

OR= 1.49 CI= 0.444 - 5.11 P Value = 0.52

We can find from this table that 21.1% of the cases traveled abroad before 2000, compared to 15.2% of the controls. While 78.9% of the cases traveled 2000 and above, compared to 84.8% of the controls. The difference between the two groups is not statistically significant.

This means that year of traveling abroad up does not affect the chance of getting. This finding could be explained as, the Year of travel abroad is not classified as one of the risk factors of HCV.

The person can get HCV when he is exposed to any of the risk factors mentioned before in chapter two without consider year of travel.

5.3.9 Health organization working:

People who are working in health organization are only one case, while there is no control from this group, compared to 67 cases of the group who are not working in health organization, and all the controls are from this group. Any how, the difference between these two groups did not reach statistical significant level (P = 0.16).

This means that based on this study results in Gaza Strip, we cannot consider working in health organization as one of the risk factors that has an effect on increasing the chance of getting HCV.

This result could be described as, there is no recording for health worker cases, since there is no screening for this important group, and I could not reach to the positive cases. The only reported case gave history of working as a nurse before coming back to Gaza, and during the time of the study she was not one of the gaza health professionals.

5.3.10 Blood Transfusion:

Table (5.11)

Hepatitis C and Blood Transfusion

Previous Blood Transfusion	Subject				Total	
	Case		Control			
	No	%	No	%	No	%
Transfuse Blood	8	11.8	2	1.5	10	4.9
Did not Transfuse	60	88.2	133	98.5	193	95.1
Total	68	100.0	135	100.0	203	100.0

OR= 8.87 CI= 1.83 - 43.01 P value < 0.01

From this table, we find out that 11.8% of the cases have transfused blood, compared to 1.5% of the controls, while 88.2% of the cases did not transfuse blood, compared to 98.5%

of the controls. This difference between the groups has reached statistical significant level, (P value < 0.01).

This means that the group of people who has transfused blood is exposed to infection of HCV more than those who did not transfuse blood.

This result could be explained that during transfusion of blood, there is risk to get HCV, especially when the blood transfusion reported before the year 2000. This happens because of the poor techniques of lab at that time to detect HCV cases. Also there was no enough information about the disease, to control the disease way of transmission, and little health education activities.

A prospective study was carried out between 1996and 1999 in Brazil to determine the incidence of post-transfusion infection in surgery patients caused by HCV. In this study, 164 patients who received a blood transfusion were followed for Six months, and investigated HCV infection. The overall prevalence of HCV infection is 4.26% and the incidence of HCV infection after surgery was 1.27%. This study shows a high rate of HCV infection acquired post-transfusion in a cohort of surgery patients in Brazil (Nogueira CA, et al, 2002).

5.3.11 Blood Donation:

Table (5.12)

Hepatitis C and Blood Donation

Previous Blood Donation	Subject				Total	
	Case		Control			
	No	%	No	%		
Donate Blood	19	27.9	34	25.0	53	26.0
Did not Donate Blood	49	72.1	102	75.0	151	74.0
Total	68	100.0	136	100.0	204	100.0

OR= 1.16 CI = 0.061 - 2.24 P value = 0.65

We find out from this table that 27.9% of the cases have donated blood, compared to 25% of the controls, while 72.1 of the cases did not donate blood compared to 75% of the controls. Any how this difference between the groups did not reach statistical significant level (p value = 0.65).

This means that blood donation is not considered as a factor that increases the chance of getting HCV infection.

This result could be explained as using more advanced techniques in donating blood. Nowadays we are using sterile bags with sterile needles to collect the blood in. Also these needles used for collecting blood for testing before donations are sterile and disposable.

In Brazil Ajacio BM, and others, started a case control study in year 2002. One hundred and seventy eight blood donors with two positive ELISA results, and 356 controls tested negative. They used a standard questionnaire to collect data concerning demographic and

socioeconomic aspects, and number of donations. The prevalence of HCV among blood donors was 1.1%

5.3.12 Having Surgery:

Table (5.13)

Hepatitis C and Having Surgery

Having Surgery	Subject				Total	
	Case		Control			
	No	%	No	%	No	%
Have Surgery	36	52.9	11	8.1	47	23.0
Did not have	32	47.1	125	91.9	157	77.0
Total	68	100.0	136	100.0	204	100.0

OR = 12.79 CI= 5.87 - 27.79 P value < 0.01

From the findings, it is clear that 52.9% of the cases are from the group who has done surgery, compared to 8.1% of the controls. While there are only 47.1 of the cases from the other group that did not do any surgery, compared to 91.9% of the controls. This difference between the two a group is strongly statistically significant (P value< 0.001).

These figures show up that having a surgery is considered as one of the risk factors that increases the chance of getting infection with HCV. We can consider some reasons to support this relation. One of these reasons is the sterility procedure used in the operation rooms, the safety procedures for the health workers and the patients, and the effectiveness of the lab techniques to find out approximately all the blood units donated from HCV patients and do not give them to surgery patients.

All these factors and others could explain the strong relation between having surgery and the chance of getting HCV infection.

5.3.13 Surgery Frequency:

Most of the cases having surgery for once (33 case), while there are only three cases who did surgery for more than one time. Also p value (0.32) did not show any statistical level between.

So there is no effect for surgery frequency on chance of getting HCV. The patient may get it from the first time of surgery or from the second, or the third. This depends on reasons we have mentioned above (5.4.6) table 12.5.

5.3.14 Date of last Surgery:

Table (5.14)

Hepatitis C and Date of Last Surgery

surgery date group	Subject				Total	
	Case		Control			
	No	%	No	%	No	%
Up to 2000	21	58.3	3	27.3	24	51.1
2000 and Above	15	41.7	8	72.7	23	48.9
Total	36	100.0	11	100.0	47	100.0

OR= 3.73 CI = 0.85 - 16.45 P value= 0.07

This data show that 58.3% of the cases are from the group of people that have surgery before the year 2000, compared to 27.3% of the controls. While 41.7% of the cases are from the group that has surgery in the year 2000 or above, compared to 72.7% of the controls. Any how the difference between the two groups is not statistically significant (P value = 0.07).

In other meaning the risk of HCV infection during surgery did not depend on the date of last surgery. This result is explained as; the risk of getting HCV during surgery depends on factors such as sterility of the instrument, and not on the date of last surgery.

5.3.15 Having Insulin Injection:

Table (5.15)

Hepatitis C and Having Insulin Injection

Having Insulin Injection	Subject				Total	
	Case		Control			
	No	%	No	%	No	%
Having Insulin Injection	3	4.4	2	1.5	5	2.5
Did not have	65	95.6	134	98.5	199	97.5
Total	68	100.0	136	100.0	204	100.0

OR= 3.09 CI= 0.50 - 18.96 P value = 0.20

4.4% of cases compared to 1.5% of the controls are from the group of Subjects that had insulin injection. While 95.6% of cases compared to 98.5 of the controls arte from the group of subjects that do not have insulin injection. This difference between the two groups is not statistically significant (value=0.20).

This means that in Gaza Strip, there is no risk nowadays from the use of insulin injection. We also can say that the risk of getting HCV infection when using insulin injection is not higher than not using the injection.

The result is explained by the recent trend nowadays in our country by using sterile and disposable insulin syringe for all diabetics. So the risk of using it again like the situation in the past is finished. It is also clear that the role of health provider in our country in the development of health services helps in reducing number of cases of HCV through reducing the risk factors that increase the chance of getting HCV infection.

5.3.16 Having Caesarian Section:

The percentage of the cases is equal to that of the controls in both groups who done Caesarian, and who did not do it. This means that risk of getting HCV infection is not affected by having Caesarian or not (P value = 0.98).

I think there is nearly no effect of this factor, since there are very little number of cases from women group who has done the Caesarian (one case). Also sterility used nowadays during Caesarian, and other surgeries reduced the chance of getting HCV.

5.3.17 Having Tattooing:

Table (5.16)

Hepatitis C and Having Tattooing

Having Tattooing	Subject				Total	
	Case		Control			
	No	%	No	%	No	%
Having Tattooing	29	42.6	33	24.3	62	30.4
Did not have	39	57.4	103	75.7	142	69.6
Total	68	100.0	136	100.0	204	100.0

OR = 2.34 CI= 1.25 - 4.32 P value < 0.01

It is clear that 42.6% of cases are from people, who have tattooing, compared to 24.3% of controls. But 57.4% of cases are from the other group of people that do not have tattooing, compared to 75.7% of controls. This difference between the two groups reached high statistical level (P value < 0.01).

This means that the group that has tattooing is more exposed to HCV infection than that does not have tattooing. So tattooing is considered as one of the risk factors that increase the chance of getting HCV in Gaza.

This result is explained as, tattooing was done by needles which are not sterile, and used for more than one person. So this way of tattooing is considered as a way of transmission for hepatitis C virus. This was clear, since tattooing was done in the past years, and not recently. There was shortage in health education, and awareness about most of the public health problems such as HCV. But nowadays there is more awareness about these problems.

In 1991 and 1992, there was a study in U.S.A for detecting risk factors for HCV infection. This was assessed by physician's interview of 626 consecutive patients, later all were screened for HCV infection, and confirmed for the result. Forty three patients were seropositive for HCV. Logistic regression analysis identified four independent risk factors for HCV: injection-drug use (17% of positive cases), ancillary hospital jobs held by men (17 %), tattoos (41 %), and drinking (23%) (Haley RW, 2001).

Balasekaran R, and others conducted a case control study, three independent risk factors of HCV were identified. These included a history of sexually transmitted disease, heavy

alcohol intake, and presence of a tattoo. 88% of the cases of HCV had an identified risk factor for their HCV infection (Balasekaran R, et al, 199).

5.3.18 Tattooing Date:

Table (5.17)

Hepatitis C and Tattooing Date

Tattooing Date	Subject				Total	
	Case		Control			
	No	%	No	%	No	%
Up to 1994	26	89.7	24	72.7	50	80.6
1994 and above	3	10.3	9	27.3	12	19.4
Total	29	100.0	33	100.0	62	100.0

OR= 3.26 CI= 0.79 - 13.44 P value= 0.09

It is clear that 89.7% of cases are from group done it before year 1994, compared to 72.2% of controls. While 10.3% of cases are from group done tattooing after 1994, compared to

27.3% of controls. Any how the difference between the two groups did not reach statistically significant level (p value = 0.09).

This result is supported by the evidence that HCV is transmission is affected by methods of sterilization, and awareness, but not affected by the year of tattooing.

5.3.19 Dentist Visit:

Table (5.18)

Hepatitis C and Dentist Visit

Dentist Visit	Subject				Total	
	Case		Control			
	No	%	No	%	No	%
Visited Dentist	63	92.6	66	48.5	129	63.2
Did not visit	5	7.4	70	51.5	75	36.8
Total	68	100.0	136	100.0	204	100.0

OR =13.36 CI= 5.06 - 35.28 P Value<0.01

This table shows that 92.6% of the cases are from the group that has visited the dentist, compared to 48.5% of the controls. While 7.4% only of the cases are from the group that did not visit the dentist, compared to 51.5% of the controls. The difference between the two groups is highly statically significant (P value < 0.001).

This means that the group that visited the dentist complaining from some dental pain shows highly risk of getting HCV infection than other group that did not visit the dentist.

I think this result is explained as; the risk of getting Hepatitis C virus infection during the visit of the dental clinic is high. This is due to the risk comes from the use of unsterilized

instruments, or following wrong procedure for sterilization to decrease the time waiting for this process and even do not have autoclave.

I think this also shows how much it is necessary to visit the private clinics for dentists and other doctors to evaluate the situation, and even not giving the license for the clinic to work.

Mele A, and others in 1994 mentioned that, there is evidence that dental treatment is strongly associated with the presence of antibodies to HCV in patients who don't have a history of blood transfusions or intravenous drug abuse.

5.3.20 Dental Action:

Table (5.19)
Hepatitis C and Dental Action

Dental action	Subject				Total	
	Case		Control			
	No	%	No	%	No	%
Extraction	12	44.4	15	55.6	27	100.0
Else	51	50.0	51	50.0	102	100.0
Total	63	48.8	66	51.2	129	100.0

OR = 0.80 **CI = 0.34 – 1.88** **P value = 0.61**

We can see that 44.4% of the cases are from the group that has done extraction, compared to 55.6 % of the controls. While equal percentage (50.0 %) of cases and controls are from the other group which has done other actions, such as the ordinary filling, filling the nerve, surgery, and cleaning. Any how, the difference between the two groups is not statistically significant (p value = .0.61).

This means that in this study, we can not consider any of the two groups (extraction, or others) as a factor that increases the chance of getting HCV infection.

We explain this result by mentioning that the sterility of the dentist tools is the most important factor that increases the chance of getting HCV, and not the type of action taken inside the clinic.

5.3.21 Use of Unsterile Injection:

Table (5.20)
Hepatitis C and Use of Unsterile Injection

Un Sterile Injection Use	Subject				Total	
	Case		Control			
	No	%	No	%	No	%
Use Un sterile Injection	10	14.7	2	1.5	12	5.9
Did not use	58	85.3	134	98.5	192	94.1
Total	68	100.0	136	100.0	204	100.0

OR = 11.55 CI= 2.45 - 54.38 P Value < 0.01

Data collected about the variable of using un sterile injection shows that 14.7% of the cases are from the group used un sterile injection, compared to 1.5% of the controls from the same group. While 85.3% of the cases are from the second group that did not use un sterile injection, compared to 98.5 of the controls.

This shows that the variable of using unsterile injection is considered one of the risk factors for HCV infection, and the group that has used unsterile injection was more exposed to HCV infection than the other group. This difference between the two groups is statistically significant (P value < 0.01).

Unsterile injection will help in the transmission of HCV since this un sterile injection may be contaminated with this virus. This is considered as one of the strongest risk factors for HCV. People in the past were using this type of injection; nowadays using disposable injections decreases the transmission of HCV.

Dr Sudarshan Kumari, Regional Adviser, WHO/SEARO talked about this risk factor in his article titled (overview of Hepatitis C problem in countries of the South-East Asia Region). He found out almost three-fourths of the injectable drug addicts tested in Nepal are carriers of HCV. An estimated 40,000 youth in the age of 18-25 are considered to be injectable drug users and most of them are anti-HCV positives (WHO, 2003)[a].

Also, in USA, it is estimated in year 2000, 17,000of 30,000 new cases of HCV occurred among intra drug users. (Armstrong GL, et, al, 2000). In Canada, injection drug use is currently the most important risk factor for HCV infection. It has been estimated that the average prevelance of HCV among Drug Users is 80% (Chaudhary RK, 1992).

5.3.22 Use Analgesics:

Table (5.21)
Hepatitis C and Use of Analgesics

Using Analgesics	Subject				Total	
	Case		Control			
	No	%	No	%	No	%
Using	16	23.5	30	22.1	46	22.5
Did not Use	52	76.5	106	77.9	158	77.5
Total	68	100.0	136	100.0	204	100.0

OR= 1.39 CI= 0.54 - 2.17 P value= 0.81

This table shows that nearly there is no difference between cases and controls percentage in the two groups of Analgesics using. The difference between the two groups is not statistically significant (P value= 0.81).

It is also clear that few percent of the cases are using Analgesics, while most of the cases are not using Analgesics.

This result shows that this factor of using Analgesics is not considered as a risk factor for HCV, and using these Analgesics will not increase the chance of getting HCV infection.

In this part of the study, there was confusion during data collection and subjects (cases and controls) were confused by the use of analgesics and narcotics. Accordingly higher percentage was reported as receiving drugs. It was difficult to specify those who are receiving narcotics.

5.3.23 Making Sure Barber Changing Razor:

Table (5.22)
Hepatitis C and Making Sure Barber Changing Razor

Make Sure Barber Changing the Razor	Subject				Total	
	Case		Control			
	No	%	No	%	No	%
Make sure	56	91.8	92	92.9	148	92.5
Did not	5	8.2	7	7.1	12	7.5
Total	61	100.0	99	100.0	160	100.0

OR=0.85 CI= 0.26 - 2.82 P value = 0.79

This table shows that 91.8% of the cases are making sure that barber is changing the razor before starting with another one, compared to 92% o the controls. While 8.2% only of the

cases did not make sure that barber is changing the razor, compared to 7% only from the controls.

This means that there is no difference between cases and controls in this factor. In other meaning, we can say that making sure that barber is changing the razor is not considered as one of the risk factors that affecting the chance of getting HCV.

This is proved since the difference between the two groups did not reach statistically significant level. This is explained as, most of the people in our society are awarded from this point, and they always asking this question to the barber if he did not change it alone.

5.3.24 Practicing Illegal Sex:

One case only from 68 cases reported practicing illegal sex, while we could not find any of the controls doing that could not have any positive answer among the controls.

This founding is logic in our country, since there is big confusion between our religious attitudes and these things.

In other societies, it is also clear that practicing illegal sex is considered as one of the poor risk factors for HCV. This was clear in the studies held in U.S.A. In five studies in the United States, the estimated annual risk of sexual transmission of HCV from people with chronic infection varies from 0-0.6% (CDC, 1998)[a].

5.3.25 Sharing Family in Teeth Brush:

All the cases of HCV and the controls are not sharing their families in their brush. So this Factor can not be considered as one of the risk factors for HCV in Gaza Strip.

In the past it may be considered as risk factor, but nowadays most of the people are educated well, and have high level of awareness. They do not using the brush of others even that of their family

5.3.26 Sharing Family with Razor:

From the data collected, it is clear that all the cases are not sharing their families with

razor, same as the controls.

It is also clear that 8 cases and 39 of the controls are females who did not use razor. They did not answer this question.

This means that people nowadays do not share family with razor and this factor is not considered as one of the risk factors that increase the chance of getting HCV.

This happens because of the improvement of health education programs, and level of awareness of people. These programs helped in decreasing number of non –communicable diseases in our country like HCV.

5.3.27 Sharing Family with Nail Cutter:

Table (5.23)
Hepatitis C and Sharing Family with Nail Cutter

Sharing Family with Nail Cutter	Subject				Total	
	Case		Control			
	No	%	No	%	No	%
Share family	3	4.4	3	2.2	6	2.9
Did not share	65	95.6	133	97.8	198	97.1
Total	68	100.0	136	100.0	204	100.0

OR= 2.05 **CI= 0.41 - 10.42** **P value= 0.38**

This table shows that 4.4% of the cases are from the group who shred their family with the cutter nail, compared to 2.2% of the controls. While 95.6% of the cases are from the second group who did not share their families with the cutter nail, compare4d to 97.8% of

the controls. Any how this difference between these two groups did not reach statistical significant level (p value= 0.38).

We can say that sharing family with cutter nail is not considered as one of the risk factors that increase the chance of getting HCV.

Also the explanation for this result is, the awareness that people have nowadays about this public health problem, and the effort of health providers all over the world to clarify the ways of transmission of HCV, and the main risk factors for this important disease.

5.3.28 IV Kidney Dialysis:

All cases are asked about this factor, and all answered they did not do hemodialysis.

So, we can not consider hemodialysis as one of the risk factors in our country, but actually all over the world, Hemodialysis is considered as one of the important risk factor that affects HCV infection.

Othman B, and Monem F, in 2001, held a study among hemodialysis patients (HD), transplant recipients and staff members for two dialysis units in Damascus, Syria. They found out that, the over all prevalence of HCV among HD patients was 48-9%, 24.4% in one centre (AL-Moussat Hospital), and 88.6% in the (kidney Hospital).

Also, there was a survey conducted in the hemodialysis population of the state Tocantins, Brazil, to asses the prevalence of HCV. A sample of (100) patients were tested for HCV. Prevelance of HCV was of 16%. (Karla P, and others, 2003).

5.4 Summary

5.4.1 Risk factors (Statistically significant):

Table (5.24)

Hepatitis C and Statistically Significant Risk Factors

Risk factor		Cases		Control			Total	odd Ratio	P-value
		No	%	No	%	No	%		
1.Traveled Abroad	**Yes**	39	75.4	33	24.3	72	35..3	**4.19**	**<0.01**
	No	29	42.6	103	75.7	132	64.7		
2. Blood Transfusion	**Yes**	8	11.8	2	1.5	10	4.9	**8.87**	**<0.01**
	No	60	88.2	133	98.5	193	95.5		
3. Surgery Operation	**Yes**	36	52.9	11	8.1	47	23	**12.79**	**<0.01**
	No	32	74.1	125	91.9	157	77		
4. Tattooing	**Yes**	29	42.6	33	24.3	62	30.4	**2.34**	**<0.01**
	No	39	57.4	103	75.7	142	69.6		
5. Dental Visits	**Yes**	63	92.6	66	48.5	129	63.2	**13.36**	**<0.01**
	No	5	7.4	70	51.5	75	36.8		
6. Used Un Sterile Injection	**Yes**	10	14.7	2	1.5	12	5.9	**11.55**	**<0.01**
	No	58	85.3	134	98.5	192	94.1		

5.4.2 Risk factors (Statistically Not Significant):

Table (5.25)
Hepatitis C and Statistically Not Significant Risk Factors

Risk factor		Cases		Control		Total		odd Ratio	P-value
		No	%	No	%	No	%		
1. Blood Donation	**Yes**	19	27..9	34	25	53	26	**1.16**	**0.65**
	No	49	27.1	102	75	151	74		
2. Insulin Injection	**Yes**	3	4.4	2	1.5	5	2.5	**3.09**	**0.20**
	No	65	95.6	134	98..5	199	97..5		
3.Using Analgesics	**Yes**	16	23..5	30	22..1	46	22..5	**1.39**	**0.81**
	No	52	76..5	106	77..9	158	77..5		
4. Checking Barber change Razor	**Yes**	56	91.8	92	92..9	148	92..5	**0.85**	**0.79**
	No	5	8.2	7	7.1	12	7.5		
5.Caesarian Section	**Yes**	1	14.3	5	13..9	6	14. 0	**1.03**	**0.98**
	No	6	85.7	31	86.1	37	86. 0		
7. Sharing Nails cutter.	**Yes**	3	4	3	2.2	6	2.9	**2.05**	**0.38**
	No	65	95.6	133	97.8	198	97.1		

- Practicing illegal sex=

one case only, and there is no control (p value= 0.16)

-Sharing family with brush:-

All cases and controls answered not sharing family with teeth brush, and razor.

Chapter six

Conclusion & Recommendations

Chapter Six

Conclusion and Recommendation

6.1 Conclusion

In an attempt to define the main risk factors for hepatitis C in Gaza Strip - Palestine, the current study was conducted as a part of my study at school of public health.

The study findings might help in decreasing the prevalence of HCV in Gaza, and adopting suitable polices for prevention of HCV.

Palestinians enjoys very low prevalence rate of HCV infection**.** The highest prevalence of infection is found among those had traveled abroad in general and visited Egypt in specific. This may correlated with high prevalence rate of anti-HCV that reported in the general population and healthy blood donors in Egypt.

In addition, blood transfusion and using non sterile injection have a role in HCV transmission. Also visiting dentist for treatment, having surgery, and tattooing have important role in increasing the chance of HCV infection. These last risk factors could be reduced to minimum by following correct way of sterility.

There are also some risk factors considered in other countries as important, but in our country we can not mention them as important factors in HCV transmission. These factors are: blood donation because of advanced lab diagnosis. Having insulin injection is not of the risk factors in our country, since patients used sterile syringes. Practicing illegal sex is not also one of risk factors for HCV in our country, because of religious and culture factors that do not allow for these things. Sharing family with teeth brush, nail cutter, and razor also are not considered as risk factors for HCV, since there is high level of awareness about this public health problem.

Knowledge of these risk factors might help in minimizing ways of transmission of HCV, and holding appropriate policy for prevention of this important disease that is considered as global problem. Knowledge of these risk factors that affecting transmission of HCV Gaza Strip, will help in applying preventing policy for HCV. This policy may help in decreasing cases of HCV in other countries.

Also it is clear from results of this study that there is difference between risk factors of HCV in our country, and these in Western or Europe countries. Practicing illegal Sex, and using narcotics are clear examples for this difference. They are not considered as important factors. It is also clear from this study that we could not include cases of health workers, hemodialysis patients, and prisoners in the study. They were not included in this study. I hope that there will be screening for these groups, in order to

clarify the risk factors affecting their exposure to HCV. I hope in future, there will be effective vaccine for HCV. Also I hope development of diagnosis methods of the disease, and knowledge of its genotypes, will help in control and treatment of cases. This will give the hope for chronic patients to

get ride of this disease. Finally I would like to say that, this study might help in decreasing prevalence Rate of HCV in Palestine, and surrounding countries.

6.2 Recommendation

1. Establish a sentinel surveillance system to monitor the changes in HCV infection Prevalence and genotype distribution in Palestine Authority.

2.Develop laboratory methods for serological diagnosis of HCV infection; study the early immunological response in incident HCV infections**,** and doing PCR for positive cases of HCV.

3.Clarify the role of hepatitis C in the occurrence of acute and fulminated hepatitis.

4. Increase the effort in searching for HCV vaccine.

5. Develop health education programs about HCV, its risk factors, and way of transmission in Palestine.

6- People must be aware about HCV risk factors when they travel to endemic localities.

7- Start screening system for HCV to all health workers in Palestine

8- Continuous checking of sterility procedures done in all surgery rooms before starting the work.

9- Avoid tattooing, since it is one of the important risk factors about HCV.

10- To start continuous visits for the dental clinics (private, and governmental) to make sure of the sterility procedures, and even not to give the license unless it is good.

11- We need to check tat barber is changing razor, and not sharing our family with nail cutter or teeth brush.

6.3 Future Research Recommendations

1- Start Surveillance about the challenges of HCV vaccine.

2- Held up a study about HCV genotypes in Palestine.

3- Include Heamodialysis patients, prisoners, and health workers in a study about risk factors of HCV in Palestine.

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GHSRC QUESTIONNAIRE

Risk Factors of Hepatitis C

In Gaza STRIP

Serial Number : ……..

NAME : ……..

ID. No. : ……...……

AGE : …….

SEX	Male□	Female□	
GOVERNERATE	North□	Gaza□	
	Midde Zone□	Khanyounis□	
		Rafah□	
AREA	Village□	Camp□	City□
MARTITUAL STATUS	Single□	Married□	
	Window□	Directed□	
JOB LEVEL	Employee□	Worker□	
	Police□	Health Worker□	
EDUCATION LEVEL	Primary Orless□	Proparatory□	
	Secondary□	Diploma□	
	Universtiy□	Posgraduate□	

Health Determinants

1. Did you travel abroad ?

□ Yes No□

□ Country……..

□ Date……..……..

2. Did you Work in Health organization ?

□ Yes No□

□ Work type ……..…..

□ Work place ……..

3. Did you have Blood transfusion ?

□ Yes No□

Transfusion frequency ……..…

Date of last Transfusion ……..

4. Did you donate blood ?

□ Yes No□

Donation frequency …….

Date of last Donation …….

5. Have you done surgery ?

□ Yes No□

surgery frequency ……

Date I last surgery ……..

6. Are you doing Renal Dialysis ?

□ Yes No□

Date of starting Dialysis …….

7. Do you take insulin Injection ?

□ Yes No□

Date of starting treatment …….

8. Have you Done Caesarian Section ?

□ Yes No□

Caesarian Frequency ……..

Date of last Caesarian ……...

9.Have you Tattooing on your body ?

□ Yes No□

Date of last Time …….

10.Did you visit Dentist ?

□ Yes No□

What type I action ……..

Date of last Time ……

11. Did you use unsterile injection ?

□ Yes No□

□ Date …….

12- Did you use analgesics ?

□ Yes No□

13- Are sure that Barber changing the Razor ?

□ Yes No□

14- Did you practice illegal Sex ?

□ Yes No□

15- Did you share family with Teeth brush ?

□ Yes No□

16- Did you share family with Razor ?

□ Yes No□

17-Did you share family with nail cutter ?

□ Yes N

استبيان من مركز غزة للبحوث الصحية

عوامل الخطر في الإصابة بالالتهاب الكبدي من نوع (c) في قطاع غزة

تاريخ الزيارة

الاسم رباعيا :----------

رقم الهوية : ----------

العمر : ----------

الجنس	□ذكر	□أنثى	
العنوان (المنطقة)	□الشمال	□غزة	
	□الوسطى	□خانيونس	
	□رفح		
مكان السكن	□قرية	□مخيم	□مدينة
الحالة الاجتماعية	□أعزب	□متزوج	
	□مطلق	□أرمل	
نوع العمل	□موظف	□عامل	
	□شرطي	□عامل صحي	
المستوى التعليمي	□ابتدالي أو قل	□إعدادي	
	□ثانوي	□دبلوم	
	□جامعي	□دراسات عليا	

المحددات الصحية

1-هل سبق لك السفر للخارج :

نعم □ □ لا

□ البلد :.....

□ التاريخ :.....

2- هل سبق وعملت في مؤسسة صحية

نعم □ □ لا

نوع العمل : .....

مكان العمل : .....

3- هل سبق أن نقل لك دم

نعم □ □ لا

□ كم مرة ؟: .....

□ تاريخ آخر مرة : .....

4- هل سبق أن تبرعت بدم ؟

نعم □ □ لا

□ كم مرة ؟: .....

□ تاريخ آخر مرة : .....

5- هل أجريت لك عملية جراحية ؟

نعم □ □ لا

□ كم مرة ؟: .....

□ تاريخ آخر مرة : .....

6- هل تقوم بعمل غسيل كلوي ؟

نعم □ □ لا

□ تاريخ بدء عملية الغسيل : .....

7- هل تتعاطى حقن أنسولين ؟

نعم □ □ لا

□ تاريخ بدء العلاج :.....

8-هل أجريت لك عملية ولادة قيصرية ؟

نعم □ □ لا

□ كم مرة ؟: .....

□ تاريخ آخر مرة : .....

9- هل يوجد وشم على جسمك ؟

نعم □ □ لا

التاريخ: .....

10- هل زرت طبيب الأسنان ؟

نعم □ □ لا

□ ماهو نوع الإجراء: .....

□ تاريخ آخر مرة : .....

11-هل سبق لك استخدام حقن غير معقمة ؟

نعم □ □ لا

التاريخ: .....

12- هل سبق وأن تعاطيت المسكنات ؟

نعم □ □ لا

13 -هل تتأكد أن الحلاق غير موس الحلاقة عند زيارتك له ؟

نعم □ □ لا

14- هل مارست الجنس خارج نطاق الزواج ؟

نعم □ □ لا

15- هل تشارك أفراد أسرتك في استخدام فرشاة الأسنان ؟

نعم ☐ ☐ لا

16- هل تشارك أفراد أسرتك في استخدام موس الحلاقة ؟

نعم ☐ ☐ لا

17- هل تشارك أفراد أسرتك في قصافة الأظافر ؟

نعم ☐ ☐ لا

Gaza Health Services Research Center

The Gaza Health Service Research Center (GHSRC) was established in 1981 as a vital statistics, epidemiology, and health information center for the government health services in Gaza. In 1986 the center was designated as World Health Organization (WHO) collaborating center in Primary Health Care Research. WHO provided additional resources and staff in order to carry out research activities in a variety of areas related to the health of the Gaza population.

Since 1986, the GHSRC has recruited additional staff, carried out training and development activities, and initiated research projects in Primary Health Care (PHC) fields.

After the arrival of the Palestinian National Authority (P.N.A.), This center has participated actively in the reform of health care system in Palestine through the establishment of new health services units such as the Directorate for Planning, Research and Development, Community Mental Health, Women Health and Health Education Departments.

On September 1995, The Gaza Health Services Research Centre hosted and organized in collaboration with the University of Birmingham a meeting on the Future of Palestinian Health Research. This meeting was sponsored by the European Commission as part of the Accompanying Measures of the International Collaboration program of DGX 11.

The Gaza Health Services Research Center has done remarkably well in pursuing its objectives taking into consideration the limited facilities available. Reviewing the activities carried out in five years; the center performance in quite impressive.

However, a research center with a broad scope of aspirations like GHSRC deserve more effective support from all related to the field parties computerization should continue, the

soft ware library should be brought to life. Manpower should receive more support. More seminars, meetings and training should be done.

Such a center should be allowed to flourish and prosper to ensure the local community good health programs.

بسم الله الرحمن الرحيم

Palestinian National Authority
Ministry of Health
Helsinki Committee

السلطة الوطنية الفلسطينية
وزارة الصحة
لجنة هلسنكي

Date: 22/11/2000

التاريخ :

Mr./Ms/
Gaza Health Services Research Center

السيدة : مركز غزة للبحوث الصحية

I would like to inform you that the committee has discussed your application about:

نفيد سيادتكم علما بأن اللجنه قد ناقشت طلبكم حول موضوع :-

Viral Hepatitis Surveillance in Mediterranean Countries

تقصي مرض الالتهاب الكبدي الفيروسي في دول البحر المتوسط

on its meeting on ***November 2000*** and decided the following.

في جلستها المنعقدة بتاريخ نوفمبر 2000 وقد تم الاتفاق على :

To approve the above Mention

الموافقة على البحث المذكور بعاليه

Signature
توقيع

Chairman
رئيس اللجنة

Conditions:-
1. Valid for 2 years from the date of approval to start
2. It is Necessary to notify the committee in any change in the Admitted study Protocol
3. The Committee appreciate receiving one copy of your final research when it is completed

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