CAPITAL UNIVERSITY OF SCIENCE AND TECHNOLOGY, ISLAMABAD

Prevalence of Hepatitis B and Hepatitis C in Relation to Minor Risk Factors in Kahuta Region

by

Hammad Safdar Ali

A thesis submitted in partial fulfillment for the degree of Master of Science

in the

Faculty of Health and Life Sciences
Department of Biosciences

2018

Dedicated to Almighty ALLAH and the Holy Prophet Muhammad (P.B.U.H)
and My Loving Family

CAPITAL UNIVERSITY OF SCIENCE & TECHNOLOGY

ISLAMABAD

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Acknowledgements

Words fail me when I think of expressing gratitude to ALMIGHTY ALLAH, who has bestowed me with more than I deserve. In humbleness, I give all praise to ALMIGHTY ALLAH, the most beneficent, the most merciful for blessing me with the ability to complete this work. All respect to his Holy Prophet (Peace Be upon Him) who enabled us to recognize our creator.

I am unable to find words for expressing my feelings toward my supervisor Dr. Syeda Marriam Bakhtiar, Assistant professor, Department of Bioinformatics & Biosciences, Capital University of Science & Technology, Islamabad for her sincere encouragement, guidance, useful suggestions and trust in me, throughout my research. Her observations and comments helped me to establish the overall direction of the research and to move forward with investigation in depth. I just cannot thank her enough for her unconditional support.

Most of the results described in this thesis would not have been obtained without a close collaboration with few teachers. I owe a great deal of appreciation and gratitude to Dr. Sahar Fazal, Dr. Shaukat Iqbal Malik, Dr. Erum Dilshad, Shahid Hussain, for their help in operating different instruments.

A word thanks goes to all my friends and seniors especially Dr. Javed Iqbal Soomro (MO THQ Kahuta), Naveed Iqbal, Hamid Raza, Saeed Iqbal Somroo, Naqoosh Zahra, Sherish Imtiyaz, Syeda Yumna, Amna and Iqra Riyasat, for their support, coordination and time to time guidance. My Official staff especially Mr. Khwaja Awais Pervaiz, Mr. Syed Uzair Ali Naqvi and Ms. Rayah Khan for their support and patience due to which I am able to perform academic activities and complete my research work on time. Profound thanks to them for creating the unforgettable memories regarding our extra co-curricular events.

In the end, I gratefully acknowledge and thank my family for their praiseworthy contribution, love and moral support. I have no words that express my gratitude for my parents, their love, care, support, encouragement and prayers have always enlightened my way throughout my life. May ALLAH bless them all.

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Abstract

Hepatitis is the liver inflammatory disease. Viruses cause hepatitis but there are other causes as well. Drugs, alcohol, toxins and medications can be the secondary cause of hepatitis and may be autoimmune hepatitis be the one of other causes of hepatitis. Hepatitis can be classified as hep-A, hep-B, hep-C, hep-D, & hep-E. And for each type a different virus is responsible for the transmission of virus/infection. Among all types hepatitis A is short term and acute. While **hepatitis B**, C, D could become chronic. **Hepatitis E** may prove to be dangerous in pregnant women. **Hepatitis A** is spread by HAV and is transmitted by edible things like food, water and other infected by faces of Hepatitis A patient. Hepatitis B is transmitted by body fluids like vaginal secretions, semen, and blood of Hepatitis B patient or by sharing shaving razors, having sex, and injection drugs use with HBV infected person. **Hepatitis C** is amongst the most fatal virally transmitted disease and is transmitted by blood infected with HCV. Typically with injection drug use (IDUs) and having sexual intercourse with HCV patient. Hepatitis D is very uncommon form of hepatitis which appears in conjunction with Hepatitis B and couldn't replicate without HBV presence in blood and it is also termed as Delta Hepatitis. Hepatitis E is a water borne disease spread by the **Hepatitis E** virus (HEV) contamination with the fecal material ingestion. It is not very common in America and is caused due to poor sanitation. It is reported by CDC in Middle East, Africa, Central America and Asia. This cross-sectional study will be conducted on 500 patients who belongs to different regions of Pothohar belt specifically Kahuta region. Information will be collected by interviewing patients by researcher-made questionnaire. A questionnaire including demographic and socioeconomic data and risk factors of hepatitis B and hepatitis C including age, gender, level of education, job, STD history, , history of contact with hepatitis, history of IV drug use (IDU), history of Non-IV drug use (Non- IDU), barber (phlebotomy) and etc. were collected. Statistical analysis will be performed using the SPSS, software package.

The prevalence of Hepatitis B is observed to 2% while Hepatitis C is 6%, and there is no significant co-relation among Hepatitis & age/gender. But significant co-relation is observed with surgery patients and individuals with tattooing & piercing.

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Abbreviations

HBV	Hepatitis B virus
HCV	Hepatitis C virus
EIA	Enzyme Immuno Assay
HBsAg	Hepatitis B surface Antigen
IDU	Injection Drug Users
RT-PCR	Real Time Polymerase Chain Reaction
FH	Family History
CDC	Disease Control Center
WHO	World Health Organization
IV	Intra Venous

Chapter 1

Introduction

1.1 Background

Hepatitis is the liver inflammatory disease. Viruses cause hepatitis but there are other causes as well. Drugs, alcohol, toxins and medications can be the secondary cause of hepatitis and may be autoimmune hepatitis be the one of other causes of hepatitis. Hepatitis can be classified as hep-A, hep-B, hep-C, hep-D, & hep-E. And for each type a different virus is responsible for the transmission of virus/infection.

Among all types hepatitis A is short term and acute. While hepatitis B, C, D could become chronic. Hepatitis E may prove to be dangerous in pregnant women. Hepatitis A is spread by HAV and is transmitted by edible thing like food, water and other edibles infected by feces of Hepatitis A patient. Hepatitis B is transmitted by body fluids like vaginal secretions, semen, and blood of Hepatitis B patient or by sharing shaving razors, having sex, and injection drugs use with HBV infected person. Hepatitis C is amongst the most fatal virally transmitted disease and is transmitted by blood infected with HCV. Typically with injection drug use (IDUs) and having sexual intercourse with HCV patient. Hepatitis D is very uncommon form of hepatitis which appears in conjunction with Hepatitis B and couldn't replicate without HBV presence in blood and it is also termed as Delta Hepatitis. Hepatitis E is a water borne disease spread by the Hepatitis E virus

(HEV) contamination with the fecal material ingestion. It is not very common in America and is caused due to poor sanitation. It is reported by CDC in Middle East, Africa, Central America and Asia.

Hepatitis in Asia, America & Africa is a leading health problem [1]. About 2 billion, worldwide, infected individuals among them 400 million are chronically infected with Hepatitis B Virus and it is spreading exponentially [2]–[4]. The most obvious reason for spread is lack of knowledge and awareness about major communicable diseases, poor lifestyle and economic crisis [5], [6].

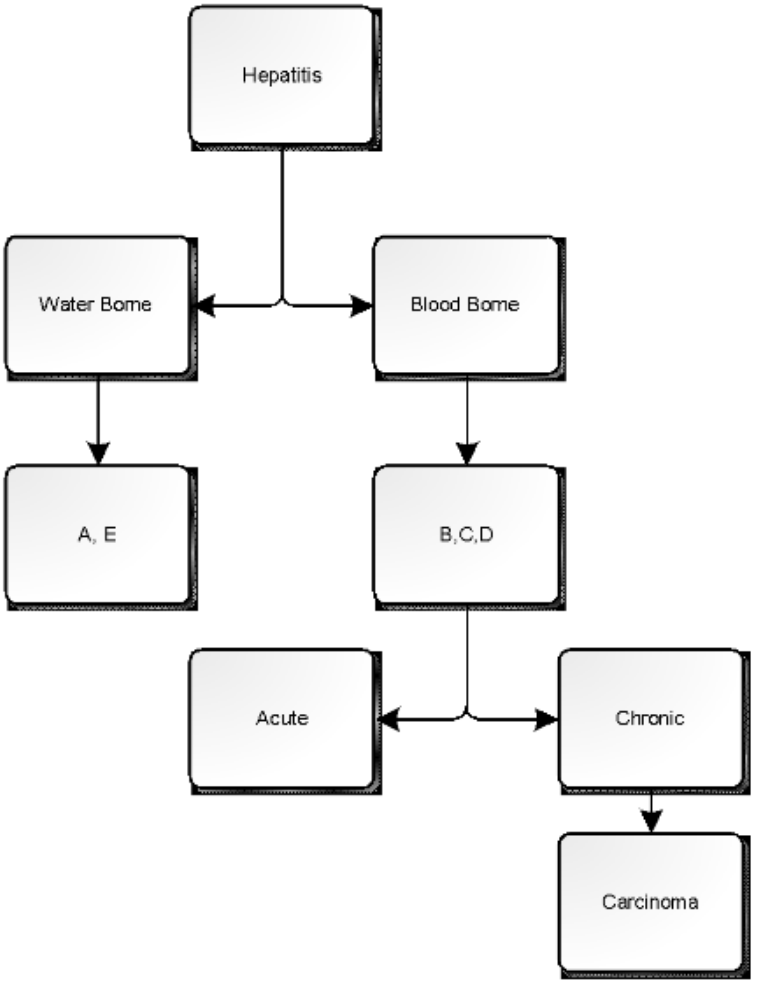

FIGURE 1.1: Flowchart 1: Types of Hepatitis & Infection Flow

1.2 Aims and Objectives

Aim of this study is to determine the prevalence of blood borne hepatitis B & C. in the individuals which has not undergone any major surgery or blood transfusion. The study is designed to carry out the estimation of risk factor associated with blood borne hepatitis. This study's major objectives are:

1. To determine prevalence of hepatitis B & C in certain areas of Pothohar region.
2. To determine the age specific prevalence rate
3. To determine the major contributing factors other than major surgery and blood transfusion.

Chapter 2

Literature Review

2.1 Hepatitis B & C

Hepatitis B virus (HBV) and Hepatitis C virus (HCV) are responsible for considerable amount of liver disease globally, and both the viruses have same mode of transmission, the co-infection of these viruses happens but is considered as uncommon [7].

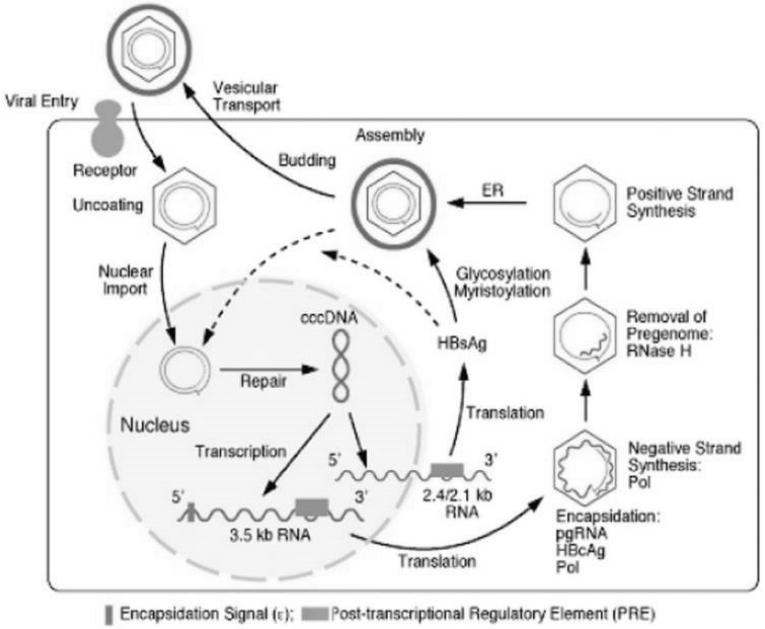

FIGURE 2.1: Hepatitis B Virus, Replication Cycle.[8]

The liver becomes tender and swollen, may permanent damage occur, such as scarring or liver cancer. Symptoms may include pale colored feces, jaundice, fatigue that may prolong weeks or may be months. Gastrointestinal symptoms such as loss of apetite, nausea, vomiting, weight loss, and fever may occur. HCV cause the Hepatitis C infection. This damages the liver and it may take years. Acute liver infection may occur to people and they get recovered and feel better, this is acute type of Hepatitis C. But, in some indivivduals it may persists and go on to develop long term infection, resulting cirrhosis of liver ultimately resulting in liver carcinoma [9].

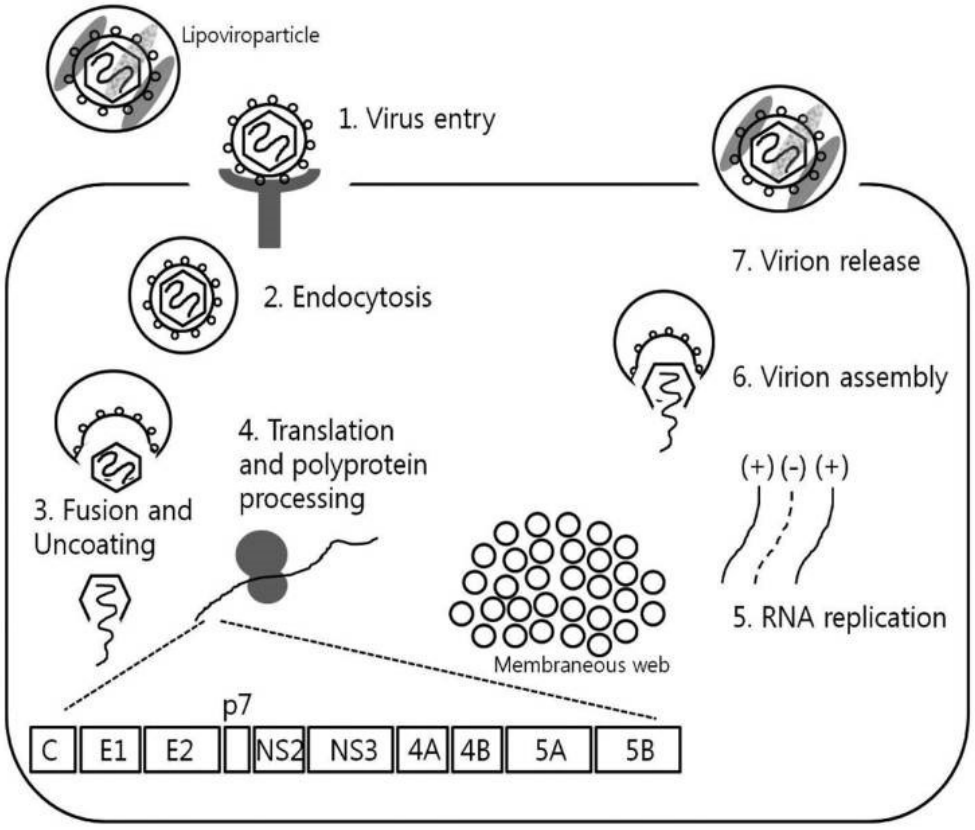

FIGURE 2.2: Schematic representation of HCV life cycle[10]

HCV belongs to Flaviviridae family of viruses and is enveloped small positive stranded RNA virus [11]. E1 and E2 are heterodimers which plays important role in entry in cell, HCV contains dual layered wrapped nucleocapsid with lipid bilayer [12]. HCV infection often leads to Hepatocellular Carcinoma because viral replication occur in liver cell. Therefore, to start the process Hepatitis C virus has to cross the plasma membrane to access the cytosol [7].

In 1989, HCV was first discovered as a causative agent of hepatitis, and it belongs to a family of viruses named Flaviviridae, and its characteristic feature is positive-stranded RNA virus. The number of individuals that are getting infected with this virus globally is almost about 200 million. This is almost 3.3% of the whole world's population. The percentage of infections of HCV that may lead to the chronic liver disease is in almost 50-80% of individuals[13]. According to the WHO report of 2004 the annual mortality rate due to liver cirrhosis & liver carcinoma are 308000 and 785000 respectively.

Pakistan is a developing country with the population of almost 170 million people with low educational and low health standards. According to Human development index of UN, it was ranked among 174 countries at 134. There is a rough presumption that around 10 million individuals are infected with HCV. Awareness programs are organized by Public Health Authorities through social, electronic and print media, however, enormous efforts are prerequisite to spread the knowledge regarding the several risk factors associated with the transmission of HCV. In the developing countries, there is major lack in the execution of international standards concerning the reuse of needles, ear and nose piercing, tattooing, re-use of syringes, use of injection drugs, blood transfusion, unsterilized dental equipment, surgical instruments, shaving and cosmetology instrument sharing, unsafe sex practices are main source of transmission of HCV infection[14].

Blood transfusion and blood products, risky dialysis, oral surgery & clinical instruments, and other infections due to medical procedures are the most common cause of the HCV infection worldwide. In several regions of world the infection rate along the susceptibility rate decreased relevantly after the adoption of preventive measures and control strategies. In most countries which or developing the spread of Hepatitis C virus infection is due to lack of awareness regarding used syringe disposal, multiple uses of a syringe, and specialized blood bags, among other factors [15].

Risk factors associated to HCV infection may vary region-region. Countries which are developed, hepatitis C infection spread is usually through injectable drug use

and treacherous sexual practices. Whereas, in developing countries like Malaysia, Pakistan, India, and Nepal the infection is caused by risky clinical practices and unhealthy blood and blood products. Other factors like demographic characteristics such as age, gender, ethnicity, marital status, and economic status along lifestyle and religious beliefs e.g. tattooing, ecto-dermal & endo-dermal punctures, barbering practices, tooth-brushes and shaving instrument sharing, circumcision & rituals etc., health care and cosmetology like oral treatments, plastic surgeries, cosmetic implants, acupuncture, and cupping etc., with social and economic conditions such as local medical facilities, salary/income, and health conditions.

2.2 Hepatitis B & C Diagnosis

There are three standard approached to detect HBV. HBsAg (surface antigen test) a part HBV found in the blood of Hepatitis B patient. In response to HBV or vaccine, anti-HBs a surface antibody is produced[16].

Diagnosis of HCV depends on detection of HCV by an Enzyme Immune Assay. Initially Anti-HCV is not detectable in patients but RT-PCR can be helpful in the detection of HCV in early onset of infection. Ideal approach, population based surveillance data, is used to monitor the spread and prevalence of disease, high risk identification and design the control strategies for HCV & HBV as well. However, public awareness, significant technical and logistical resources allocation, in developing countries which is not very easy [17].

TABLE 2.1: Antibody and Antigen Biomarkers for Hepatitis B Infection[13]

Clinical state	HBsAg	Total Anti-HBs	Total anti-HBc	Action
Chronic infection	+	-	+	Hepatitis B linked care
Acute	+	-	+ (IgM anti-HBc)	Hepatitis B linked care
Resolved infection	-	+	+	Reconfirmation, Counselling
Immune (immunization)	-	+	-	Reconfirmation
Susceptible (never infected and no evidence of immunization)	-	-	-	Vaccination
***Isolated core antibody**	-	-	+	Situation dependent

In case of Acute HCV infection, clinical symptoms are silent but 16-20% individuals may develop symptoms like fever, nausea, loss of appetite, loss of weight, fatigue, vomiting and abdominal pain [18]. Chronic HCV infection is often asymptotic, and HBV or HCV may remain undiagnosed. HBV incidence has been reduced remarkably due to large scale vaccination but HCV is still a global public health concern. Being blood borne and same transmission process, HBV & HCV are distinct endemics [19].

TABLE 2.2: HCV Assays Interpretation[20]

Anti-HCV	HCV RNA	Interpretation
+ve	+ve	Acute/Chronic Hepatitis
+ve	-ve	HCV infection resolution Low level viremia in acute HCV False-positive anti-HCV test False-negative HCV RNA test
-ve	+ve	Early acute HCV Infection Immunosuppressed chronic HCV infection False-positive HCV RNA test

2.3 Prevalence of Hepatitis Worldwide

Hepatitis C virus, identified as major causative agent of non A or non B hepatitis in 1989. 200 million people are effected by HCV worldwide that is 3.3% constitute of world's population

TABLE 2.3: HCV Assays Interpretation[20]

Region	Country	Years[a]	No. of patients	Mean age	(%) Male	Proportions of subjects with serologic markers		
						HBsAg (total) (%)	anti-HCV (total) (%)	Both HBsAg and anti-HCV (%)
AFR-D/E	Ethiopia	1992–94	156	42	75[d]	29	36	0
	Gabon	1990–98	73	45[d]	67[d]	34	34	4
	Kenya	P 1995	30	40	53	27	0	0
	Mali	1998–99	53	45[d]	65[d]	55	25	13
	Nigeria	1993–94	18	47[d]	84[d]	67	0	0
	Senegal	1995	25	39	89[d]	84	0	0
	South Africa	1991–92	77	45	73	19	23	1
AMR-A[e]	United States	1989-2000	516	54	61	7	27	2[c]
	United States	1994–97	285	49	56	2	35	0
	United States	1994–96	39	39	80	8	51	0
	United States	1991–92	52	44	65	6	58	1
AMR-B/D	Mexico	2000–02	1486	57[d]	49	5	37	0
	Peru	1991–92	85	57[d]	55[d]	12	11	2
EMR-B	Saudi Arabia	1989–90	28	56[d]	76[d]	46	36	7
	Saudi Arabia	1990–91	34	–[b]	–	21	44	0
	Tunisia	P 1992	23	–	–	48	30	9
	Tunisia	P 1994	168	–	–	35	45	5
EMR-D	Egypt	1992	39	–	–	36	82	23
	Egypt	1994–95	18	37	83	22	78	17[c]
	Pakistan	1999–2000	72	52[d]	54	24	68	10
	Pakistan	1997–2000	54	–	–	31	48	4
	Somalia	1988–90	30	34[d]	100	50	10	3
EUR-A	Belgium	1995	141	–	63[d]	9	24	1
	Czech Republic	1991–93	115	59	–	21	24	3
	Italy	2001	2185	62	57[d]	13	70	3
EUR-B/C	Russia	1994–96	25	–	–	24	40	12
	Russia	1996–2000	335	–	–	22	33	4
	Turkey	1999–2002	226	57	64	37	38	1
SEAR-B	Indonesia	1990	58	–	–	33	43	16
	Indonesia	P 1994	86	50	65	28	45	1
	Thailand	P 1994	94	50[d]	69	29	18	1
	Thailand	1997–98	65	53	57	34	23	2
SEAR-D	India	1994–95	99	43	72	16	11	2[c]
	India	1994–95	32	42	87[d]	31	28	9[c]
	India	1997–99	111	47	91	25	14	4[c]
	Nepal	1989–92	63	52	76	40	14	6[c]
WPR-A	Japan	1991	8576	–	–	24	52	3
	Japan	1997–99	325	64	72	12	70	9[c]
	Japan	P 1991	150	–	–	16	73	5
WPR-B	China	P2002	769	–	–	66	32	21[c]
	Mongolia	2004	41	48	44	68	41	29[c]
	South Korea	1995–2000	585	51	74[d]	56	13	3
	Taiwan	1996–97	210	57[d]	81	66	29	6

Along with viral infection alcohol abuse plays major role in liver cirrhosis and a leading cause of Hepatocellular Carcinoma globally with combined effects of HBV or HCV infection [21], [22]

FIGURE 2.3: Global prevalence of HCV reported by Hanafiah et. al., 2013

The clinical results and sequels of chronic liver infection may differ among individuals but infection with hepatitis B virus causes wide spectrum clinical occurrences, that may be asymptotic-acute carriers with self-limiting or wholely hepatic failure, with progressive liver cirrhosis leading chronic hepatic infection to hepatocellular carcinoma [23].

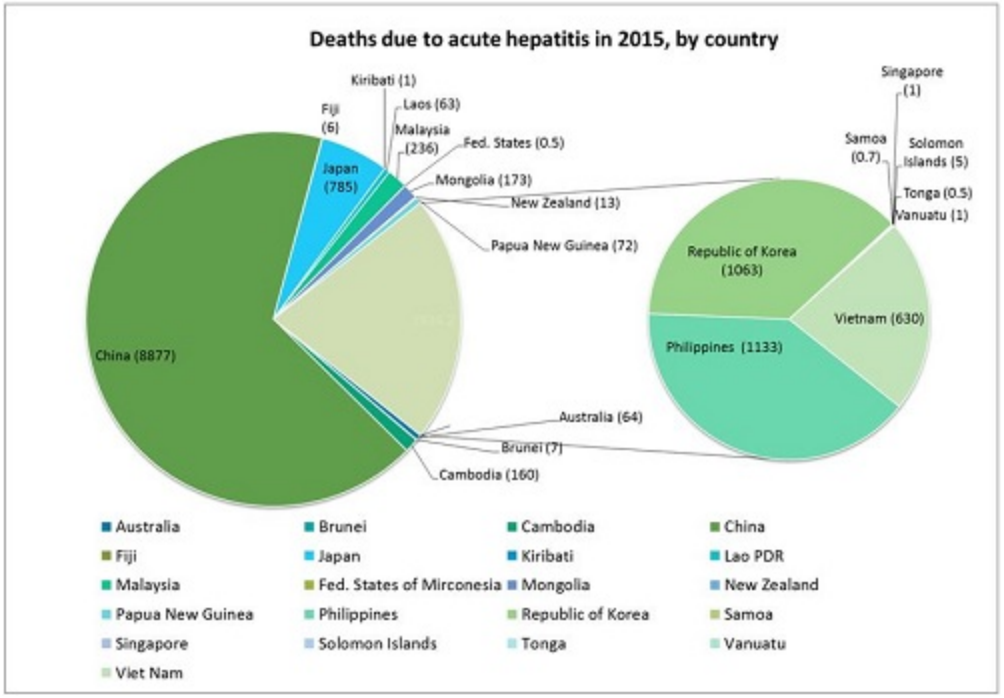

FIGURE 2.4: Graph 1: Global health estimates by WHO 2015, death due to acute heaptitis region wise[24]

Chronic infection due to HBV & HCV are the leading cause of HCC (hepatocellular carcinoma) [25]. According to WHO, about 350 million individuals are infected with chronic liver infection caused HBV (WHO, 2004) and 170 million with HCV.

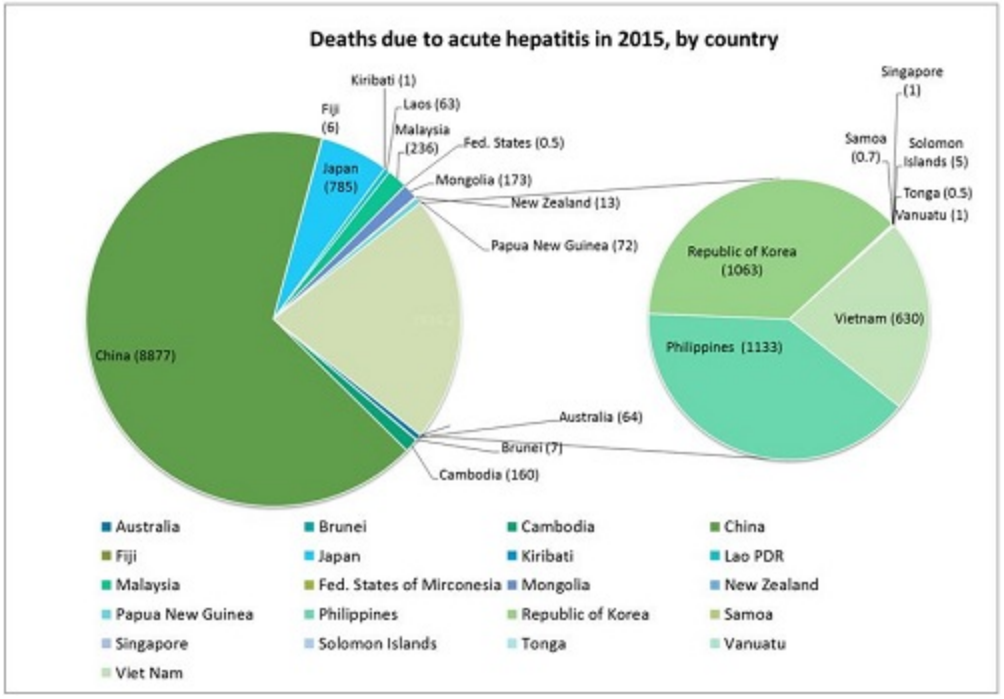

FIGURE 2.5: Graph 2: Global health estimates by WHO 2015, death due to chronic heaptitis region wise[24]

2.4 Prevalence of Hepatitis in Pakistan

Pakistan is reported for having fertility rate of almost four children a mother[11]. It's almost twice the size of California State of USA, and moreover Pakistan is greater than the size of Turkey or Chile. Pakistan is divided into five provinces, Punjab, Sindh, Khyber Pakhtoon khwa (KPK), Baltistan, and Baluchistan, as well as federally administered areas including the capital (Islamabad), Federally Administered Tribal Areas (FATAs), and the western third of Jammu and Kashmir[12]. Considering Pakistan's size and large, growing population, there is a surprising dearth of information about hepatitis prevalence, although more is known about its risk factors. We reviewed the medical and public health literature over

a 13-year period for details on the prevalence of HBV and HCV in Pakistan, analyzing data separately for general and high-risk populations and for each of the four provinces[11].

TABLE 2.4: Prevalence of Hepatitis B reported in Pakistan

Year	Major Findings	Region studied	Author
2009	0.34% - 12.62%	Random	Sheikh *et al.*,
2008	4.5% prevalence	Karachi	Noor Ali *et al.*,
2008	2.4% Prevalence among health care workers	Abbottabad	Sarwar *et al.*,
2007	2.3% prevalence	Rawalpindi	Chaudhary et al.,
2006	3.2% prevalence	Different areas of Pakistan	Mirza et al.,
2006	2.4% prevalence	Karachi	Aziz et al.,

TABLE 2.5: Prevalence of Hepatitis C Reported in Pakistan

Year	Major Findings	Region studied	Author
2009	88% - 94% prevalence in IDUs	Karachi	Kuo et al.,
2008	5.20% prevalence	Karachi	Hakim et al.,
2007	1.40% prevalence in pediatric population	Karachi	Aziz et al.,
2006	4.41% prevalence	Sargodha	Alam et al.,
2006	16.50% prevalence in pregnant women	Hyderabad	Yousfani et al.,
2006	4.99% Prevalence in blood donors	Different areas of Pakistan	Sultan et al.,
2005	66%-57% prevalence in	Different areas of Pakistan	Shah et al.,
2002	5.60% prevalence in health care workers	Different areas of Pakistan	Aziz et al.,

In several region of the countries the incidence rate of hepatitis infection decreases after the befitting preventive and control measures application. Spread of Viral Hepatitis in under developed countries is mostly due poor disposal facilities of used syringes and lack of health care facilities. Multiple usage of Syringes and infusion bags, among others [8].

2.5 Preventions from Hepatitis B & C virus

Public health care services in china are more focused on donation of blood, blood transfusion, preoperative HCV screening, and safe injection practices, injection drug use reduction, and high risk sexual behaviors [26]. The implementation of these measures requires public health care officials to work together with relevant third party organization for the improvement detection, monitoring and preventive measures for the treatment of Hepatitis C infection.

2.6 Health Problems due to HBV & HCV

Globally infections due to HBV & HCV are significant health problem [6]. About 350 million people are worldwide affected with Hepatitis B virus and about one million people die annually due to liver cirrhosis. Although, number of patients achieve the state of non-replicative infection, nut prolonged immunological response leads to development of live cirrhosis or hepatic function failure in almost 40% of infected individuals [14].

Hepatitis infection in women of child bearing age has seroprevalence of 1-2% and transmission rate is about 5-15% [27]. Occurrence rate of HCV RNA and HCV antibody in infants is 5% according to the different studies conducted on prevalence of HCV in Africa and Europe.

Pakistan is reported for having fertility rate of almost four children a mother[11]. It's almost twice the size of California State of USA, and moreover Pakistan is greater than the size of Turkey or Chile. Pakistan is divided into five provinces, Punjab, Sindh, Khyber Pakhtoon khwa (KPK), Baltistan, Federally Administered Tribal Areas (FATAs), western third of Jammu and Kashmir as well as federally administered areas including the capital (Islamabad)[12]. In view of the Pakistan's size and huge, developing populace, there is an amazing deficiency of data about hepatitis pervasiveness, albeit its hazard factors are more recognized. We checked on the therapeutic and public health literature for over a 13-year time frame for

points of interest on the predominance of HCV and HBV in Pakistan, data analysis has done independently for general and high-risk populaces and for every one of the four territories[11].

According to the WHO reports, Pakistan is in the intermediate zone with the infection rate of 0.13% of total infectious diseases. Pregnant women are the most vulnerable group of population susceptible to HVB & HCV infection but few studies have been conducted yet [28].

Kahuta is a Tehsil of Rawalpindi among eight Tehsils situated in Punjab. Kotli Sattian & Kallar Sayedan were part of it but separated later. Kahuta is land of beautiful landmarks like snowcapped mountains, breathtaking views and wildlife and livestock keeping and people from different ethnicity.

A number people of different castes are populated here but the prominent ones are namely, Maliks, Rajas, Sattis, Gakkhars, Mughals, Sheikhs, Kiyanis, Qureshis, &Khattars. There are other castes as well but day by day increment in population of the place they are growing smaller.

The name was derived from local medicinal tree "KOH" & "BOOTA" and with the passage of time it turned into KAHUTA/KOHUTA.

FIGURE 2.6: Google Map view of KAHUTA

Kahuta-Eastern tehsil of Rawalpindi District, Punjab, lies in Lower Himalayas, between $33^0 18'$ and $3348'$ N. and $73^0 15'$ and $73^0 39$ E., area of Kahuta is 206 square miles. It has Jhelum River at eastern border. It is a hilly area except the south western corner and in the north it reaches the altitude of almost 6000ft. the population of Kahuta is almost 220576 capita according to 2017 survey report. Kahuta is headquarter of almost 231 villages.

FIGURE 2.7: Demographics of KAHUTA region

2.7 Risk factors of Hepatitis B & C

Risk factors related to blood borne Hepatitis vary from region to region in different countries. In developed countries, it may be caused by Injection Drug Use and high-risk sexual behavior, whereas, in developing countries it may be caused by unsafe medical practices and contamination on blood and contaminated blood products. Demographic characteristics (age, gender, ethnicity, marital status, occupation, etc.) life styles and religious beliefs (tattoos, piercing, hairdressing, circumcisions and rituals, sharing of toothbrushes and shaving razors etc.) oral treatment and cosmetology and socio-economic conditions.

2.7.1 Injecting Drug Use

As hepatitis C virus and hepatitis B virus are blood borne and are transmitted via blood contact of infected individuals. About 8-10 million IDUs worldwide are suffering with HCV acute or chronic may be[29].

2.7.2 Blood Transfusion

Patients with thalassemia and hemophilia timely need to be transfused with fresh blood and source of that blood must be reputable, as multi-transfused patients are more prone to blood borne diseases[11].

2.7.3 Genetically Transmitted

HCV is not genetically transmitted[27]. But it is transmitted by members of family may be by blood contact or through bruises or injection syringes used by HCV/HBV patients[14].

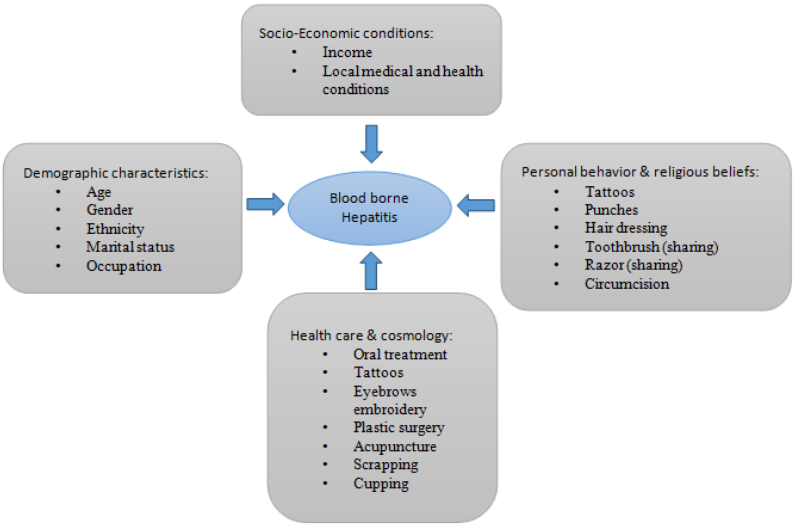

FIGURE 2.8: Flowchart 2: Risk Factors associated with Hepatitis Virus Infection

Chapter 3

Material and Methods

This cross-sectional study will be conducted on 500 patients who belongs to different regions of Pothohar belt specifically Kahuta region. Information will be collected by interviewing patients by researcher-made questionnaire. A questionnaire including demographic and socioeconomic data and risk factors of hepatitis B and hepatitis C including age, gender, level of education, job, STD history, , history of contact with hepatitis, history of IV drug use (IDU), history of Non-IV drug use (Non- IDU), barber (phlebotomy) and etc. were collected. Statistical analysis will be performed using the SPSS, software package.

3.1 Sample Collection

There are different methods of sampling; including Probability Sampling and Non-Probability Sampling. In probability sampling, it is possible to both determine which sampling units belong to which sample and the probability that each sample will be selected. The probability sampling methods further includes: Simple Random Sampling (SRS), Stratified Sampling, Cluster Sampling, Systematic Sampling, and Multistage Sampling. For our project Samples will be exploiting random collection techniques as this technique is used randomly collect samples from a large group of people. Our technique of sampling is random because it includes

people from Islamabad and Rawalpindi: from adults of all ages and ethnicities excluding people with major physical abnormalities. Random selection depends upon size of population, area, and physical and chemical samples are collected from the people.

Samples were collected from various areas of Islamabad and Rawalpindi on the basis of random sampling only excluding people with major physical abnormalities. Blood samples collected in three different vacutainers were stored at 40c for further analysis. Picture 1A, 1B, 1C, 1D, summarize the process of sample and data collection.

FIGURE 3.1: Picture 1: Snaps taken during sampling & data collection

3.2 Anthropometric Measurements

Anthropometric measurements include personal details of subjects, which includes age, gender, ethnicity, family history, disease history, life stylewith special focus ondiet habits and use of medicinal procedures.

3.3 Blood Sampling

Each Subject was asked to sit relaxed, suitable site for venipuncture to collect blood, by placing the tourniquet 3 to 4 inches above was selected for insertion of syringe on the subject arm or back side of Hand. After putting gloves vein was palpated. Vein was selected, cleaned in a circular motion, after the area was cleaned, it was touched or palpated again.

Subjects were asked to make a fist and avoid pumping the fist. Patient's arm was firmly gripped using thumb to draw the skin stretched and anchor the vein. Needle was inserted into the lumen of the vein. There should be an angle of 15-30 degree with the arm surface, Syringe was filled for 5CC blood. Tourniquet was removed first than needle from the patient's arm was removed using a swift and backward motion. Alcohol swab was placed immediately on the puncture site and patient was asked to apply adequate pressure to avoid formation of a hematoma. After holding pressure for 1-2 minutes. 5ml blood from each subject was collected in 5 CC Syringe. 3 ml blood was stored in red capped clot activator vacutainers for cholesterol and CRP test and 2 ml Blood was stored in grey capped vacutainer containing sodium fluoride and potassium oxalate for Glucose test.

3.4 Sample Preparation

Blood samples collected in red capped vacationer centrifuged at 800 rpm for 5 to 10 min to separate serum. Red top tube is a plainvacutainer and these tubes contains no anticoagulant in them and is utilized forthe collectionof serum for selected chemistry tests.

3.5 Biochemical Analysis

The biochemical analysis was performed to identify any discrepancy or deviations from standard level indicating the presence of disease.The biochemical analyzer

was used for detection of HCV, and HBV.All the data and results of biochemical analysis were recorded on excel sheet (ANNEX 3). Biochemical analysis was performed by extracting blood serum and using immunochromotographic assay by collaborations of sadaqat labs (kahuta) Rawalpindi. Figure 8 summarizes the process biochemical tests.

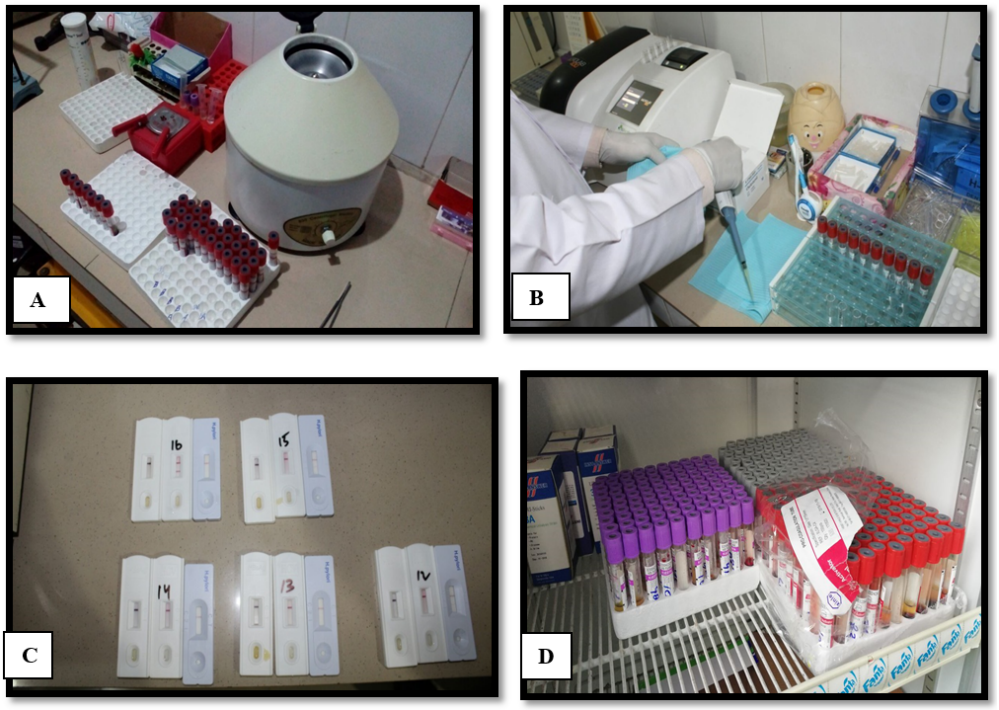

FIGURE 3.2: Picture 2: Snaps taken during sampling & data collection

3.6 Statistical Analysis

By using the Statistical Package for Social Sciences (SPSS), statistical analysis was carried out. Prevalence in the form of percentage was obtained using MS Excel, Pie charts and bar charts are plotted respectively. Association of HBV and HBC with Risk factors tattooing, piercing, injectable, family history, barber visits, dental procedures was measured. Results are presented as mean ± standard deviation and percentage. For the comparison of categorical ones, Chi-square test was implemented. Descriptive statistics was used to calculate the values of odds ratios and 95% CI and risk factor was judged. Significance is defined as $p>0.05$.

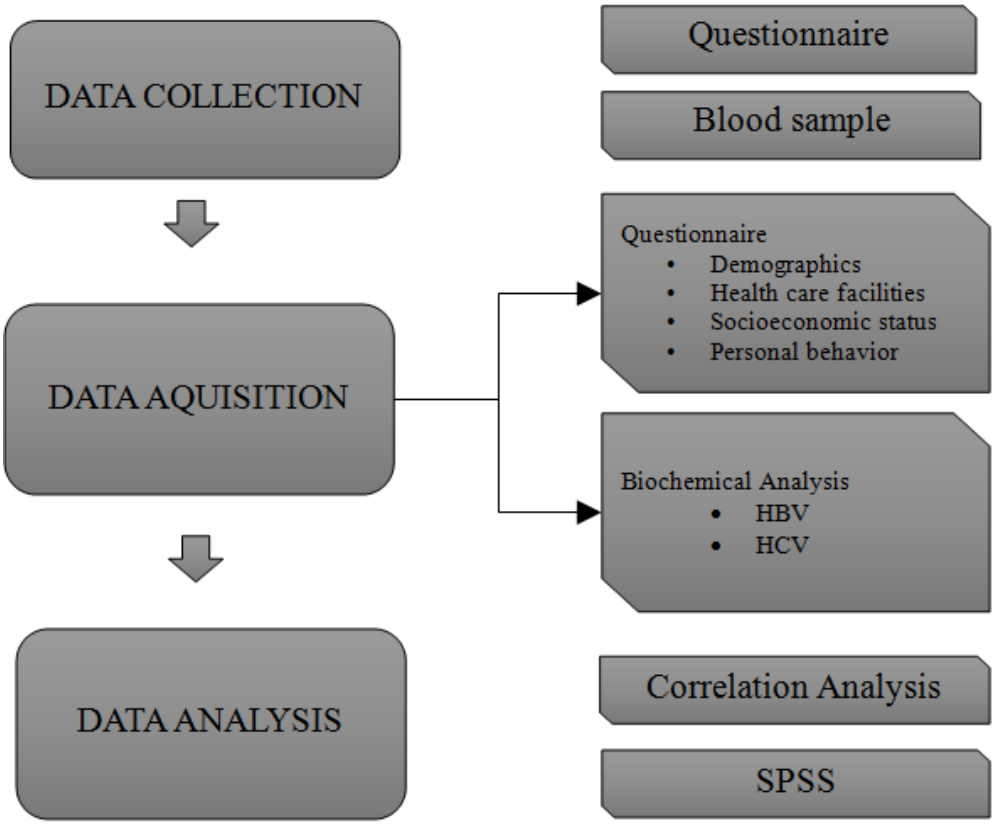

FIGURE 3.3: Flowchart 3: Methodology adopted to perform research

Chapter 4

Results and Discussion

4.1 Prevalence of Hepatitis B

TABLE 4.1: Frequencies of healthy & HBV infected individuals

HBV					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	-ive	373	97.9	97.9	97.9
	+ive	8	2.1	2.1	100.0
	Total	381	100.0	100.0	

Total 380 individuals took part and among them 8 individuals were identified with HBV infection whereas, 372 individuals showed negative results to HBV infection (Table 4).

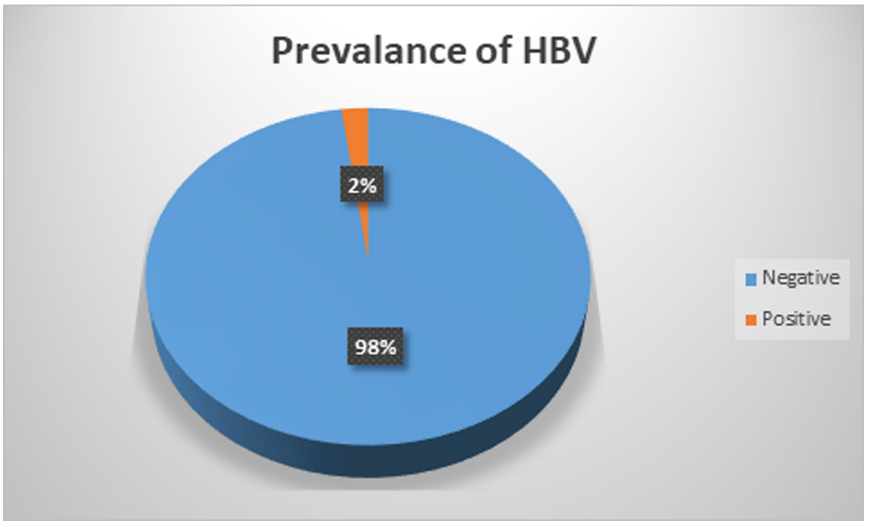

FIGURE 4.1: Prevalence of HBV

4.2 Prevalence of Hepatitis C

TABLE 4.2: Frequencies of healthy & HCV infected individuals

HBV					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	-ive	373	97.9	97.9	97.9
	+ive	8	2.1	2.1	100.0
	Total	381	100.0	100.0	

Total 380 individuals took part and among them 24 individuals were identified with HCV infection whereas, 355 individuals showed negative results to HCV infection.

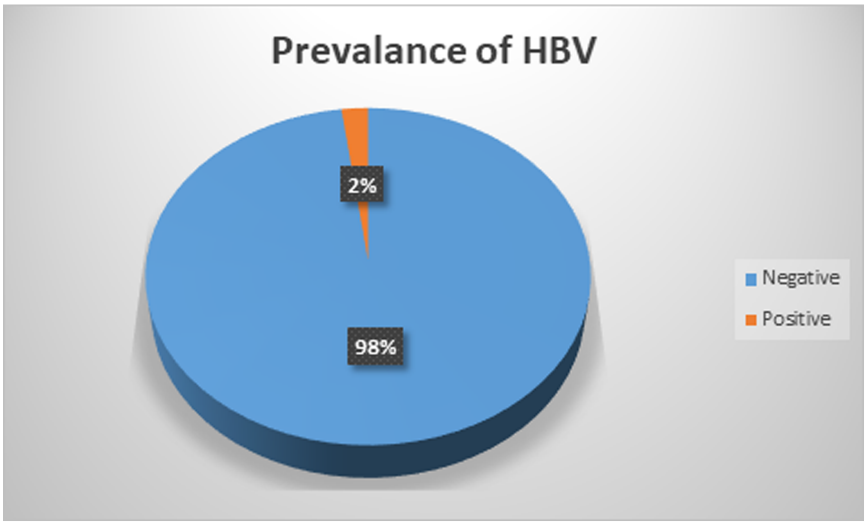

FIGURE 4.2: Prevalence of HCV

4.3 Hepatitis B Prevalence Age Group-wise

TABLE 4.3: Age wise prevalence of HBV infected individuals

HBV					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	-ive	373	97.9	97.9	97.9
	+ive	8	2.1	2.1	100.0
	Total	381	100.0	100.0	

The prevalence of hepatitis B virus was observed more in adults as compared to young individuals (Table 4.3).

TABLE 4.4: Association of HCV with Age

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	2.418[a]	1	0.120		
Continuity Correction[b]	1.276	1	0.259		
Likelihood Ratio	4.198	1	0.040		
Fisher's Exact Test				0.207	0.123
Linear-by-Linear Association	2.412	1	0.120		
N of Valid Cases	381				

a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is 1.83.

b. Computed only for a 2x2 table

Chi-square test was performed to compare the correlation of HBV with respect to the age of patients. The results of correlation between the HBV to the patients age was not significant. This chi-square test results has shown significance at the p-value of 0.120, which is much higher than the significant p-value of 0.05 (Table 4.4).

TABLE 4.5: Correlation of HCV with Age

Symmetric Measures

		Value	Asymptotic Standard Error[a]	Approximate T[b]	Approximate Significance
Nominal by Nominal	Phi	0.080			0.120
	Cramer's V	0.080			0.120
Interval by Interval	Pearson's R	0.080	0.015	1.556	.121[c]
Ordinal by Ordinal	Spearman Correlation	0.080	0.015	1.556	.121[c]
N of Valid Cases		381			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Based on normal approximation.

To find out that if the association between the HBV and patients is strong or weak, systematic measurements of Phi and Cramer's V was done. The results has shown the value of Phi and Cramer's test at 0.080, that is less than 1, which depicts that there is no association between the HBV and the patients age (Table 4.5).

The prevalence of hepatitis C virus was observed more in Adults are compared to young individuals (Table 4.6).

TABLE 4.6: Prevalence of HCV in Young and Adults

		AGE		
		Youth	Adults	Total
HCV	-ive	82	275	357
	+ive	5	19	24
Total		87	294	381

- Youth group represents the individuals aged between 18 – 25 yrs.
- Adults group represents the individuals older than 25 yrs.

TABLE 4.7: Association of HCV in Young and Adults

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.058[a]	1	0.809		
Continuity Correction[b]	0.000	1	1.000		
Likelihood Ratio	0.059	1	0.807		
Fisher's Exact Test				1.000	0.520
Linear-by-Linear Association	0.058	1	0.810		
N of Valid Cases	381				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 5.48.

b. Computed only for a 2x2 table

TABLE 4.8: Correlation of HCV in Young and Adults

Symmetric Measures

		Value	Asymptotic Standard Error[a]	Approximate T[b]	Approximate Significance
Nominal by Nominal	Phi	0.012			0.809
	Cramer's V	0.012			0.809
Interval by Interval	Pearson's R	0.012	0.050	0.241	.810[c]
Ordinal by Ordinal	Spearman Correlation	0.012	0.050	0.241	.810[c]
N of Valid Cases		381			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Based on normal approximation.

Phi and Cramer's V was done to find out that if the association between the HCV and patients is strong or weak, The results has shown the value of Phi and Cramer's test at 0.012, that is less than 1, which depicts that there is no association between the HCV and the patients age (Table 4.7).

Chi-square test was also performed to compare the correlation of HCV with respect to the age of patients. The results of correlation between the HCV to the patients

age was not significant. This chi-square test results has shown significance at the p-value of 0.809, which is much higher than the significant p-value of 0.05 (Table 4.8).

TABLE 4.9: Risk of HCV in Young and Adults

Risk Estimate			
	Value	95% Confidence Interval	
		Lower	Upper
Odds Ratio for HCV (-ive / +ive)	1.133	0.410	3.128
For cohort AGE = Youth	1.103	0.494	2.460
For cohort AGE = Adults	0.973	0.786	1.204
N of Valid Cases	381		

Odds ratio were measured to find out the risk estimate among HCV patients, and their value was at 1.133, whereas the risk estimate for HCV among adults is 0.973 times greater, but the value of risk estimate among young individuals is 1.103 times greater, that depicts that young ones are at more risk (Table 4.9).

4.4 Hepatitis B Prevalence Gender-wise

TABLE 4.10: Hepatitis B Prevalence Gender-wise

		GENDER		
		Female	Male	Total
HBV	-ive	186	187	373
	+ive	5	3	8
Total		191	190	381

- Female group represents the total 191 individuals.
- Male group represents the total 190 individuals.

The prevalence of hepatitis B virus was observed more in females as compared to male individuals (Table 4.10)

Phi and Cramer's V test was done to find out that if the HBV is specific to gender. The results has shown the value of Phi and Cramer's test at -0.036, that shows

TABLE 4.11: Association of HBV with Gender

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.500[a]	1	0.479		
Continuity Correction[b]	0.122	1	0.726		
Likelihood Ratio	0.505	1	0.477		
Fisher's Exact Test				0.724	0.365
Linear-by-Linear Association	0.499	1	0.480		
N of Valid Cases	381				

a. 2 cells (50.0%) have expected count less than 5. The minimum expected count is 3.99.

b. Computed only for a 2x2 table

TABLE 4.12: Correlation of HBV with Gender

Symmetric Measures

		Value	Asymptotic Standard Error[a]	Approximate T[b]	Approximate Significance
Nominal by Nominal	Phi	-0.036			0.479
	Cramer's V	0.036			0.479
Interval by Interval	Pearson's R	-0.036	0.050	-0.706	.481[c]
Ordinal by Ordinal	Spearman Correlation	-0.036	0.050	-0.706	.481[c]
N of Valid Cases		381			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Based on normal approximation.

negative correlation, which depicts that HBV is not specific to any gender (Table 4.12).

Chi-square test was also performed to compare the correlation of HBV with respect to the patient's gender. The results of correlation between the HBV to the patients gender was not significant. This chi-square test results has shown significance at the p-value of 0.479, which is much higher than the significant p-value of 0.05 (Table 4.11).

TABLE 4.13: Risk of HBV within Gender

Risk Estimate			
	Value	95% Confidence Interval	
		Lower	Upper
Odds Ratio for HBV (-ive / +ive)	0.597	0.141	2.533
For cohort GENDER = Female	0.798	0.462	1.378
For cohort GENDER = Male	1.337	0.543	3.289
N of Valid Cases	381		

Odds ratio were measured to find out the risk estimate among HBV patients, and their value was at 0.597, whereas the risk estimate for HBV among females is 0.798 times greater, but the value of risk estimate among male individuals is 1.337 times greater, that depicts that males are at more risk (Table 4.13).

4.5 Hepatitis C Prevalence Gender-wise

TABLE 4.14: Hepatitis C Prevalence Gender-wise

		GENDER		
		Female	Male	Total
HCV	-ive	180	177	357
	+ive	11	13	24
Total		191	190	381

- Female group represents the total 191 individuals.
- Male group represents the total 190 individuals.

The prevalence of hepatitis C virus was observed more in males as compared to female individuals (Table 4.14).

Chi-square test was also performed to compare the correlation of HCV with respect to the patient's gender. The results of correlation between the HCV to the patients gender was not significant. This chi-square test results has shown significance at the p-value of 0.664, which is much higher than the significant p-value of 0.05 (Table 4.15).

TABLE 4.15: Hepatitis C Association with Gender

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.189[a]	1	0.664		
Continuity Correction[b]	0.050	1	0.823		
Likelihood Ratio	0.189	1	0.663		
Fisher's Exact Test				0.680	0.412
Linear-by-Linear Association	0.189	1	0.664		
N of Valid Cases	381				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 11.97.

b. Computed only for a 2x2 table

TABLE 4.16: Hepatitis C Correlation in Gender

Symmetric Measures

		Value	Asymptotic Standard Error[a]	Approximate T[b]	Approximate Significance
Nominal by Nominal	Phi	0.022			0.664
	Cramer's V	0.022			0.664
Interval by Interval	Pearson's R	0.022	0.051	0.434	.665[c]
Ordinal by Ordinal	Spearman Correlation	0.022	0.051	0.434	.665[c]
N of Valid Cases		381			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Based on normal approximation.

TABLE 4.17: Hepatitis C Risk in Gender

Risk Estimate

	Value	95% Confidence Interval	
		Lower	Upper
Odds Ratio for HCV (-ive / +ive)	1.202	0.524	2.754
For cohort GENDER = Female	1.100	0.704	1.720
For cohort GENDER = Male	0.915	0.624	1.342
N of Valid Cases	381		

Odds ratio were measured to find out the risk estimate among HCV patients, and their value was at 1.202, whereas the risk estimate for HCV among males is 0.915 times greater, but the value of risk estimate among female individuals is 1.100 times greater, that depicts that females are at more risk (Table 4.17).

Phi and Cramer's V test was done to find out that if the HCV is specific to

gender. The results has shown the value of Phi and Cramer's test at 0.022, that shows weak and not acceptable correlation, which depicts that HCV is not specific to any gender (Table 4.16).

4.6 Hepatitis B Prevalence Education-wise

TABLE 4.18: Hepatitis B Prevalence Education-wise

		Education		
		Illitrate	littrate	Total
HBV	-ive	125	248	373
	+ive	5	3	8
Total		130	251	381

- Illiterate group represents the total 130 individuals.
- Literate group represents the total 251 individuals.

The prevalence of hepatitis B virus was observed more in illiterate as compared to literate individuals (Table 4.18).

TABLE 4.19: Hepatitis B Association Education-wise

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	2.928[a]	1	0.087		
Continuity Correction[b]	1.780	1	0.182		
Likelihood Ratio	2.733	1	0.098		
Fisher's Exact Test				0.128	0.094
Linear-by-Linear Association	2.920	1	0.087		
N of Valid Cases	381				

a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is 2.73.

b. Computed only for a 2x2 table

Chi-square test was also performed to compare the correlation of HBV with respect to the patient literacy rate. The results of correlation between the HBV to the patients literacy status was not significant. This chi-square test results has shown significance at the p-value of 0.087, which is quite higher than the significant p-value of 0.05 (Table 4.19).

Phi and Cramer's V test was done to find out that if the HBV correlates with literacy status. The results has shown the value of Phi and Cramer's test at -0.088,

TABLE 4.20: Hepatitis B Correlation Education-wise

Symmetric Measures

		Value	Asymptotic Standard Error[a]	Approximate T[b]	Approximate Significance
Nominal by Nominal	Phi	-0.088			0.087
	Cramer's V	0.088			0.087
Interval by Interval	Pearson's R	-0.088	0.054	-1.713	.087[c]
Ordinal by Ordinal	Spearman Correlation	-0.088	0.054	-1.713	.087[c]
N of Valid Cases		381			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Based on normal approximation.

that shows negative correlation, which depicts that HBV does not correlates with the status of patients literacy (Table 4.20).

TABLE 4.21: Hepatitis B Risk Education-wise

Risk Estimate

	Value	95% Confidence Interval	
		Lower	Upper
Odds Ratio for HBV (-ive / +ive)	0.302	0.071	1.286
For cohort Education = Illitrate	0.536	0.308	0.934
For cohort Education = littrate	1.773	0.723	4.350
N of Valid Cases	381		

Odds ratio were measured to find out the risk estimate among HBV patients, and their value was at 0.302, whereas the risk estimate for HBV among illiterate is 0.536 times greater, but the value of risk estimate among literate individuals is 1.773 times greater, that depicts that are literate at more risk (Table 4.21).

4.7 Hepatitis C Prevalence Education-wise

TABLE 4.22: Hepatitis C Risk Education-wise

		Education		
		Illitrate	littrate	Total
HCV	-ive	125	232	357
	+ive	5	19	24
Total		130	251	381

- Illiterate group represents the total 130 individuals.
- Literate group represents the total 251 individuals.

The prevalence of hepatitis C virus was observed more in literate as compared to illiterate individuals (Table 4.22).

TABLE 4.23: Hepatitis C Association Education-wise

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	2.012[a]	1	0.156		
Continuity Correction[b]	1.430	1	0.232		
Likelihood Ratio	2.174	1	0.140		
Fisher's Exact Test				0.186	0.114
Linear-by-Linear Association	2.007	1	0.157		
N of Valid Cases	381				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 8.19.

b. Computed only for a 2x2 table

Chi-square test was also performed to compare the correlation of HCV with respect to the patient literacy rate. The results of correlation between the HCV to the patients literacy status was not significant. This chi-square test results has shown significance at the p-value of 0.156, which is quite higher than the significant p-value of 0.05.

Phi and Cramer's V test was done to find out that if the HCV correlates with literacy status. The results has shown the value of Phi and Cramer's test at 0.073, that shows weak and not acceptable correlation, which depicts that HCV does not correlates with the status of patients literacy (Table 4.23).

TABLE 4.24: Hepatitis C Correlation Education-wise

Symmetric Measures

		Value	Asymptotic Standard Error[a]	Approximate T[b]	Approximate Significance
Nominal by Nominal	Phi	0.073			0.156
	Cramer's V	0.073			0.156
Interval by Interval	Pearson's R	0.073	0.045	1.418	.157[c]
Ordinal by Ordinal	Spearman Correlation	0.073	0.045	1.418	.157[c]
N of Valid Cases		381			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Based on normal approximation.

TABLE 4.25: Hepatitis C Risk Education-wise

Risk Estimate

	Value	95% Confidence Interval	
		Lower	Upper
Odds Ratio for HCV (-ive / +ive)	2.047	0.747	5.615
For cohort Education = Illitrate	1.681	0.761	3.713
For cohort Education = littrate	0.821	0.659	1.022
N of Valid Cases	381		

Odds ratio were measured to find out the risk estimate among HCV patients, and their value was at 2.047, whereas the risk estimate for HCV among illiterate is 1.681 times greater, but the value of risk estimate among literate individuals is o.821 times greater, that depicts that are literate at more risk (Table 4.25).

4.8 Hepatitis B Prevalence Family History-wise

The prevalence of hepatitis B virus was observed more in the individuals with no family history of HBV infection (Table 4.26).

Chi-square test was also performed to compare the correlation of HBV with respect to the patient with family history of HBV infection (Table 4.27). The results of correlation between the HBV to the Family history of infection was not significant.

This chi-square test results has shown significance at the p-value of 0.657, which is quite higher than the significant p-value of 0.05

TABLE 4.26: Hepatitis B Prevalence Family History-wise

		FH_HBV		
		No	Yes	Total
HBV	-ive	364	9	373
	+ive	8	0	8
Total		372	9	381

- Nil family history of HBV infection represents the total 372 individuals.
- Positive results for HBV with family history of HBV Infection represents the total 9 individuals.

TABLE 4.27: Hepatitis B Association with Family History-wise

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.198[a]	1	0.657		
Continuity Correction[b]	0.000	1	1.000		
Likelihood Ratio	0.387	1	0.534		
Fisher's Exact Test				1.000	0.824
Linear-by-Linear Association	0.197	1	0.657		
N of Valid Cases	381				

a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is .19.

b. Computed only for a 2x2 table

TABLE 4.28: Hepatitis B Correlation Family History-wise

Symmetric Measures

		Value	Asymptotic Standard Error[a]	Approximate T[b]	Approximate Significance
Nominal by Nominal	Phi	-0.023			0.657
	Cramer's V	0.023			0.657
Interval by Interval	Pearson's R	-0.023	0.006	-0.444	.658[c]
Ordinal by Ordinal	Spearman Correlation	-0.023	0.006	-0.444	.658[c]
N of Valid Cases		381			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Based on normal approximation.

Phi and Cramer's V test was done to find out that if the HBV correlates with family history of HBV infection. The results has shown the value of Phi and Cramer's test at -0.023, that shows weak and not acceptable correlation, which

depicts that HBV does not correlates with the status of patients family history (Table 4.28).

4.9 Hepatitis C Prevalence Family History-wise

TABLE 4.29: Hepatitis C Prevalence Family History-wise

		FN_HCV		
		No	Yes	Total
HCV	-ive	349	8	357
	+ive	23	1	24
Total		372	9	381

- Nil family history of HCV infection represents the total 372 individuals.
- Positive results for HCV with family history of HBV Infection represents the total 9 individuals.

TABLE 4.30: Hepatitis C Association Family History-wise

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.362[a]	1	0.548		
Continuity Correction[b]	0.000	1	1.000		
Likelihood Ratio	0.300	1	0.584		
Fisher's Exact Test				0.447	0.447
Linear-by-Linear Association	0.361	1	0.548		
N of Valid Cases	381				

a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is .57.

b. Computed only for a 2x2 table

Chi-square test was also performed to compare the correlation of HCV with respect to the patient with family history of HCV infection. The results of correlation between the HCV to the Family history of infection was not significant. This chi-square test results has shown significance at the p-value of 0.548, which is quite higher than the significant p-value of 0.05 (Table 4.30).

Phi and Cramer's V test was done to find out that if the HCV correlates with family history of HBV infection. The results has shown the value of Phi and Cramer's test at 0.031, that shows weak and not acceptable correlation, which

depicts that HCV has very weak correlation with the status of patients family history which is not generally acceptable(Table 4.31).

TABLE 4.31: Hepatitis C Correlation Family History-wise

Symmetric Measures

		Value	Asymptotic Standard Error[a]	Approximate T[b]	Approximate Significance
Nominal by Nominal	Phi	0.031			0.548
	Cramer's V	0.031			0.548
Interval by Interval	Pearson's R	0.031	0.066	0.600	.549[c]
Ordinal by Ordinal	Spearman Correlation	0.031	0.066	0.600	.549[c]
N of Valid Cases		381			

a. Not assuming the null hypothesis.
b. Using the asymptotic standard error assuming the null hypothesis.
c. Based on normal approximation.

TABLE 4.32: Hepatitis C Risk Family History-wise

Risk Estimate

	Value	95% Confidence Interval	
		Lower	Upper
Odds Ratio for HCV (-ive / +ive)	1.897	0.227	15.822
For cohort FN_HCV = No	1.020	0.937	1.110
For cohort FN_HCV = Yes	0.538	0.070	4.125
N of Valid Cases	381		

Odds ratio were measured to find out the risk estimate among HCV patients, and their value was at 1.897, whereas the risk estimate for HCV among no family history is 1.020 times greater, but the value of risk estimate among patients with family history individuals is 0.538 times greater, that depicts that non family history individuals are at more risk (Table 4.32).

4.10 Hepatitis B Prevalence in Surgery Patients

TABLE 4.33: Hepatitis B Prevalence in Surgery Patients

		No Surgery	Yes	Total
HBV	-ive	371	2	373
	+ive	8	0	8
Total		379	2	381

- HBV infection in non-surgery individuals represents the total 379 individuals.
- HBV infection in surgery patients represents the total 2 individuals.

The prevalence of hepatitis B virus was observed more in the individuals with no surgery (Table 4.33).

TABLE 4.34: Hepatitis B Association with Surgery

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.043[a]	1	0.835		
Continuity Correction[b]	0.000	1	1.000		
Likelihood Ratio	0.085	1	0.770		
Fisher's Exact Test				1.000	0.958
Linear-by-Linear Association	0.043	1	0.836		
N of Valid Cases	381				

a. 2 cells (50.0%) have expected count less than 5. The minimum expected count is .04.

b. Computed only for a 2x2 table

Chi-square test was also performed to compare the correlation of HBV with respect to the patient with surgery done. The results of correlation between the HBV to the surgery was not significant. This chi-square test results has shown significance at the p-value of 0.835, which is quite higher than the significant p-value of 0.05 (Table 4.34).

Phi and Cramer's V test was done to find out that if the HBV correlates with surgery. The results has shown the value of Phi and Cramer's test at -0.011, that shows weak and not acceptable correlation, which depicts that HBV does not correlates with the status of patients with surgery (Table 3.35).

TABLE 4.35: Hepatitis B Correlation with Surgery

Symmetric Measures

		Value	Asymptotic Standard Error[a]	Approximate T[b]	Approximate Significance
Nominal by Nominal	Phi	-0.011			0.835
	Cramer's V	0.011			0.835
Interval by Interval	Pearson's R	-0.011	0.004	-0.207	.836[c]
Ordinal by Ordinal	Spearman Correlation	-0.011	0.004	-0.207	.836[c]
N of Valid Cases		381			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Based on normal approximation.

4.11 Hepatitis C Prevalence in Surgery Patients

TABLE 4.36: Hepatitis C Prevalence in Surgery Patient

		No Surgery	Yes	Total
HCV	-ive	356	1	357
	+ive	23	1	24
Total		379	2	381

- HCV infection in non-surgery individuals represents the total 379 individuals.
- HCV infection in surgery patients represents the total 2 individuals.

The prevalence of hepatitis C virus was observed more in the individuals with no surgery (Table 4.36).

TABLE 4.37: Hepatitis C Association with Surgery

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	6.505[a]	1	0.011		
Continuity Correction[b]	1.191	1	0.275		
Likelihood Ratio	2.922	1	0.087		
Fisher's Exact Test				0.122	0.122
Linear-by-Linear Association	6.488	1	0.011		
N of Valid Cases	381				

a. 2 cells (50.0%) have expected count less than 5. The minimum expected count is .13.

b. Computed only for a 2x2 table

Chi-square test was also performed to compare the correlation of HCV with respect to the patient with surgery done. The results of correlation between the HCV to

the surgery was not significant. This chi-square test results has shown significance at the p-value of 0.011, which is nearest to significant p-value of 0.05 (Table 3.37).

TABLE 4.38: Hepatitis C Correlation with Surgery

Symmetric Measures

		Value	Asymptotic Standard Error[a]	Approximate T[b]	Approximate Significance
Nominal by Nominal	Phi	0.131			0.011
	Cramer's V	0.131			0.011
Interval by Interval	Pearson's R	0.131	0.113	2.566	.011[c]
Ordinal by Ordinal	Spearman Correlation	0.131	0.113	2.566	.011[c]
N of Valid Cases		381			

a. Not assuming the null hypothesis.
b. Using the asymptotic standard error assuming the null hypothesis.
c. Based on normal approximation.

Phi and Cramer's V test was done to find out that if the HCV correlates with surgery. The results has shown the value of Phi and Cramer's test at 0.131, that shows significant and moderate correlation, which depicts that HCV correlates with the status of patients with surgery (Table 3.38).

TABLE 4.39: Hepatitis C Risk with Surgery

Risk Estimate

	Value	95% Confidence Interval	
		Lower	Upper
Odds Ratio for HCV (-ive / +ive)	15.478	0.938	255.478
For cohort Surgury = No	1.041	0.957	1.131
For cohort Surgury = Yes	0.067	0.004	1.042
N of Valid Cases	381		

Odds ratio were measured to find out the risk estimate among HCV patients, and their value was at 15.478, whereas the risk estimate for HCV among patients without surgery is 1.041 times greater, but the value of risk estimate among patients with surgery is 0.067 times greater, that depicts that patients without surgery are at more risk (Table 4.39).

4.12 Hepatitis B Prevalence in Tattoo/Piercing

TABLE 4.40: Hepatitis B Prevalence in Tattoo/Piercing

		None Factor	Tattoo/Piercing	Total
HBV	-ive	227	146	373
	+ive	3	5	8
Total		230	151	381

- HBV infection in individuals without tattoo/piercing represents the total 227 individuals.
- HBV infection in individuals with tattoo/piercing represents the total 373 individuals.

The prevalence of hepatitis B virus was observed more in the individuals with tattoo/piercing (Table 4.40).

TABLE 4.41: Hepatitis B Association with Tattoo/Piercing

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1.786[a]	1	0.181		
Continuity Correction[b]	0.943	1	0.331		
Likelihood Ratio	1.736	1	0.188		
Fisher's Exact Test				0.273	0.166
Linear-by-Linear Association	1.781	1	0.182		
N of Valid Cases	381				

a. 2 cells (50.0%) have expected count less than 5. The minimum expected count is 3.17.

b. Computed only for a 2x2 table

Chi-square test was also performed to compare the correlation of HBV with respect to the patient with tattooing/piercing (Table 4.41). The results of correlation between the HBV to the tattoo/piercing was not significant. This chi-square test results has shown significance at the p-value of 0.181, which is quite higher than the significant p-value of 0.05.

Phi and Cramer's V test (Table 4.42) was done to find out that if the HBV correlates with tattoo/piercing. The results has shown the value of Phi and Cramer's test at 0.068, that shows no correlation, which depicts that HBV does not correlates with the tattoo/piercing.

Odds ratio were measured to find out the risk estimate (Table 4.43) among HBV patients, and their value was at 2.591, whereas the risk estimate for HBV among

patients without tattoo/piercing is 1.623 times greater, but the value of risk estimate among patients with tattoo/piercing is 0.626 times greater, that depicts that patients without tattoo/piercing are at more risk.

TABLE 4.42: Hepatitis B Correlation with Tattoo/Piercing

Symmetric Measures

		Value	Asymptotic Standard Error[a]	Approximate T[b]	Approximate Significance
Nominal by Nominal	Phi	0.068			0.181
	Cramer's V	0.068			0.181
Interval by Interval	Pearson's R	0.068	0.052	1.336	.182[c]
Ordinal by Ordinal	Spearman Correlation	0.068	0.052	1.336	.182[c]
N of Valid Cases		381			

a. Not assuming the null hypothesis.
b. Using the asymptotic standard error assuming the null hypothesis.
c. Based on normal approximation.

TABLE 4.43: Hepatitis B Risk with Tattoo/Piercing

Risk Estimate

	Value	95% Confidence Interval	
		Lower	Upper
Odds Ratio for HBV (-ive / +ive)	2.591	0.610	11.007
For cohort Factor = None	1.623	0.661	3.985
For cohort Factor = Tattoo/Piercing	0.626	0.361	1.087
N of Valid Cases	381		

4.13 Hepatitis C Prevalence in Tattoo/Piercing

TABLE 4.44: Hepatitis C Prevalence in Tattoo/Piercing

		Factor		
		None	Tattoo/Piercing	Total
HCV	-ive	214	143	357
	+ive	16	8	24
Total		230	151	381

- HCV infection in individuals without tattoo/piercing represents the total 214 individuals.
- HCV infection in individuals with tattoo/piercing represents the total 143 individuals.

The prevalence of hepatitis C virus was observed more in the individuals without tattoo/piercing.

TABLE 4.45: Hepatitis C Association with Tattoo/Piercing

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.425[a]	1	0.515		
Continuity Correction[b]	0.190	1	0.663		
Likelihood Ratio	0.433	1	0.510		
Fisher's Exact Test				0.667	0.336
Linear-by-Linear Association	0.424	1	0.515		
N of Valid Cases	381				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 9.51.

b. Computed only for a 2x2 table

Chi-square test was also performed to compare the correlation of HCV with respect to the patient with tattooing/piercing. The results of correlation between the HCV to the tattoo/piercing was not significant. This chi-square test results has shown significance at the p-value of 0.515, which is quite higher than the significant p-value.

TABLE 4.46: Hepatitis C Correlation with Tattoo/Piercing

Symmetric Measures

		Value	Asymptotic Standard Error[a]	Approximate T[b]	Approximate Significance
Nominal by Nominal	Phi	-0.033			0.515
	Cramer's V	0.033			0.515
Interval by Interval	Pearson's R	-0.033	0.050	-0.650	.516[c]
Ordinal by Ordinal	Spearman Correlation	-0.033	0.050	-0.650	.516[c]
N of Valid Cases		381			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Based on normal approximation.

Phi and Cramer's V test was done to find out that if the HCV correlates with tattoo/piercing. The results has shown the value of Phi and Cramer's test at -0.033, that shows negative correlation, which depicts that HCV does not correlates with the tattoo/piercing.

Odds ratio were measured to find out the risk estimate among HCV patients, and their value was at 0.748, whereas the risk estimate for HCV among patients

without tattoo/piercing is 0.899 times greater, but the value of risk estimate among patients with tattoo/piercing is 1.202 times greater, that depicts that patients with tattoo/piercing are at more risk.

TABLE 4.47: Hepatitis C Risk with Tattoo/Piercing

Risk Estimate			
	Value	95% Confidence Interval	
		Lower	Upper
Odds Ratio for HCV (-ive / +ive)	0.748	0.312	1.794
For cohort Factor = None	0.899	0.669	1.208
For cohort Factor = Tattoo/Piercing	1.202	0.673	2.146
N of Valid Cases	381		

Chapter 5

Conclusions and Recommendations

In this study total 381 subjects 190 (49.9%) males and 191 (50.1%) females included. Mean age of over all subjects was 41.71 years with maximum number of subjects was 40 years.

Total 380 individuals took part and among them 8 individuals were identified with HBV infection whereas, 372 individuals showed negative results to HBV infection. Total 380 individuals took part and among them 24 individuals were identified with HCV infection whereas, 355 individuals showed negative results to HCV infection.

The prevalence of hepatitis B virus was observed more in Adults are compared to young individuals. Chi-square test was performed to compare the correlation of HBV with respect to the age of patients. The results of correlation between the HBV to the patients age was not significant. This chi-square test results has shown significance at the p-value of 0.120, which is much higher than the significant p-value of 0.05. To find out that if the association between the HBV and patients is strong or weak, systematic measurements of Phi and Cramer's V was done. The results has shown the value of Phi and Cramer's test at 0.080, that is less than 1, which depicts that there is no association between the HBV and the patients age.

The prevalence of hepatitis C virus was observed more in Adults are compared to young individuals. Chi-square test was also performed to compare the correlation of HCV with respect to the age of patients. The results of correlation between the HCV to the patients age was not significant. This chi-square test results has shown significance at the p-value of 0.809, which is much higher than the significant p-value of 0.05. Phi and Cramer's V was done to find out that if the association between the HCV and patients is strong or weak, The results has shown the value of Phi and Cramer's test at 0.012, that is less than 1, which depicts that there is no association between the HCV and the patients age.Odds ratio were measured to find out the risk estimate among HCV patients, and their value was at 1.133, whereas the risk estimate for HCV among adults is 0.973 times greater, but the value of risk estimate among young individuals is 1.103 times greater, that depicts that young ones are at more risk.

The prevalence of hepatitis B virus was observed more in females as compared to male individuals. Chi-square test was also performed to compare the correlation of HBV with respect to the patient's gender. The results of correlation between the HBV to the patients gender was not significant. This chi-square test results has shown significance at the p-value of 0.479, which is much higher than the significant p-value of 0.05. Phi and Cramer's V test was done to find out that if the HBV is specific to gender. The results has shown the value of Phi and Cramer's test at -0.036, that shows negative correlation, which depicts that HBV is not specific to any gender.Odds ratio were measured to find out the risk estimate among HBV patients, and their value was at 0.597, whereas the risk estimate for HBV among females is 0.798 times greater, but the value of risk estimate among male individuals is 1.337 times greater, that depicts that males are at more risk.

The prevalence of hepatitis C virus was observed more in males as compared to female individuals. Chi-square test was also performed to compare the correlation of HCV with respect to the patient's gender. The results of correlation between the HCV to the patients gender was not significant. This chi-square test results has shown significance at the p-value of 0.664, which is much higher than the significant p-value of 0.05. Phi and Cramer's V test was done to find out that

if the HCV is specific to gender. The results has shown the value of Phi and Cramer's test at 0.022, that shows weak and not acceptable correlation, which depicts that HCV is not specific to any gender.Odds ratio were measured to find out the risk estimate among HCV patients, and their value was at 1.202, whereas the risk estimate for HCV among males is 0.915 times greater, but the value of risk estimate among female individuals is 1.100 times greater, that depicts that females are at more risk.

The prevalence of hepatitis B virus was observed more in illiterate as compared to literate individuals. Chi-square test was also performed to compare the correlation of HBV with respect to the patient literacy rate. The results of correlation between the HBV to the patients literacy status was not significant. This chi-square test results has shown significance at the p-value of 0.087, which is quite higher than the significant p-value of 0.05. Phi and Cramer's V test was done to find out that if the HBV correlates with literacy status. The results has shown the value of Phi and Cramer's test at -0.088, that shows negative correlation, which depicts that HBV does not correlates with the status of patients literacy.Odds ratio were measured to find out the risk estimate among HBV patients, and their value was at 0.302, whereas the risk estimate for HBV among illiterate is 0.536 times greater, but the value of risk estimate among literate individuals is 1.773 times greater, that depicts that are literate at more risk.

The prevalence of hepatitis C virus was observed more in literate as compared to illiterate individuals. Chi-square test was also performed to compare the correlation of HCV with respect to the patient literacy rate. The results of correlation between the HCV to the patients literacy status was not significant. This chi-square test results has shown significance at the p-value of 0.156, which is quite higher than the significant p-value of 0.05. Phi and Cramer's V test was done to find out that if the HCV correlates with literacy status. The results has shown the value of Phi and Cramer's test at 0.073, that shows weak and not acceptable correlation, which depicts that HCV does not correlates with the status of patients literacy.Odds ratio were measured to find out the risk estimate among HCV patients, and their value was at 2.047, whereas the risk estimate for HCV

among illiterate is 1.681 times greater, but the value of risk estimate among literate individuals is o.821 times greater, that depicts that are literate at more risk.

The prevalence of hepatitis B virus was observed more in the individuals with no family history of HBV infection.Chi-square test was also performed to compare the correlation of HBV with respect to the patient with family history of HBV infection. The results of correlation between the HBV to the Family history of infection was not significant. This chi-square test results has shown significance at the p-value of 0.657, which is quite higher than the significant p-value of 0.05. Phi and Cramer's V test was done to find out that if the HBV correlates with family history of HBV infection. The results has shown the value of Phi and Cramer's test at -0.023, that shows weak and not acceptable correlation, which depicts that HBV does not correlates with the status of patients family history.

The prevalence of hepatitis C virus was observed more in the individuals with no family history of HCV infection.Chi-square test was also performed to compare the correlation of HCV with respect to the patient with family history of HCV infection. The results of correlation between the HCV to the Family history of infection was not significant. This chi-square test results has shown significance at the p-value of 0.548, which is quite higher than the significant p-value of 0.05. Phi and Cramer's V test was done to find out that if the HCV correlates with family history of HBV infection. The results has shown the value of Phi and Cramer's test at 0.031, that shows weak and not acceptable correlation, which depicts that HCV has very weak correlation with the status of patients family history which is not generally acceptable.Odds ratio were measured to find out the risk estimate among HCV patients, and their value was at 1.897, whereas the risk estimate for HCV among no family history is 1.020 times greater, but the value of risk estimate among patients with family history individuals is 0.538 times greater, that depicts that non family history individuals are at more risk.

The prevalence of hepatitis B virus was observed more in the individuals with no surgery.Chi-square test was also performed to compare the correlation of HBV with respect to the patient with surgery done. The results of correlation between

the HBV to the surgery was not significant. This chi-square test results has shown significance at the p-value of 0.835, which is quite higher than the significant p-value of 0.05. Phi and Cramer's V test was done to find out that if the HBV correlates with surgery. The results has shown the value of Phi and Cramer's test at -0.011, that shows weak and not acceptable correlation, which depicts that HBV does not correlates with the status of patients with surgery.

The prevalence of hepatitis C virus was observed more in the individuals with no surgery. Chi-square test was also performed to compare the correlation of HCV with respect to the patient with surgery done. The results of correlation between the HCV to the surgery was not significant. This chi-square test results has shown significance at the p-value of 0.011, which is nearest to significant p-value of 0.05. Phi and Cramer's V test was done to find out that if the HCV correlates with surgery. The results has shown the value of Phi and Cramer's test at 0.131, that shows significant and moderate correlation, which depicts that HCV correlates with the status of patients with surgery.Odds ratio were measured to find out the risk estimate among HCV patients, and their value was at 15.478, whereas the risk estimate for HCV among patients without surgery is 1.041 times greater, but the value of risk estimate among patients with surgery is 0.067 times greater, that depicts that patients without surgery are at more risk.

The prevalence of hepatitis B virus was observed more in the individuals with tattoo/piercing.Chi-square test was also performed to compare the correlation of HBV with respect to the patient with tattooing/piercing. The results of correlation between the HBV to the tattoo/piercing was not significant. This chi-square test results has shown significance at the p-value of 0.181, which is quite higher than the significant p-value of 0.05. Phi and Cramer's V test was done to find out that if the HBV correlates with tattoo/piercing. The results has shown the value of Phi and Cramer's test at 0.068, that shows no correlation, which depicts that HBV does not correlates with the tattoo/piercing.Odds ratio were measured to find out the risk estimate among HBV patients, and their value was at 2.591, whereas the risk estimate for HBV among patients without tattoo/piercing is 1.623 times

greater, but the value of risk estimate among patients with tattoo/piercing is 0.626 times greater, that depicts that patients without tattoo/piercing are at more risk.

The prevalence of hepatitis C virus was observed more in the individuals without tattoo/piercing.Chi-square test was also performed to compare the correlation of HCV with respect to the patient with tattooing/piercing. The results of correlation between the HCV to the tattoo/piercing was not significant. This chi-square test results has shown significance at the p-value of 0.515, which is quite higher than the significant p-value. Phi and Cramer's V test was done to find out that if the HCV correlates with tattoo/piercing. The results has shown the value of Phi and Cramer's test at -0.033, that shows negative correlation, which depicts that HCV does not correlates with the tattoo/piercing.Odds ratio were measured to find out the risk estimate among HCV patients, and their value was at 0.748, whereas the risk estimate for HCV among patients without tattoo/piercing is 0.899 times greater, but the value of risk estimate among patients with tattoo/piercing is 1.202 times greater, that depicts that patients with tattoo/piercing are at more risk.

Conclusion to this research was that in Kahuta region of Pakistan, the HCV (6%) was more prevalent as compared to HBV (2%). Patients with history of surgery and having any kind of piercing or tattoos on their body either educated or non-educated were inducted to infection and there were no subjects reported as pregnant or with the significant infection in family as well. Life-style, which include physical activity and hygiene (personal or practical) matters which is the major factor observed to be the cause of infection spread.

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Appendix A

QUESTIONNAIRE FOR RESEARCH PROJECT

PID No:

Project Title: The Prevalence HCV and HBV in Kahuta Region

Investigator(s): Capital University of Science & Technology, Expressway, Kahuta Road, Zone-V, Islamabad. PHONES: +92-51-2512800-1, +92-51-4486700-4, FAX NUMBER: +92-51-4486705 UAN: +92-51-111-555-666 Extensions: 123,280,0

Instructions:

1. This survey form may contain words that are new to you. If you read any words that are not clear to you, please ask the person who gave you this form to explain them to you.
2. Your records will be kept confidential and will not be released without your consent except as required by law.
3. Your identity will be kept private.
4. If the results of this study are written in a scientific journal or presented at a scientific meeting, your name will not be used.
5. Your initials _____ indicate your permission to be identified by name in any publications or presentations.
6. If you do not want to be acknowledged by name in any publications or presentations, please initial here _____.
7. The data will be stored in a locked file cabinet.
8. Your signed consent form will be stored in a cabinet separate from the data.
9. Your decision to take part in this research study is entirely voluntary.
10. You may refuse to take part in or you may withdraw from the study at any time without penalty or loss of benefits to which you are normally entitled.
11. You may be asked to leave the study for any of the following reasons:
12. Failure to follow the Project Director's instructions;
13. A serious adverse reaction which may require evaluation;
14. The Project Director thinks it is in the best interest of your health and welfare; or
15. The study is terminated.
16. You may wish to discuss this with others before you agree to take part in this study.
17. If you have any questions about the research now or during the study, please contact:

_____

1

QUESTIONNAIRE FOR RESEARCH PROJECT

GMEResearch

PID No:

BIODATA: (This information provided by Patient will be confidential)

First Name: _____ **Mid Name:** _____ **Last Name:** _____

Date of Birth _____ **Age:** _____ **Gender:** _____ **Contact No: (Office)** _____

Home: _____ **Cell:** _____ **Email:** _____

Permeant Address:

Address: _____

City: _____ **Province:** _____

Temporary Address:

Address: _____

City: _____ **Province:** _____

1. **ANTHROPOMETRIC MEASUREMENT**

Weight (kg)	
Height (m)	
BMI (kg/m^2)	
HCV	
HBV	

2. **FAMILY HISTORY**

Obese Persons in family

Father	Sister	Uncle	Mother's Sister
Mother	Brother	Aunty	Mother's Brother

3. **PHYSICAL ACTIVITY**

Morning walk	Evening walk	Work at home	Outing

4. **DIETARY HISTORY**

Breakfast	Lunch	Dinner

5. **SOCIAL AND PERSONAL HISTORY**

- Education: _____
- Job: _____ Part time /Full time
- Do you have children? No / Yes - How many? _____ • Marital status: Single / Married /Separated / Divorced

QUESTIONNAIRE FOR RESEARCH PROJECT

PID No:

6. SAMPLES

Blood Sample:	

Thank you for completing the questionnaire please return it to_____ **Department of Health and Life Science, Capital University of Science and Technology, Islamabad.** If you have any concerns regarding this research please contact me or my supervisor in the first instance.

CONSENT

I have read the above description of this research study. I have been informed of the risks and benefits involved, and all my questions have been answered to my satisfaction. Furthermore, I have been assured that any future questions I may have will also be answered by a member of the research team. I voluntarily agree to take part in this study. I understand I will receive a copy of this consent form,

Subject's Signature

Date

Appendix B

HCV	HBV	Surgury	Factor	AGE	GENDER
0	0	0	0	17	1
0	0	0	0	21	1
0	0	0	0	22	1
0	0	0	0	30	1
0	0	0	0	50	1
1	0	0	0	65	1
0	0	0	0	67	1
0	0	0	0	71	1
0	0	0	0	15	1
0	0	0	0	16	1
0	0	0	0	51	1
0	0	0	0	50	1
0	1	0	1	35	0
0	0	0	0	24	1
0	0	0	0	31	1
0	0	0	0	50	1
0	0	0	0	63	1
0	0	0	0	19	1
0	0	0	1	18	0
0	0	0	1	12	0
0	0	0	1	22	0
0	0	0	0	60	1
0	0	0	0	50	1
0	0	0	0	28	1
0	0	0	0	71	1
0	0	0	0	19	0
1	0	0	1	20	0
0	0	0	1	65	0
0	0	0	1	26	1
0	0	0	1	26	1
0	0	0	0	24	1
0	0	0	0	24	1

Appendix C

Gallery

Medical Camp at Dr. Javed's Clinic