An-Najah National University
Faculty of Graduate Studies

SCREENING OF GASTROINTESTINAL CARCINOMAS AMONG PALESTINIAN POPULATION

By

Osama Hamad Ahmad Hamad

Under Supervision
Of

Dr. Awni A. Abu-Hijleh
&
Dr. Mohammed Musmar

Submitted in Partial Fulfillment of the Requirements for the Degree of Master of Science in Biological Sciences, Faculty of Graduate Studies at An-Najah National University
Nablus - Palestine

August 2003

Screening of Gastrointestinal Carcinomas Among Palestinian Population

By

Osama Hamad Ahmad Hamad

This thesis was defended successfully on August, 2003 and approved by:

Committee Members		**Signature**
1. Dr. Awni Abu-Hijleh	(Supervisor)	.....
2. Dr. Mohammad Mdsmar	(Supervisor)	.....
3. Dr. Samar Ghazal	(Internal Examiner)	.....
4. Dr. Yousef Al-Horani	(External Examiner)	.....

DEDICATION TO

My Beloved Family and Wife

ACKNOWLEDGMENTS

I would like to express my profound gratitude to my supervisors Dr. Awni Abu-Hijleh & Dr. Mohammad Musmar for their valuable assistance and direct supervision through the course of this work and during the course of writing up this thesis.

Special thanks for my family and faithful relatives for their encouragement and support.

My deep thanks to my colleagues in the Basic Boys School – Nablus, for their encouragement and kind cooperation during this work.

My special thanks to Mr. Ismael Abu-Ziadeh for his help.

My very deep thanks to Mr. Slalh Abbas the social worker at Al-Watni Hospital for his help.

My thanks also to Ikhlas Al-Khalelie, for their help and support.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

Figure **Page**

LIST OF ABBREVIATION

ACS	American Cancer Society
GI	Gastrointestinal
BMI	Body Mass Index
PNCR	Palestinian National Cancer Registry
APO-E	Apolipoprotein-E
FOBT	Faecal Occult Blood Test
SPSS	Statistical Package for Social Sciences
HBV	Hepatitis B virus
HPV	Human Papillomavirus
HIV	Human Immunodeficiency Virus
CRC	Colorectal Cancer

ABSTRACT

The prevalence of the different gastrointestinal (GI) cancers, in the population of northern West Bank, was investigated depending on the registries of 1000 patients at Al-Watani Hospital – Nablus, during the years 1999-2002. The analysis of the data showed that, while the most frequent single cancer is breast cancer (18.4%), the incidence frequency of all GI cancers was (25.5%). The most frequent GI cancer was liver cancer and then colorectal cancer followed by stomach, oral cavity and pancreatic cancers, respectively. Nablus district occupied the first position in the incidence frequency of GI cancers (47%) followed by Jenin, Tulkarem, Qalqeelia and Salfeet districts, respectively.

Further investigation of 141 GI cancer cases showed that GI cancers are more frequent among the older people (55-75 years). This study showed that liver and stomach cancers were more frequent in males. According to the place of residence, the results revealed that pancreas, colorectal and oral cavity cancers are most frequent in the residents of refugee camps, villages, and cities, respectively. Moreover, the findings of this study showed that pancreas and colorectal cancers are more frequent among housewives, liver cancer is more frequent among employees, and stomach and oral cavity cancers are more frequent among workers.

As an example of correlations, it was found that the incidence frequencies of pancreas and colorectal cancers are higher in smokers. Furthermore, the results relating the incidence of GI cancers to the presence of chronic diseases(s) in the family members showed that incidence frequencies of both colorectal and pancreas cancers are higher within the group having family member(s) with chronic disease(s) compared to the group living with healthy members. The results relating the incidence of GI cancers to the presence of first degree relative(s) having cancer showed that incidence frequencies of both colorectal and stomach cancers are higher within the people having cancer diseased relative(s) compared to the people with no family history of cancer.

In conclusion, it is clear that the incidence of the different GI cancer types is not affected equally by the same variables and risk factors. Consequently, the effect of each variable should be investigated separately for each GI cancer type since extrapolation of the effect of the same risk factors on all GI cancer types is not always correct.

CHAPTER I

INTRODUCTION

Cancer is one of the most common life threatening diseases, which is considered a major world problem since it requires special care and support especially during the final stages. There are about 9 million new cases and about 6 million deaths every year about half of which occur in developing countries. Cancer care includes primary prevention, early diagnosis, curative treatment and palliative care.

1.1 Cancer Epidemiology and Terminology

Cancer is a group of diseases characterized by uncontrolled growth and spread of abnormal cells. If the growth is not controlled, it can result in death. Cancer is caused by both external factors (tobacco, chemicals, radiation, and infectious organisms) and internal factors (inherited mutation, hormones, immune conditions, mutations that occur from metabolism). Causal factors may act together or in sequence to initiate or promote carcinogenesis. Ten or more years often pass between exposures or mutations and detectable cancer (ACS, 2002).

The terminology used by physicians and scientists to describe different types of cancer is highly technical and often complicated. A tumor, or neoplasm, is any abnormal growth of cells, which may be either benign or malignant. A benign tumor remains confined to its original

location. It neither invades surrounding normal tissue nor spread to distant body sites. A common skin wart is an example of a benign tumor. Since benign tumor remains localized to their site of origin, they can almost always completely removed by surgery. Therefore, benign tumors are generally not life-threatening, except for those that occur in inoperable locations, such as some brain tumors (Cooper, 1993).

In contrast, a malignant tumor is capable both of invading adjacent normal tissue and of spreading to other tissues and organs. Only malignant tumors are properly called cancer, and it is their ability to invade normal tissues and spread throughout the body, or metastasize, that makes cancer so dangerous. Once metastasis has occurred, cancer can no longer be successfully dealt with by localized treatment such as surgery. The ability of malignant tumors to invade and metastasize thus constitutes cancer's principal health hazard (Cooper, 1993).

There are over one hundred different kinds of cancer, which originate from different types of normal cells. However, only a few occur frequently. In fact, cancers of only eleven different sites account for about 80 percent of all cancers in the United States **Table 1.1**, and cancers of about thirteen different sites account for about 80 percent of all cancers in Palestine **Table 1.2** (Cooper, 1993; PNCR, 2001).

Table 1.1. Cancer Cases and Deaths, US, 2002, (ACS, 2002).

Cancer site	Cases/year	%	Deaths/year	%
Breast	205,000	16	40,000	7
Prostate	189,00	15	30,200	5
Lung & Bronchus	169,400	13	154,900	28
Colorectal	148,300	12	56,600	10
Uterus &Ovary	75,600	6	24,600	4
Lymphomas	60,900	5	25,800	5
Skin	58,300	5	7,600	1
Bladder	56,500	4	12,600	2
Leukemia	30,800	2	21,700	4
Pancreas	30,300	2	29,700	5
Oral Cavity	28,900	2	7,400	1
Total	1,053,000	82%	411,100	74%
All Sites	1,284,900	100%	555,500	100%

Table 1.2. The Most Common Cancer Cases in Palestine in the Years 1998-1999 (PNCR, 2001).

Cancer Site	Number of Cancer Cases	%
Breast	454	13
Lymphoma	280	8
Colorectal& Rectum	279	8
Leukemia	276	8
Lung & Bronchus	270	8
Skin	194	6
Bladder	185	5
Uterus & Ovary	168	5
Prostate	134	4
Brain & Nervous System	131	4
Stomach	129	4
Liver	81	2
Kidney	69	2
Pancreas	61	2
	2711	78%
Total	3474	100%

1.1.1 Cancer Incidence in Palestine

In the years 1998 and 1999, 3474 new cases of cancers were reported in Palestine; 1742 (50.1%) for male, and 1732 (49.9%) for female. 2283 (65.7%) cases were registered in the West Bank, and 1191 (34.3%) were registered in Gaza Strip. The crude incidence rate in 1998 for all cancer cases among Palestinian population was 66.8 per 100,000 populations (71 per 100,000 in the West Bank and 60.5 per 100,000 in Gaza Strip). The geographical distribution of cancer cases in Northern West Bank for the years 1998-1999 is shown in **Table 1.3** (PNCR, 2001).

Table 1.3. The Geographical Distribution of Cancer Cases in Northern West Bank for the Years 1998-1999 (PNCR, 2001).

District	No. of Cancer Cases	Incidence (%)	Incidence Rate per 100,000 pop. (in 1998)
Nablus	402	43	78
Jenin	258	27	55
Tulkarem	167	18	63
Qalqilia	61	6.5	43
Salfit	52	5.5	54
Total	940	100	

It has been observed that the number of new cancer cases started to increase gradually from the age of 25 years for both sexes (male and female), till the age of 74 years for male, and 64 for female, when it started

to decrease for both sexes. The incidence rate according to different age groups is shown in **Table 1.4**.

Table 1.4. Cancer Incidence in Palestine According to Different Age Groups in the Years 1998-1999 (PNCR, 2001).

Age Group	Incidence (%)
< 14	8.8
15-39	16.8
40-74	59.8
> 75	14.5

1.2 Risk of Developing Cancer

Since the occurrence of cancer increases as an individuals ages, most cases affecting adults begin in middle age. About 77% of all cancers are diagnosed at ages 55 and older. Cancer researchers use the word *risk* in different ways. Lifetime risk refers to the probability that an individual, over the course of a lifetime, will develop cancer or die from it. In the US, men have a little less than 1 in 2 lifetime risk of developing cancer; for women the risk is a little more than 1 in 3. Relative risk is a measure of the strength of the relationship between risk factors and the particular cancer. It compares the risk of developing cancer in persons with a certain exposure or trait to the risk in persons who do not have this exposure or trait. For

example, male smokers have a 20-fold relative risk of developing lung cancer compared with nonsmokers. This means that they are about 20 times more likely to develop lung cancer than nonsmokers. Most relative risks are not this large. For example, women who have a first-degree (mother, sister, or daughter) family history of breast cancer have about a 2-fold increased risk of developing breast cancer compared with women who do not have a family history. This means that women with a first-degree family history are about two times more likely to develop breast cancer than women who do not have a family history of the disease. Some factors thought to influence the development of colorectal cancers are listed in **Table 1.5** (ACS, 2002).

Table 1.5. Risk Factors for Colorectal Cancer (ACS, 2002).

	Relative Risk
Family history (first degree relative)	1.8
physical inactivity (less than 3 hours per week)	1.7
Inflammatory bowel disease (physician diagnosed Crohn's disease, ulcerative colitis, or pancolitis	1.5
Obesity	1.5
Red meat	1.5
Smoking	1.5
Alcohol (more than 1 drink/day)	1.4
High vegetable consumption (5 or more serving per day)	0.7
Oral contraceptive use (5 or more years of use)	0.7
Estrogen replacement (5 or more years of use)	0.8
Multivitamins containing folic acid	0.5

All cancers involve the malfunction of genes that control cell growth and division. About 5% to 10% of cancers are clearly hereditary, in that an inherited faulty gene predisposes the person to a very high risk of particular cancers. The remainders of cancers are not hereditary, but result from damage to genes (mutations) that occurs throughout our lifetime, either due to internal factors, such as hormones or the digestion of nutrients within cells, or external factors, such as tobacco, chemicals, and sunlight.

1.3 Gastrointestinal Cancer

Gastrointestinal (GI) cancer includes those of the colon, rectum (colorectal), stomach (gastric), esophagus, pancreas, liver and bile duct. In the United States, (279,500) new GI cancer cases were reported in 2002, which accounts for 21.7% of all cancer cases from both sexes (ACS, 2002), and (139,700) deaths from GI cancers, which accounts for 25.1% of all cancer deaths in USA in 2002 from both sexes. The second half of the 20th century has seen a sharp worldwide decline in both incidence and mortality of gastric and colorectal cancers. Despite this, the condition remains the world's second leading cause of cancer mortality behind lung cancer. It has been estimated that there will have been more than 870,000 deaths from

gastric and colorectal cancers in the year 2000, accounting for approximately 12% of all cancer deaths (Kelley and Duggan, 2003).

There is marked geographic variation in the incidence of gastric cancer. International Agency for Research on Cancer data for 1996 **(Table 1.6)** demonstrate age-standardized incidence rates in males ranging from $95.5/10^5$ in Yamagata, Japan, to $7.5/10^5$ in Whites in the United States. High-risk areas include China and large parts of central and South America (Kelley and Duggan, 2003).

Table 1.6. International comparison of age-adjusted incidence rates (/100,000) of gastric cancer in selected countries (ACS, 2002).

Country, region	Male	Female	Ratio
Japan, Yamagata	95.5	40.1	2.4
Japan, Hiroshima	83.1	35.9	2.3
Korea, Kanwha	65.9	25.0	2.6
Japan, Osaka	65.0	27.3	2.4
Costa Rica	51.5	22.7	2.3
China, Shanghai	46.5	21.0	2.2
Italy, Florence	36.3	15.9	2.3
Columbia, Cali	33.3	19.3	1.7
Peru, Trujillo	31.1	20.1	1.5
Yugoslavia, Vojvodina	20.8	9.4	2.2
Hong Kong	19.4	9.5	2.0
Germany, Saarland	18.5	9.0	2.1
Italy, Genoa	17.6	8.3	2.1
United Kingdom	16.1	6.3	2.6
Spain, Granada	15.5	7.0	2.2
US, SEER* (Black)	14.5	5.9	2.5
Norway	13.6	6.4	2.1
Switzerland, Geneva	12.3	5.4	2.3
France, Bas Rhin	12.2	4.9	2.5
Australia, Victoria	11.7	4.9	2.4
Philippines, Manila	11.1	6.4	1.7
Canada	10.6	4.5	2.4
Australia, NSW	10.1	4.2	2.4
Singapore (Malay)	8.7	5.5	1.6
India, Bombay	7.7	3.8	2.0
Thailand, Chiang Mai	7.5	4.9	1.5
US, SEER* (White)	7.5	3.1	2.4
Highest/lowest ratio	12.7	12.9	

Gastric cancer has attracted attention from epidemiologic investigators over recent years, particularly with the emergence of *Helicobacter pylori (H. pylori)* as a risk factor for the condition. This has lead to an improved understanding of the etiology and pathogenesis of gastric cancer and raised the possibility of active prevention of the disease. Differences in exposures to *H. pylori* and range of other environmental factors probably account for much of the variations seen in the incidence of gastric cancer over time and between populations (Kelley and Duggan, 2003).

The National Cancer Institute estimates that approximately 8.9 million Americans with a history of cancer were alive in 1997. Some of these individuals were considered cured, while others still had evidence of cancer and may have been undergoing treatment. About 1,284,900 new cancer cases were diagnosed in 2002. Since 1990, about 16 million new cancer cases have been diagnosed. These estimates do not include carcinoma in situ (noninvasive cancer) of any site except urinary bladder, and do not include basal and squamous cell skin cancers. More than 1 million cases of basal and squamous cell skin cancers are expected to be diagnosed this year. The last year (2002) about 555,500 Americans were expected to die of cancer, more than 1,500 people a day. Cancer is the

second leading cause of death in the US, exceeded only by heart disease. In the US, 1 of every 4 deaths is from cancer.

1.4 Causes of Cancer

Carcinogens may act in two general ways to increase the likelihood that cancer will develop. Some carcinogens, called initiating agents, react with DNA to induce mutations, whereas others, called promoting agents, stimulate cell proliferation. For example, abnormal hormonal stimulation of cell proliferation by estrogen is a major factor in the development of endometrial cancer of uterus. In addition to these agents, some chemicals increase the risk of cancer by inhibiting normal function of the immune system, the immune system is capable of acting against cancer cells, thereby preventing tumor growth. Consequently, chemicals or other agents that interfere with normal immune function impart an increased risk that cancer will develop (Cooper, 1993).

1.4.1 Environmental Factors & Cancer Risk

It is generally thought that the risk of developing many cancers is substantially affected by environmental agents, broadly defined as any

external substance to which an individual is exposed. Environmental factors thus encompass all of the agents routinely encountered in the course of daily living, including substances present in food, air, and water (Cooper, 1993). A principal argument linking cancer to environmental factors has come from comparison of cancer incidence in different parts of the world. For example, colon cancer in the US is nineteen-fold higher than in India. This variation in the incidence could be due either to genetic differences between populations or to environmental factors to which the inhabitants of different countries are exposed. These alternative possibilities have been investigated by studies of migrant populations. For example, stomach cancer which is rare in US but common in Japan has been studied in two generations of Japanese-American shifts from Japan to US. The characteristic patterns of cancer incidence in Japan compared to US therefore appear to be determined primarily by environmental factors rather than by genetic differences (Kelley and Duggan, 2003).

Such changes in cancer incidence are observed among other migratory populations, suggesting that the worldwide variations in cancer frequencies are primarily due to environmental differences. On this basis, it has been estimated that environmental factors are responsible for up to 80% of all cancers (Cooper, 1993).

1.4.2 Smoking

Cigarette smoking is unquestionably the major identified cause of human cancer deaths (Cooper, 1993). In addition to being responsible for the vast majority (80-90%) of lung cancers (accounting for approximated 25% of all cancer deaths), smoking has also been implicated in the development of other kinds of cancer, including cancer of oral cavity, pharynx, larynx, esophagus, bladder, kidney and pancreas. Also, smoking is the only risk factor known for pancreatic cancer which increases the incidence of pancreatic cancer by two folds (Cooper, 1993). It is estimated that smoking cause about 30% of all cancer deaths – clearly an impressive toll for a single agent (Cooper, 1993).

The evidence implicating tobacco as a major cause of human cancer is abundantly supported by experimental studies in animals. These studies have shown that tobacco smoke contains a variety of very potent carcinogenic chemicals, which can act to both, induce mutations and stimulate cell proliferation (Cooper, 1993). An estimated 28,900 new cases of oral cavity and pharynx cancer, with 7,400 deaths of this cancer were reported at US in 2002 (ACS, 2002). In North America and Western Europe the major risk factors for esophageal cancer are Alcohol and Tobacco, which may account for about 80-90% of cases each year (RMH, 2003).

Pancreatic cancer is a relatively common tumor (6,000-7,000 deaths per year in the UK) (RMH, 2003). There were 30,300 new cases of pancreatic cancer and estimated 29,700 deaths which account for 11% of total cancer deaths at United States in 2002, (ACS, 2002). Cigarette smoking is one of the predisposing to its development (RMH, 2003). The relative risk of smoking at least a pack per day is approximately four-fold, compared with that of nonsmokers (Clinton *et al.* 2000; Roebuck, B. D. *et al.* 1981). Also smoking is considered as a risk factor for colorectal cancer, and there were about 148,300 new cases in the United States in 2002 which account for 23% of total cancer cases. Colorectal cancer is the second cause of cancer deaths in the United States which account for about 56,600 deaths in 2002 (21% of total deaths) (ACS, 2002).

1.4.3 Alcohol

It is one of the common factors that cause parts of GI cancer. Excessive consumption of alcoholic beverage is clearly associated with an increased risk of some cancers, particularly those of oral cavity, pharynx, larynx, and esophagus. In addition, excess alcohol consumption can result in cirrhosis, leading to an increased incidence of liver cancer, probably as a

consequence of excess cell proliferation resulting from chronic tissue damage.

The effect of alcohol on the development of oral, pharyngeal, laryngeal and esophageal cancer seems to be exerted largely in combination with that of smoking. For example, heavy smoking (more than 2 packs per day) or heavy drinking (more than 4 drinks per day) each increased the risk of oral and pharyngeal cancers six- to seven-fold, while heavy drinking and heavy smoking together result in an increased risk of nearly forty-folds. The combination of alcohol and smoking thus exerts greater effect than either alone, suggesting that each enhances the carcinogenic activity of the other (**Figure 1.1**) (Cooper, 1993).

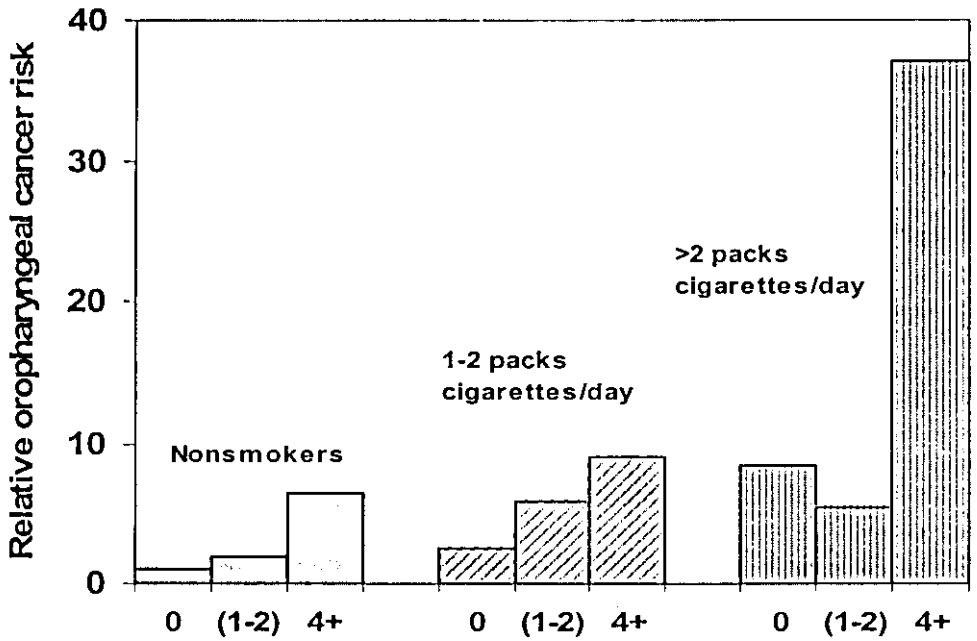


Figure1.1. Combined Effect of Alcohol and Smoking on Oropharyngeal Cancer (Blot *et al.*, 1988).

Alcohol is only weakly carcinogenic in experimental animals, acting mainly to potentiate the action of other carcinogens, so the mechanism by which excessive consumption of alcoholic beverages increases human cancer risk is not known. In addition to alcohol itself, it is possible that other ingredients of alcoholic beverages are carcinogenic. In any event, the association between consumption of alcoholic beverage and human cancer is well established. For example, the combination of alcohol and tobacco accounts for about 75% of all oral and pharyngeal cancers, which

corresponds to over 6000 deaths per year in the United States (ACS, 2002; Cooper, 1993).

The relative risk for esophageal cancer increases with the amount of alcohol consumed or tobacco smoked and several research studies have shown that mortality risk factor for esophageal cancer diminish after sustained smoking ceases (RMH, 2003).

In low-risk nations, it has been concluded that the regular and high consumption of alcohol is an important dietary factor in the pathogenesis of liver cancer. The data also suggest that other cofactors may act in an additive or synergistic fashion. It has been hypothesized that liver cancer primarily occurs in whose cumulative experience with ethanol, viral hepatitis, and toxin exposure lead to cirrhosis. Additional evidence suggests that vinyl chloride, oral contraceptives, and androgenic-anabolic steroids also may participate in liver carcinogenesis in susceptible individuals (Clinton *et al.*, 2000; Roebuck *et al.*, 1988). Liver cancer is rare in Western Europe and the USA with an incidence of 1-2 per 100,000 populations. It is associated with cirrhosis in 80% of cases and more common in people in their 50's and 60's. (RMH, 2003).

1.4.4 Diet and Cancer

Variations in diet are an obvious possibility in accounting for the differences in cancer incidence between national populations. Many potential carcinogens are found in foods, whereas other dietary components may help to prevent the development of cancer it has been estimated that up to 30 percent of total cancer deaths in the United States are related to dietary factors. A number of food components have been suggested to either increase or decrease cancer risk **Table 1.7** (Cooper, 1993). The efforts to identify the causes of stomach cancer have proceeded in several major directions: (1) the protective role of diets rich in fruit and vegetables, (2) the benefits of vitamin C, (3) the protective effects of modern food processing and storage, (4) the role of *H. pylori* and interactions with dietary factors, (5) identification of natural carcinogens or precursors such as nitrates, found in foods, (6) the production of carcinogens during grilling or barbecuing of meats, (7) the synthesis of carcinogens from dietary precursors in the stomach (Michael and Wing, 2000).

Table 1.7. Dietary factors and cancer risk (Cooper, 1993).

Dietary components	Effect on Cancer Risk
High fat	Increased risk of colon and possibly breast cancer
High calorie	Obesity resulting in increased risk of endometrial and possibly breast cancer
Cured, smoked, and pickled foods.	Increased risk of stomach cancer
Aflatoxin	Increased risk of liver
Vitamin A or β-carotene	Decreased risk of lung and other epithelial cancers
Vitamin C	Decreased risk of stomach cancer.
Vitamin E and selenium	Deficiencies associated with increased cancer risk
Fiber	Decreased risk of colon cancer
Cruciferous vegetables	Decreased cancer risk

People who consume a diet high in foods that are smoked, dried, salted, or pickled ingest greater amounts of nitrates and nitrites. These substances can be converted inside stomach into compounds that increase risk of stomach cancer; the second most common tumor worldwide (Mayoclinic, 2003). Vitamin C inhibits the formation of these compounds, perhaps accounting for its suggested protective effect against stomach cancer (Cooper, 1993). On the other hand, risk is lower for people whose diet contains plenty of fresh fruits and vegetables, whole grains, and properly refrigerated foods (Mayoclinic, 2003). Wide variations exist in the incidence of gastric cancer in specific populations ranging from 80 per 100,000 in Africa to an incidence rate in Western Europe of 5 per 100,000 (RMH, 2003).

The excess salt intake could be involved in the etiology of stomach cancer. It was postulated that the continuous use of high doses of salt would result in early atrophic gastritis, thereby increasing the later risk of stomach cancer. The high salt consumption has been associated with an increased risk of gastric cancer in ecologic and analytical studies (Kelley and Duggan, 2003).

Contaminants present in food can be carcinogenic. A good example is provided by aflatoxin, a compound produced by some molds, which can grow in improperly stored supplies of peanuts and grains. Aflatoxin is an extremely potent carcinogen in animals, and contaminated food supplies have been associated with liver cancer in humans. Studies in Asia and Africa have shown that high rates of liver cancer in different geographic areas are directly correlated with exposure to aflatoxin, to the extent that risk of liver cancer is about five-fold higher in areas with high levels of aflatoxin contamination in foods (Cooper, 1993).

Diets that are high in fats and calories have been repeatedly linked to increased cancer incidence. The association is strongest for dietary fat, which may contribute to development of breast and colon cancer. The association between high fat diets and colon cancer risk has been demonstrated in a large study that involved 90,000 United States women,

where analysis of this group indicated that colon cancer was nearly twice as frequent among those whose diet contained approximately 44% of calories as fat than among those whose diet contained only 30% calories as fat (Cooper, 1993).

The dietary pattern most frequently associated with increased risk of colorectal cancer have several characteristics: rich in total fat, rich in total or animal protein, rich in meat products, a high proportion of saturated fats, low in fruits and vegetables, and low in plant source of fiber. In addition, excessive caloric intake and obesity have been implicated in some, but not all studies (Clinton *et al.*, 2000).

In contrast to dietary fat and high calorie intake, other dietary components, including dietary fiber, certain vitamins, selenium, and other compounds present in some vegetables have been suggested to reduce cancer risk. In general, it appears that diets rich in fresh fruits and vegetables are associated with decrease cancer incidence. Such diets are high in fibers, caretenoids (a source of vitamin A), and vitamin C, as well as being low in fat and calories (Cooper, 1993). A number of studies have suggested that the risk of colon cancer is reduced about two-fold by consumption of foods that are rich in dietary fiber, including vegetables, fruits, and grains. Diets that are rich in β-carotene, which is metabolized to

form Vitamin A, are associated with decreased incidence of several cancers, including those of the lung, esophagus, stomach, bladder, and breast.

Deficiencies in vitamin E, combined with low levels of selenium, may increase the risk of a variety of cancers. Selenium is a trace element derived from soil, and it has been observed that geographic areas with low selenium levels are associated with increased cancer incidence. Several other vegetable components, in addition to fiber and vitamins may also protect against cancer. In particular, cruciferous vegetables, including broccoli, brussels sprouts, cabbage, cauliflower, collards, kale, mustard greens, rutabagas, turnips greens, contains several compounds that inhibit that action of carcinogens in experimental animal studies (Cooper, 1993).

Changes in micronutrient concentrations in patients with gastrointestinal cancer were reported by (McMillan *et al.*, 2000). The concentration of micronutrients appear to be determined by dietary intake, redistribution (including losses from the body), and consumption. Inflammation may be important in both increasing redistribution and consumption of micronutrients. In that pilot study, it has been demonstrated that the circulating concentration of the antioxidant vitamins retinol, ϖ-tocopherol, lutein, lycopene, ϖ-carotene, and the trace elements zinc, copper, iron and selenium, and their carrier proteins albumin,

ceruloplasmin, and transferrin are altered in gastrointestinal cancer patients compared with healthy subjects (McMillan *et al.*, 2000).

Folate has recently emerged as an important nutritional factor that may modulate colorectal carcinogenesis. Dietary folate intake is inversely associated with the risk of colorectal cancer, approximately a 40% reduction in the risk of colonic neoplasm in individuals with the highest dietary folate intake (Kim *et al.*, 2001; Meyer and White, 1993; White *et al.*, 1997).

Although dietary factors are believed to contribute to a sizable proportion of cancers, attempts to identify specific components which either increase or decrease human cancer incidence have largely been inconclusive. It is also unclear whether children are more susceptible to some potential dietary carcinogens than adults, perhaps because of their lower body weight or the high rate of cell proliferation in growing tissues. At present, the clearest dietary risk factors are high-fat diets (for colon cancer), obesity (for endometrial cancer), and smoked, cured, and pickled foods (for stomach cancer). General dietary recommendations designed to reduce risk include reducing fat intake, eating foods, vegetables, and high-fiber foods, and minimizing consumption of smoked, pickled, and cured foods (Cooper, 1993).

1.4.5 Hepatitis B Virus and Liver Cancer

Primary hepatocellular carcinoma is very rare in the United States and Northern Europe (Michael and Wingo, 2000). (Less than 4 per 100,000 people) (Cooper, 1993).In contrast, it is one of the most frequent types of cancer in the developing nations of sub-Saharan Africa and Asia (Michael and Wingo, 2000). (As high as 150 per 100,000 people) (Cooper 1993) and is now ranked as the third most common cancer worldwide (Michael and Wingo, 2000).

Hepatitis B is the major risk factor for liver cancer and is responsible for a substantial fraction of human cancer worldwide. The correlation between the frequency of hepatitis B virus infection and the incidence of liver cancer was established through comparative studies in different countries where worldwide distribution of hepatitis B virus and liver cancer shows that areas of the world with a high frequency of hepatitis B virus infection also have a high incidence of liver cancer. In addition, hepatitis B virus is regularly found in cancerous liver cells, consistent with the idea that infection with this virus contributes directly to changing a normal liver cell into a cancer cell. Worldwide, more than 250 million people are chronic hepatitis B carriers and, consequently, suffer more than a hundred-fold increased risk of developing liver cancer (Cooper, 1993).

1.4.6 Heredity and Cancer

Although directly inherited cancers constitute only a small percentage of total cancer incidences, there are rare hereditary forms of many different kinds of cancer. In these cases, a strong predisposition to cancer is transmitted directly from parent to child in a genetically dominant fashion, and development of cancer is inherited like any other genetic trait such as hair or eye color, and lead to the development of only one or a few specific types of cancer. Many of the inherited cancers are rare diseases of childhood. An example is provided by retinoblastoma, an eye tumor that usually develops in children by the age of 3. Provided that this disease is detected early, retinoblastoma can be successfully treated by surgery and radiotherapy. The inherited form of retinoblastoma accounts for about 40% of the total incidence.

Hereditary cancers are not limited, however, to the rare cancers of childhood. There are also inherited forms of many common adult cancers, including colon and breast carcinomas. In these cases, the inherited forms accounts for no more than a few percent of total disease incidence. Colon cancer is a good example of a common cancer with both inherited and sporadic forms. About 1 in 20 Americans are affected by colon cancer. The majority of colon cancers occur sporadically, but two inherited forms of the

disease have been identified. The most frequently recognized is known as familial adenomatous polyposis. This disease, like retinoblastoma, is inherited as a single dominant genetic trait. During the first twenty years of life, affected individuals develop hundreds of colon adenomas, or polyps. The likelihood that one or more of these multiple benign adenomas will progress to malignancy is extremely high, so that most affected individuals more (more than 75%) develop colon cancer by age 40 if the disease is not treated. The colons of these patients are, therefore, usually removed before cancer has a chance to develop. The frequency of familial adenomatous polyposis is about 1 in 100,000, so this inherited form accounts for less than 0.5 % of total colon cancer incidence. The second inherited form, hereditary nonpolyposis colon cancer; in which affected individuals develop colon cancer without the large number of polyps characteristics of familial adenomatous polyposis, is similarly infrequent. Thus, in spite of the existence of at least two inherited forms, over 95% of colon cancer appears to represent noninhereted, sporadic disease (Cooper, 1993).

The majority of cases of pancreatic cancer are not associated with hereditary factors. Most cases are sporadic, meaning that there is not always a specific known risk factor that causes it and its occurrence is not often predictable. In some families we may see pancreatic cancer among relatives

who have been diagnosed with other types of cancer such as breast, ovarian, melanoma, or colorectal cancer. Depending on the family history, these combinations of cancers can sometimes be associated with known hereditary forms of cancer for which genetic testing may be available (RMH, 2003).

Recent studies suggest that genetic differences in the ability to metabolize some of the chemicals in cigarette smoke may affect the risk of lung cancer by five- to ten-fold. Moreover, it is estimated that such inherited susceptibility may contribute to about 20% of all lung cancer cases. Genes that confer increased susceptibility to breast and colon cancers have also been estimated to be inherited by 10 to 20% of the population, and such inherited susceptibilities may play a role in the development of a substantial fraction, of these common adult tumors (Cooper, 1993).

Studies of polymorphic genes relevant to cancer have been focused so far mostly on the enzymes of metabolic pathways controlling the detoxification of chemical carcinogens involved in the initiation of carcinogenesis (Kim, 1997). However, this field could be expanded, with more attention being paid to polymorphisms that affect other biological mechanisms, in particular regulatory and transport systems that are involved at different stages of neoplastic growth. It is generally accepted that

individual patterns of gene variants can affect the risk of sporadic colorectal cancer associated with various environmental influences, especially diet (Mason and Folate, 1996). Dietary animal fat is believed to be a risk factor for colorectal cancer, and its influence appears to be stronger during post-initiation phases of carcinogenesis. Therefore molecular mechanisms governing lipid transport and metabolism considered among potential risk modulators for this type of neoplasia. Multiple genetic determinants, comprising numerous gene polymorphisms, are involved in regulation of lipid metabolism (RMH, 2003; Mayoclinic, 2003).

The apolipoprotein E (*ApoE*) gene, the polymorphism of which has attracted wide attention in relation to a number of pathological conditions, including atherosclerosis and Alzheimer disease, encodes a multifunctional protein that plays an important role in lipid transport and metabolism. The gene is mapped to human chromosome 19, and has two structurally and functionally important polymorphisms involving codons 112 and 158 (Watson *et al.*, 2003). Its three well characterized allele variants, ε2, ε3 and ε4, are related to distinct patterns of lipid transport and metabolism. In addition to being among the main determinants in the regulation of blood lipid levels (ε4 is associated with hypercholesterolemia, whereas ε2 appears to be related to a lower serum cholesterol level) (Meyer and White, 1993),

the presence of different *ApoE* variants influences the enterohepatic metabolism of cholesterol and bile acids (White and Shanno, 1997). The latter role is closely associated with the formation and secretion of secondary bile acids present in human feces. These secondary bile acids are believed to promote colorectal carcinogenesis; thus *ApoE*-genotype related variations in cholesterol absorption and bile acid output are important in colorectal carcinogenesis.

In conclusion, the results of the present study indicate that *ApoE* gene polymorphism is likely to be a factor in CRC risk and prognosis; the first study on the relationship between *ApoE* gene polymorphism and CRC risk was performed in Finland. Its results suggested that the presence of the ε4 allele of the gene could provide protection from the development of adenoma and carcinoma of the proximal colon. The reduced bile acid production observed in subjects with this allele was discussed as a possible explanation for the phenomenon (Kim *et al.*, 2001; Watson *et al.*, 2003; Potter, 1999; Lipkin *et al.*, 1999).

1.5 Cancer and Age

Cancer can occur at any age, but it becomes much more common as we grow older, and its incidence and mortality rates increase dramatically with age during most of life as shown in **Figure 1.2** (Cooper, 1993; Thun and Wingo, 2000).

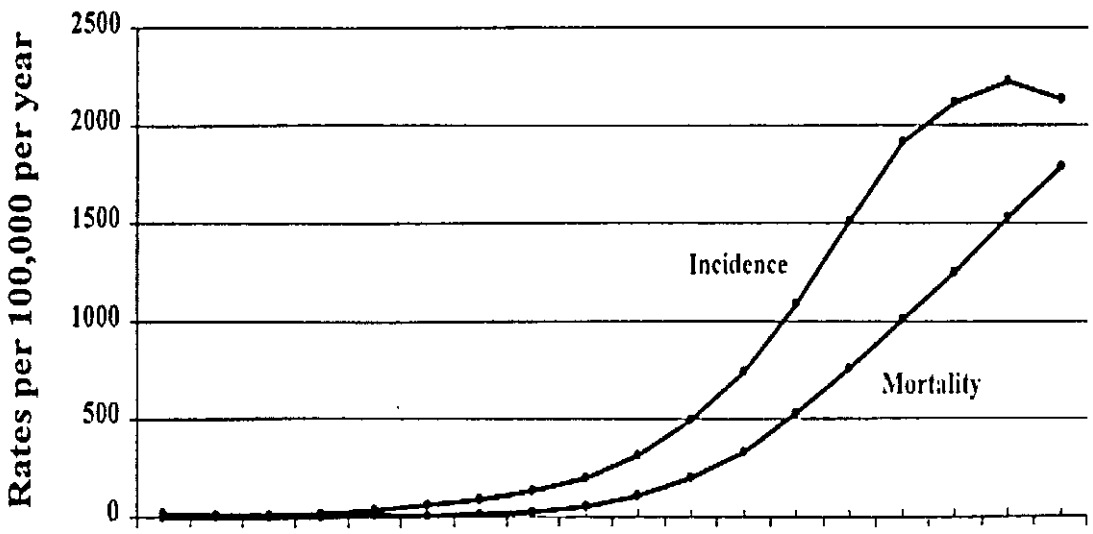


Figure1.2. Age-specific Incidence and Mortality Rates from all Cancers Combined, United States, 1992–1996 (ACS, 2002).

The relation of cancer incidence to age is illustrated in **Figure 1.3** (Cooper, 1993) for the three most common cancers, those of the lung, the breast, and the colon and rectum. For example, the incidence of colon and rectum cancers increases more than ten-fold between the ages of thirty and fifty, and other ten-fold between fifty and seventy. The increasing incidence of cancer with age reflects a fundamental feature of the biology of cancer cells. The conversion of normal cell to cancer cell does not occur as a single one-step event. Rather, the loss of growth control that characterizes cancer cells is the end result of accumulated mutations in multiple different genes regulating normal cell growth. Development of cancer thus involves series of progressive changes which gradually convert a normal cell into one that has lost control of its proliferation. Many years are required to accumulate the multiple abnormalities needed to generate most cancer cells, so the majority of cancers develop relatively late in life (Cooper, 1993).

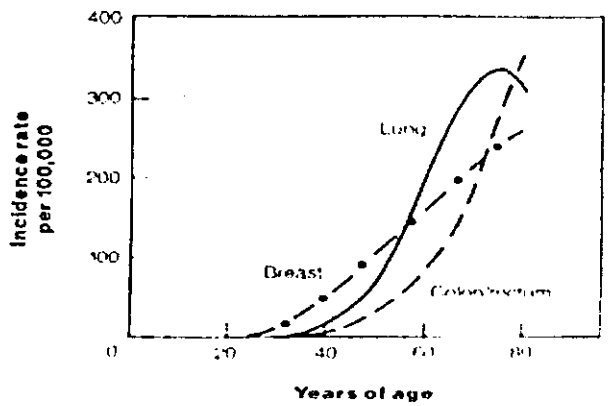


Figure1.3. Relation of Cancer Incidence to Age (Cooper, 1993).

The incidence of gastric cancer rises progressively with age, with most patients being between the ages of 50 and 70 years at presentation. Cases in patients younger than 30 years are very rare (PNCR, 2001; Kelley and Duggan, 2003).

1.6 Relation of Gender and Race to Cancer Incidence

Being male or female is an important basic human variable that affects health and illness throughout life. Men and women differ not only with regard to their reproductive organs and bodies but also in the way they think, feel, and behave. The physical difference is called sex, influenced by genes and biology; the psychological difference is called gender, in which environmental, cultural, and psychosocial factors also have a prominent role. In the case of cancer it is obvious that only men can get prostate cancer and breast cancer occurs predominantly in women (Kiss and Meyrn, 2001). Moreover, the incidence of other cancer types was found to be related, in different extents, to gender.

Parkin *et al.*, 1997, reported that gastric cancer is more common in males than females by a ratio of approximately 2 to 1 in US (Kelley and Duggan, 2003). The same results were reported by Sipponan and Correa, 2002, in the Finnish population. However, according to the report of the

Palestinian National Cancer Registry for cancer incidence in Palestine, in the years 1997-1998, stomach cancer was more common in males than females by a ratio of 1.3 to 1, while a ratio of 1 to 1 was reported for the incidence of colon cancer (PNCR, 2001). Males consistently showed a higher incidence of bladder cancer than do females throughout the world, with male/female ratios varying from approximately 2.5 to 5 (Engel *et al.*, 2002). However, the male to female ratio of bladder cancer incidence in Palestine is 8.3 (PNCR, 2001). In general, this gender disparity in cancer incidence may be partially due to historical differences between males and females in occupational exposures and cigarette smoking behaviors.

The results of the study of Watson *et al.*, 2003, showed that the relationship of different *ApoE* variants with colorectal cancer risk can differ substantially in men and women. Mechanisms that could explain these differences remain to be elucidated; however, it should be noted that epidemiological observations in developed countries show that colorectal tumor incidence in males is becoming substantially higher than in females (Parkin *et al.*, 1997; Fernandez *et al.*, 2000). This trend has been confirmed by the results of screening colonoscopy studies (Rex, 1995), with some authors regarding male gender as an additional risk factor (Rex, 1995, Chu *et al.*, 1994). The observed risk reduction in women is attributed, at least in

part, to the introduction of hormone replacement therapy in the second half of the last century (Fernandez *et al.* 2000; Franceschi *et al.*, 2000). On the other hand, gender-associated and hormone-induced peculiarities in the *ApoE*-modulated regulation of blood lipid levels (Mahley *et al.*, 2000) and cholesterol metabolism (Ng *et al.*, 2001) have been described (Watson *et al.*, 2003).

There are significant variations in the overall incidence of gastric cancer between different ethnic groups living in the same region **Table 1.8**. The ethnic distribution for gastric cancer is different, with preponderance in Whites over Blacks in the U.S. and non-Maoris over Maoris in New Zealand **Table 1.8** (Kelley and Duggan, 2003).

Table 1.8. Ethnic Differences in Age-adjusted rates (/100,000) of Gastric Cancer 9 (Cooper, 1993).

Country, region	Ethnicity	Male	Female
Singapore	Chinese	29.3	13.6
	Indian	10.3	7.9
	Malay	8.7	5.5
	Highest/lowest ratio	3.4	2.5
US, Los Angeles	Korean	35.5	16.2
	Japanese	21.2	12.0
	Black	13.6	5.9
	Hispanic White	11.8	6.9
	Chinese	11.7	7.6
	Other white	7.6	3.2
	Filipino	6.8	4.0
	Highest/lowest ratio	5.2	5.1
New Zealand	Maori	27.9	13.7
	Non-Maori	11.0	4.8
	Highest/lowest ratio	2.5	2.9

1.7 Physical Activity and Cancer Risk

Energy intake, metabolic efficiency, physical activity, and various measures of body size or obesity are intimately inter-related. It is difficult to quantitate or ascertain the role of each component in cancer risk without considering them as a group. Sedentary lifestyle with little physical activity is emerging as one of the strongest lifestyle factors associated with increased risk of colon cancer. In addition, excessive caloric intake and obesity have been implicated in some studies (Lipkin *et al.* 1999; Le Marchand *et al.*, 1992; West *et al.*, 1989; and Clinton *et al.*, 2000). One study indicated that waist or waist-to-hip ratio and indicators of central or abdominal obesity are strongly associated with risk of colon cancer (Giovannucci *et al.* 1995), perhaps explaining the stronger association in men. An inverse association between physical activity and risk of colon cancer has been observed in studies limited to occupational activity and those examining both job-related and recreational activity. In addition, many studies have found an association between BMI (Body Mass Index) and elevated risk of colon cancer in men, although this relation is weaker in women. The association between obesity and inactivity with risk of colon cancer have been observed in several countries (United States, China,

Sweden, and Japan), among men and women, and for both occupational and recreational activities (Clinton *et al.*, 2000).

1.8 Cancer Staging

Staging is the process of describing the extent or spread of the disease from the site of origin. It is essential in determining the choice of therapy and assessing prognosis. A cancer's stage is based on the primary tumor's size and location in the body and whether it has spread to other areas of the body. A number of different staging systems are used to classify tumors. The TNM staging system assesses tumors in three ways: extent of the primary tumor (T), absence or presence of regional lymph node involvement (N), and absence or presence of distant metastases (M). Once the T, N, and M are determined, a "stage" of I, II, III or IV is assigned, with stage I being early stage and IV being advanced. Summary staging (in situ, local, regional, and distant) is useful for descriptive and statistical analysis of tumor registry data. If cancer cells are present only in the layer of cells where they developed and they have not spread, the stage is in situ. If cancer cells have spread beyond the original layer of tissue, the cancer is invasive (ACS, 2002).

1.9 Cancer Screening

The individual patients risk status should be determined well before the earliest potential initiation of screening. The individual's risk status determines when screening should be initiated and what tests and frequency are appropriate, **Figure: 1.4** (Winawer *et al.*, 2003).

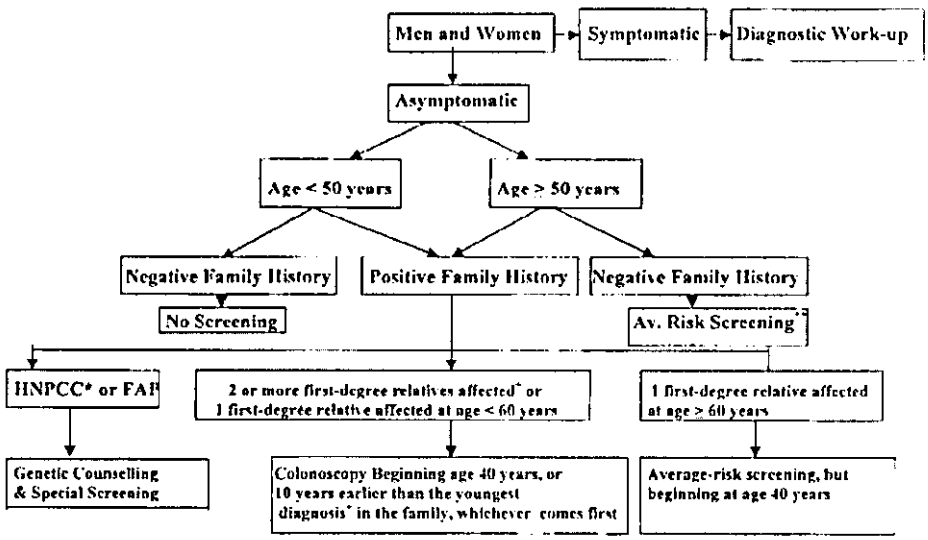


Figure1.4. Algorithm for Colorectal Cancer Screening. +, either colorectal cancer or poly; HNPCC = hereditary nonpolyposis colorectal cancer and FAP = familial adenomatous polyposis (Winawer *et al.*, 2003).

Several existing screening regimens have been proven to be effective in reducing mortality from colorectal cancer. These allow detection and removal of adenomatous polyps before they become cancerous and the removal of early-stage colorectal cancer when the disease is still highly

curable. Tumours detected because of bleeding or pains have usually progressed beyond localized stage. Current tests include Fecal Occult Blood Test (FOBT), flexible sigmoidoscopy, colonoscopy, barium enema with air contrast and digital rectal exam. Other screening tests still under development. The sensitivity of colorectal cancer screening is expected to increase with improved methods of FOBT testing in combination with immunochemical testing. Newer screening methods, such as genetic-based fecal screening and virtual colonoscopy, are still under development. Things to consider when deciding which is the right test for each case, are explained in **Table 1.9** (ACS, 2003).

Table 1.9. Things to Consider When Deciding which is the Right Screening Test for Colorectal Cancer (ACS, 2002).

Test	Advantages	Performance & complexity	Characteristics/ limitations	Cost range
Fecal Occult Blood Test	ξ No bowel preparation ξ Sampling is done at home ξ Low cost ξ Proven attentive in clinical trials ξ No risk of bowel tears or infection	Intermediate for cancer Lowest complexity	ξ Will miss most polyps and some cancers ξ May reduce false - positive test result ξ Pre-test dietary limitations needed ξ Must be done every year ξ More detective when combined with a flexible sigmoidoscopy every five years ξ Additional procedures necessary if abnormalities are detected	Lowest cost under $20
Flexible Sigmoidoscopy	ξ Fairly quick, few complication ξ Minimal bowel prepara tion ξ Done every five years ξ Minimal discomfort ξ Doesn't require a specialist	High for up to half of the colon Intermediate complexity	ξ Usually views only about a third of the colon ξ Cannot remove all polyps Very small risk of infection or bowel tear ξ More effective when combined with annual fecal occult blood testing ξ Additional procedures needed if abnormalities are detected	mid low cost: between $150 to $200
Double Contrast Barium Enema	ξ Can usually view entire colon ξ Few complication ξ Done every five years ξ No sedation needed	High High complexity	ξ Can miss some small polyps and cancers ξ Full bowel preparation needed ξ Some false-positive test results ξ Additional procedures necessary if abnormalities are detected	mid low high cost: between $300 to $400
Colonoscopy	ξ Can usually view entire colon ξ Can biopsy and remove polyps ξ Done every 10 years ξ Can diagnose other disease	Highest Highest complexity	ξ Can miss small polyps ξ Full bowel preparation needed ξ Can be expensive ξ Sedation of some kind usually needed ξ You may miss a day of work ξ Potential risk of bowel tears or infections	High cost at least $1000

According to the American Cancer Society guidelines on screening and surveillance for the early detection of colorectal caner, both men and women, beginning at age 50, should follow one of the following five screening options:

- Yearly FOBT plus flexible sigmoidoscopy every 5 years.
- Flexible sigmoidoscopy every5 years.
- Yearly FOBT.
- Colonoscopy every 10 years.
- Double-contrast barium enema every 5 years.

1.9.1 Fecal Occult Blood Test (FOBT)

Cancers and some large polyps bleed intermittently into the intestine. The FOBT detects hidden or 'occult' blood in a stool sample. Individuals receive a test kit to take home along with dietary instructions. FOBT consists of six small stool samples, with two samples each taken from three consecutive bowel movements. Upon completing the test, patients return the kit to the physician for evaluation (ACS, 2002). FOBT is a guaiac-based test that detects pseudoperoxidase activity of heme or hemoglobin. Dietary restrictions are necessary at least 24 hours before and during the collection of the stool samples and some commonly used drugs should be avoided.

Certain foods such as red meat and fresh fruits have peroxidase or pseudoperoxidase activity and can cause false positive reactions. Aspirin and nonsteroidal anti-inflammatory drugs can cause occult gastrointestinal bleeding. Vitamin C, an antioxidant, can interfere with the reaction and cause a false negative result. Subjects with a positive Hemoccult tests are referred for further investigation, mainly colonoscopy or sigmoidoscopy with double contrast barium enema (Winawer *et al.*, 1993). Studies have proven that regular use of this screening method saves lives and can reduce the incidence of colorectal cancer.

1.9.2 Flexible Sigmoidoscopy

A slender, flexible, hollow, lighted tube is inserted through the rectum into the colon to search for cancer or polyps. The sigmoidscope is around 2 feet long and, at its maximum insertion, can only reach about half of the colon. If there is a polyp or tumor present, the patient must be referred for colonoscopy so that the entire colon can be examined.

1.9.3 Colonoscopy

Like the sigmoidoscope, this procedure allows for direct visual examination of the colon and rectum. A colonoscope is similar to the sigmoidoscope, but its greater length allows the doctor to view the entire colon. If a polyp is found, the physician may remove it by passing a wire loop through the colonoscope to cut the polyp from the wall of the colon using an electric current.

1.9.4 Barium Enema with Air Contrast

This procedure, which allows complete radiological examination of the colon, is also called a double-contrast barium enema. Barium sulfate is introduced into the colon and allowed to spread throughout the colon to partially fill and open up the colon. The colon is then filled with air so that it can expand and increase the quality of x-rays that are taken.

1.9.5 Digital Rectal Exam

A physician inserts a gloved finger into the rectum to feel for anything that is irregular or abnormal. Often, a single stool sample is also collected and placed on an FOBT card for further examination.

1.10 Prevention, Diagnosis and Treatment of Cancer

Surgery, radiation, chemotherapy, hormones, and immunotherapy treat cancer. The five year relative survival rate represents persons who are living five years after diagnosis, whether disease-free, in remission, or under treatment with evidence of cancer. While 5 years relative survival rates are useful in monitoring progress in the early detection and treatment of cancer, they do not represent the proportion of people who are cured permanently, since cancer can affect survival beyond five years after diagnosis (ACS, 2002).

All cancers caused by cigarette smoking and heavy use of alcohol could be prevented completely. The American Cancer Society estimated that in 2002 about 170,000 cancer deaths were expected to be caused by tobacco use, and about 19,000 cancer deaths may be related to excessive alcohol use, frequently in combination with tobacco use. Scientific evidence suggests that about one-third of the 555,500 cancer deaths expected to occur in 2002 will be related to nutrition, physical inactivity, obesity, and other lifestyle factors and could also be prevented. Certain cancers are related to infectious exposures, e.g., hepatitis B virus (HBV), human papillomavirus (HPV), human immunodeficiency virus (HIV), helicobacter, and others, and could be prevented through behavioral changes, vaccines, or antibiotics. In

addition, many of the more than 1 million skin cancers that have been diagnosed in 2002 could have been prevented by protection from the sun rays. Regular screening examinations by a health care professional can result in the detection of cancers of the breast, colon, rectum, cervix, prostate, testis, oral cavity, and skin at earlier stages, when treatment is more likely to be successful. Self-examinations for cancers of the breast and skin may also result in detection of tumors at earlier stages. Cancers that can be detected by screening account for about half of all new cancer cases. The 5- year relative survival rate for these cancers is about 82%. If all of these cancers were diagnosed at a localized stage through regular cancer screenings, 5-year survival would increase to 95%.

The 5-year relative survival rate for all cancers combined is 62%. After adjusting for normal life expectancy (factors such as dying of heart disease, accidents, and diseases of old age), the 5-year relative survival rate represents persons who are living five years after diagnosis, whether disease-free, in remission, or under treatment with evidence of cancer. While 5-year relative survival rates are useful in monitoring progress in the early detection and treatment of cancer, they do not represent the proportion of people who are cured permanently, since cancer can affect survival beyond five years after diagnosis. Five-year survival rates for representative

adult cancers in U.S are shown in **Figure 1.5**. Although these rates provide some indication about the average survival experience of cancer patients in a given population, they are less informative when used to predict individual prognosis and should be interpreted with caution. First, 5-year relative survival rates are based on patients who were diagnosed and treated at least eight years ago and do not reflect recent advances in treatment. Second, information about detection methods, treatment protocols, additional illnesses, and behaviors that influence survival are not taken into account in the estimation of survival rates.

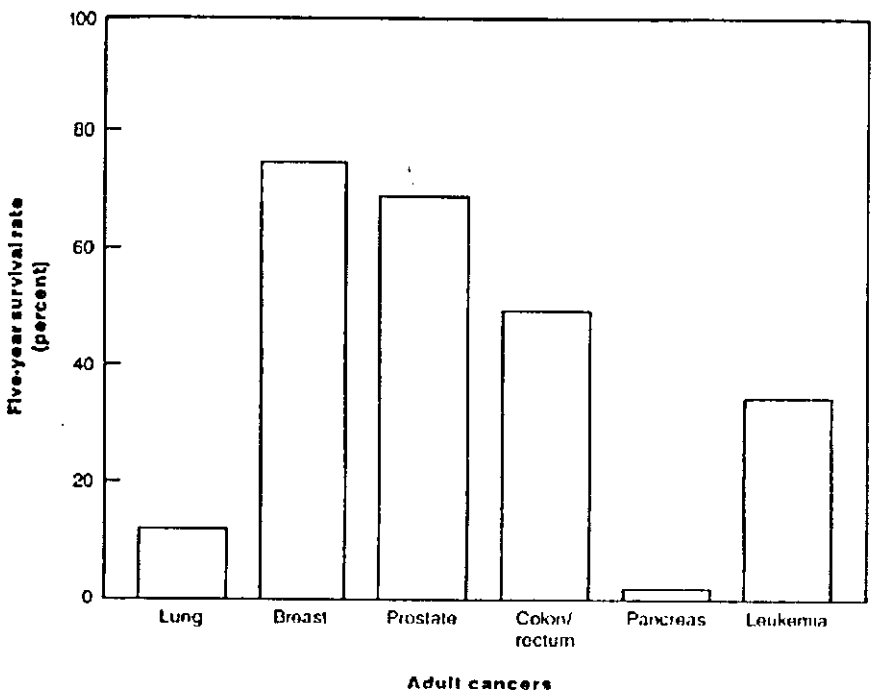


Figure1.5. Five-year Survival Rates for Representative Adult Cancers in U.S. (Cooper, 1993).

In Palestine there are three units for treating cancer patients. The first one is at Beit-jala Hospital, the second one at Al-Watani Hospital at Nablus and the third one in Al-Shifa Hospital at Gaza. These units treat patients who need chemotherapy and surgery while the patients who need radiotherapy referred to treatment abroad (PNCR, 2001).

1.11 Aims of the Study

Since no previous studies on the prevalence of gastrointestinal cancers were carried out in Palestine, the purpose of this study is to investigate the occurrence of the different gastrointestinal carcinomas in the population of Northern regions of Palestine (Jenin, Nablus, Tulkarem, Qalqilia, and Salfeet) and to examine the association of different variables collected by questionnaire such as age, sex, work, residence and education level, on dietary intake, tobacco and alcohol use, family history of cancer, use of different drugs, physical activity and other selected risk factors.

CHAPTER II

METHODOLOGY

2.1 Study Population

The Palestinian National Cancer Registry, established in 1998, published its first report on cancer incidence in the West bank and Gaza in 1999. However, no other reports in this respect were published, until now, for the years after 1999. The source of data concerning the northern regions of the West Bank is Al-Watani Hospital in Nablus, which is the main oncology center serving that regions (Jenin, Nablus, Tulkarem, Salfeet and Qalqilia). Accordingly, our study was conducted using the records of patients who were referred to Al-Watani Hospital as a start point. Subjects of this study were patients from different ages with different types of cancer who were referred to Al-Watani Hospital in 4 years (1999-2002). However, the inclusion criterion was one or more histologically proven gastrointestinal (GI) adenocarcinoma. The tissue diagnosis of these patients was made either at Rafeedia Hospital in Nablus or at private laboratories.

2.2 Data Collection and Study Design

Data were obtained from records of Al-Watani Hospital, Rafeedia Hospital – Nablus and from private laboratories. However, we found that the registries of all patients were available at Al-Watani Hospital since all

cancer patients from the northern regions of Palestine are referred to this main oncology center for treatment. We analyzed the data of 1000 patients with different types of adenocarcinoma, who were referred to Al-Watani Hospital during the 4 years period from January, 1999 to December, 2002. Information regarding age, sex, residence and type of diagnosed cancer for most patients were available from their records in the hospital. We tried to meet the patients who were definitely diagnosed for the presence of any of the gastrointestinal (GI) cancers (colon, rectum, stomach, pancreas and liver) and asked them to respond to a questionnaire (Appendix), which provided information on demographic characteristics, occupation, smoking habits, diet habits, physical activity, family history of cancer and personal medical history.

2.3 Statistical Analysis

Statistical analysis was performed using Statistical Package for Social Sciences "SPSS" (SPSS Inc., Chicago, IL, U.S.A). Incidence frequencies (%) of the different investigated types of GI, associated with several variables (sex, age groups, occupation, diet, smoking habits, physical activity, and other variables) were calculated. The Chi-Square test was used to test the significance of each of the factors that were associated

with the different types of GI cancer. All significance tests were two sided and were considered statistically significant if the observed significance level (P value) was <0.05.

CHAPTER III

RESULTS

3.1 Cancer Incidence in Northern West Bank

According to the records of Al-Watani Hospital in Nablus, 1000 consecutive patients (520 male "52%" and 480 female "48%") with different types of adenocarcinoma were referred to the hospital during the 4 years period from January, 1999 to December, 2002. The case records of those patients were examined and the incidence frequency of each type of cancer was calculated (**Table 3.1**). The results obtained revealed that the most frequent cancer is breast cancer (18.4%) followed by lung and liver cancers (8.7% each), bladder cancer (8.1%) and colorectal cancer (7.6%) as shown in **Table 3.1** and **Figure 3.1**.

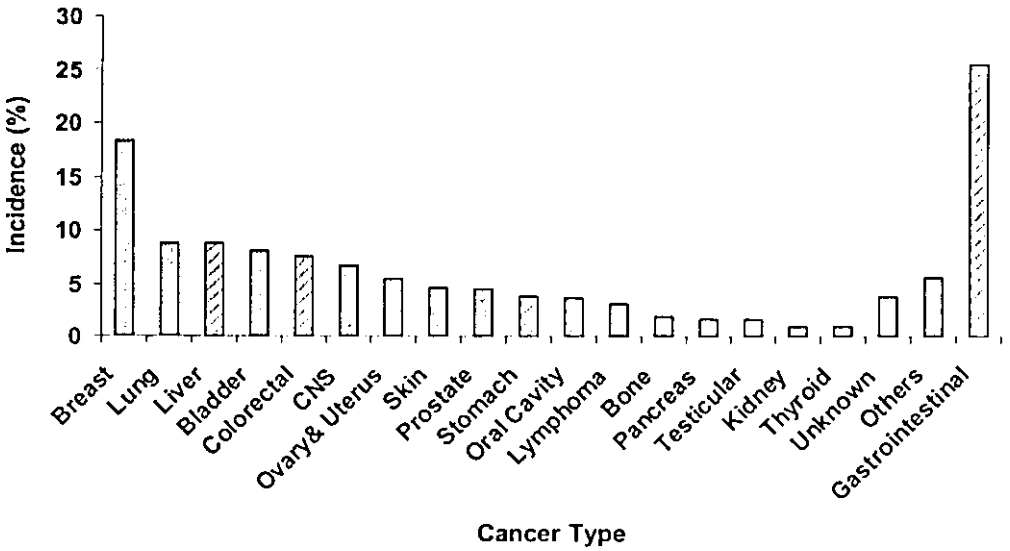
3.1.1 Incidence of GI Cancers

The same data of the cancer cases in Al-Watani Hospital showed that from the 1000 cancer cases there were 255 cases (25.5%) belonging to the different GI cancer types. The most frequent GI cancer was liver cancer (8.7% of all cancers and 33% of GI cancers), and then colorectal cancer (7.6% of all cancers and 30% of GI cancers) followed by stomach, oral cavity and pancreas cancers, respectively (**Table 3.1** and **Figure 3.1**).

Table 3.1. The Incidence Frequencies of the Most Common Cancer Types in Northern West Bank in the Years 1999-2002.

Cancer Type	No. of Cases	Incidence (%)
Breast	184	18.4
Lung	87	8.7
**Liver*	***87***	***8.7***
Bladder	81	8.1
**Colorectal*	***76***	***7.6***
CNS	67	6.7
Ovary& Uterus	55	5.5
Skin	46	4.6
Prostate	45	4.5
**Stomach*	***38***	***3.8***
**Oral Cavity*	***37***	***3.7***
Lymphoma	31	3.1
Bone	19	1.9
**Pancreas*	***17***	***1.7***
Testicular	17	1.7
Kidney	9	0.9
Thyroid	9	0.9
Unknown	39	3.9
Others	56	5.6
Total	1000	100
**Gastrointestinal*	***255***	***25.5***

(a)



(b)

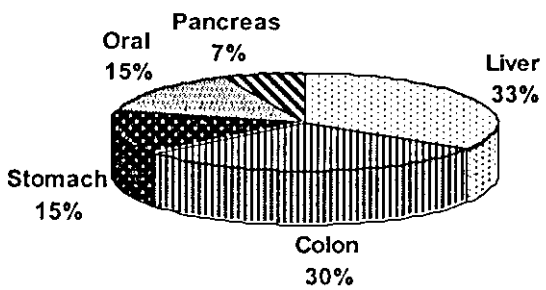


Figure 3.1. (a) The Most Common Cancer Cases in Northern West Bank in the Years 1999-2002, (b) The Incidence Frequencies of the Different GI Cancer Types.

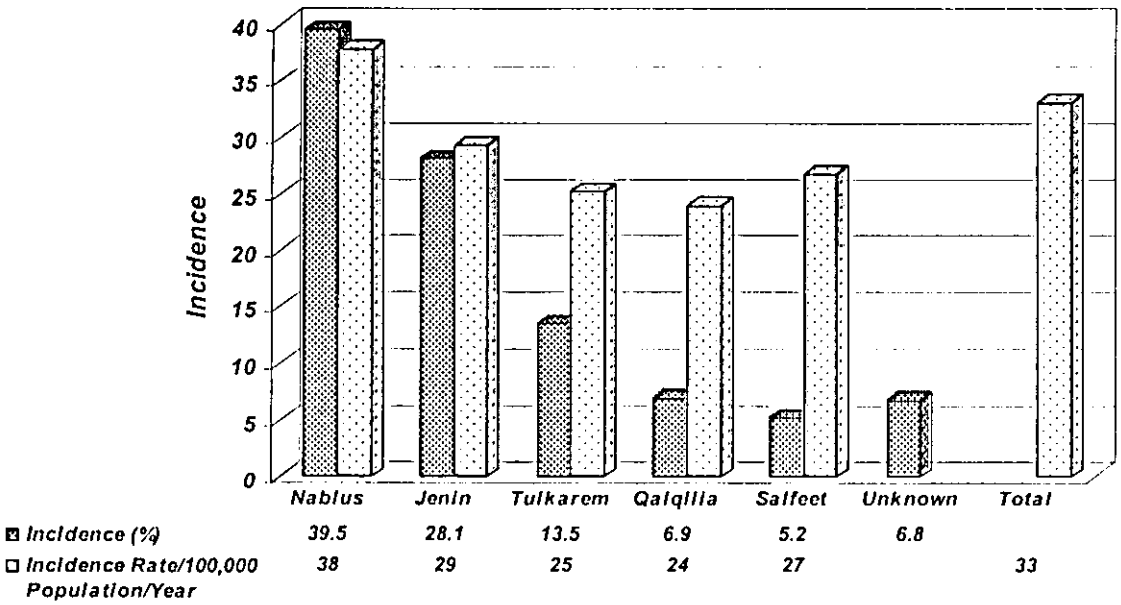
3.1.2 Geographical Distribution of Cancer Cases

The geographic distribution of the cancer cases in Northern West Bank in the years 1999-2002, according to the database of Al-Watani Hospital is shown in **Table 3.2** and **Figure 3.2**. The highest incidence frequencies of all cancers and GI cancers were found in Nablus district followed by Jenin, Tulkarem, Qalqilia and Salfeet districts, respectively. However, the crude incidence rate of cancer in Northern West Bank was 33 per 100,000 population per year, with Nablus district also occupying the first position (38 per 100,000 population per year) among the districts of Northern West Bank (**Table 3.2** and **Figure 3.2**).

Table 3.2. Incidence of Cancer and GI Cancers in the Northern West Bank in the Years 1999-2002.

District	Population	Total Cancer Cases	Incidence (%)	Incidence Rate per 100,000 Population per Year	GI Cancer Cases	Incidence (%) of GI Cancer Cases
Nablus	261,340	395	39.5	38	119	47
Jenin	239,639	281	28.1	29	66	26
Tulkarem	134,110	135	13.5	25	34	13
Qalqilia	72,007	69	6.9	24	20	8
Salfeet	48,538	52	5.2	27	16	6
Unknown		68	6.8			
Total	755,634	1000	100	33	255	100

(a)



(b)

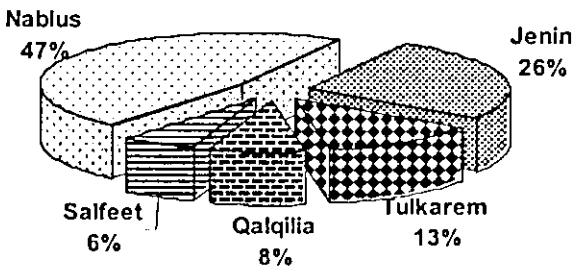


Figure 3.2. (a) Cancer Incidence in the Northern West Bank in the Years 1999-2002, (b) Incidence Frequencies of GI Cancers in the Different Districts of Northern West Bank in the Years (1999-2002).

3.2 The Correlation of GI Cancers Incidence to Different Variables

During the period of the 4 years (1999-2002), 255 GI cancer cases (25.5%) were diagnosed, in the different districts of Northern West Bank, and referred to Al-Watani Hospital – Nablus. We could obtain the personal history and information of 141 GI cancer patients (55.3% of all GI cancer cases) who responded to the questionnaire. As shown in **Figure 3.3**, it was found that the liver cancer had the highest frequency of incidence (36%) followed by colorectal and stomach cancers (21% each), then oral cavity cancers (14%) and finally pancreas cancer (9%). The association between the variables that took place in the questionnaire and the incidence of the different types of GI cancer was investigated as shown in the following sections.

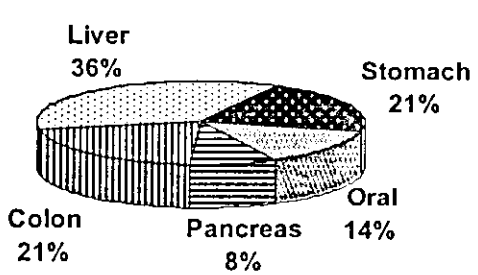


Figure 3.3. The Incidence Frequencies of the Different GI Cancer Types for the 141 Patients who Responded to the Questionnaire.

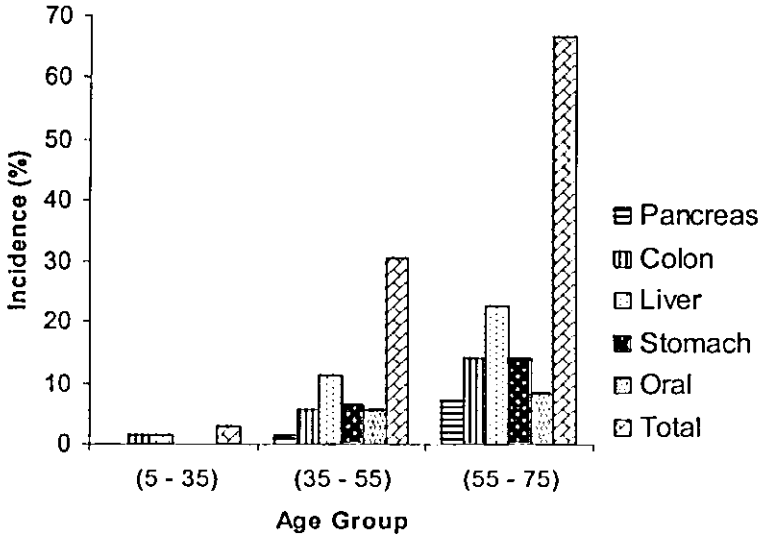
3.2.1 GI Cancers and Age

The patients who participated in this study were divided into three age groups (2.8% from 5 to 35 years, 30.5% from 35 to 55, and 66.7% from 55 to 75 years). The statistical analysis of the data revealed that there is no significant association between different age groups and the different GI cancer types (p=0.67). However, it is clear from the data of **Table 3.3** that there are partial correlations, where it was clear that, for all types of GI cancer, incidence increases with age. The highest frequency of GI cancers incidence (66.7%) was found among the older people in the age group 55-75 years, where within this age group 34% had liver cancer and 21.3% had colorectal and stomach cancers each. The incidence frequency of GI cancers within the age group 35-55 was 30.5%, where within this age group 37.2% had liver cancer and 20.9% had stomach cancer. While there were no significant difference in the incidence frequencies of liver, colorectal and stomach cancers between the two age groups, the incidence of oral cavity cancer was higher in the age group 35-55 years (18.6%) compared to the age group 55-75 years (12.8%), and the incidence of pancretic cancer was more than 2-folds (10.6%) higher in the age group 55-75 years compared to the age group 35-55 years (4.7%) as shown in **Table 3.3** and **Figure 3.4**.

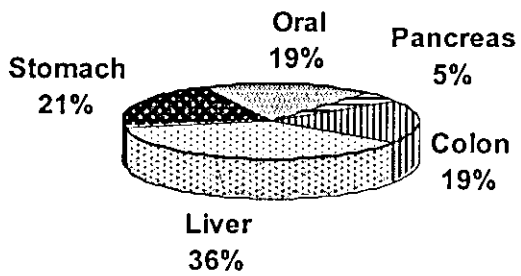
Table 3.3. The Association between Different Age Groups and Incidence of the GI Cancer Types

		Different types of Cancers					
		Pancreas	Colon	Liver	Stomach	Oral	Total
(5-35) Year	Count		2	2			4
	%within group		50%	50%			100%
	% of total		1.40%	1.40%			2.80%
(35-55) Year	Count	2	8	16	9	8	43
	%within group	4.70%	18.60%	37.20%	20.90%	18.60%	100%
	% of total	1.40%	5.70%	11.30%	6.40%	5.70%	30.5%
(55-75) Year	Count	10	20	32	20	12	94
	%within group	10.60%	21.30%	34%	21.30%	12.80%	100%
	% of total	7.10%	14.20%	22.70%	14.20%	8.50%	66.70%
Total	Count	12	30	50	29	20	141
	%within group	8.50%	21.30%	35.50%	20.60%	14.20%	100%
	% of total	8.50%	21.30%	35.50%	20.60%	14.20%	100%

(a)



(b)



(c)

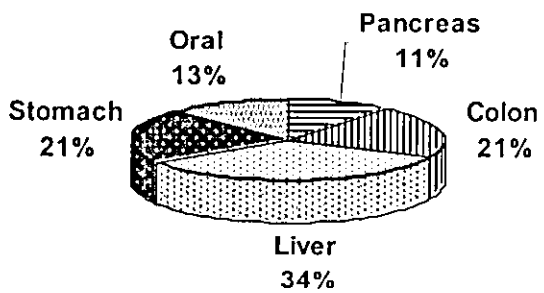


Figure 3.4. (a) GI Cancer Incidence Frequencies in Different Age Groups,(b) GI Cancer Incidence in (35-55 years) Age Group,(c) GI Cancer Incidence in (55-75 years) Age Group.

3.2.2 GI Cancers and Sex

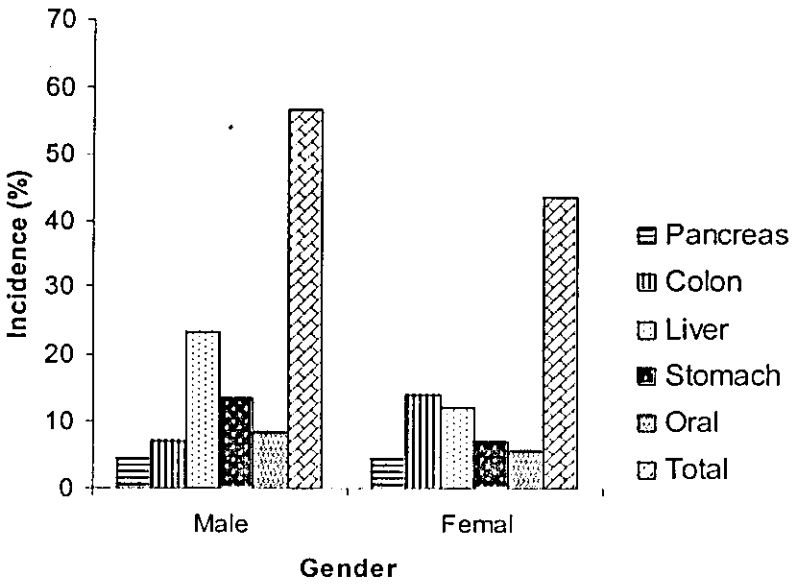
It was found that, from the 141 patients who participated in the study, there were 80 males (57%) and 61 females (43%). The statistical analysis of the data revealed that there is a significant association between the different GI cancer types and sex (p=0.047).

The differences in incidence frequencies of pancreas and oral cavity cancers were not so significant between males and females. However, there were significant differences in the incidence frequencies, between males and females, for liver cancer (41.3 % males and 27.9% females), for stomach cancer (23.8% males and 16.4% females), and for colorectal cancer (32.8% females and 12.5% males), as shown in **Table 3.4** and **Figure 3.5**.

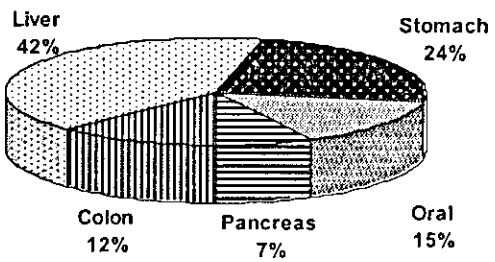
Table 3.4. Distribution of the 141 GI Cancer Cases According to Gender.

		Types of GI Cancers					
		Pancreas	Colon	Liver	Stomach	Oral	Total
Male	Count	6	10	33	19	12	80
	%within group	7.5%	12.5%	41.3%	23.8%	15.0%	100.0%
	% of total	4.3%	7.1%	23.4%	13.5%	8.5%	56.7%
female	Count	6	20	17	10	8	61
	%within group	9.8%	32.8%	27.9%	16.4%	13.1%	100.0%
	% of total	4.3%	14.2%	12.1%	7.1%	5.7%	43.3%
Total	Count	12	30	50	29	20	141
	%within group	8.5%	21.3%	35.5%	20.6%	14.2%	100.0%
	% of total	8.5%	21.3%	35.5%	20.6%	14.2%	100.0%

(a)



(b)



(c)

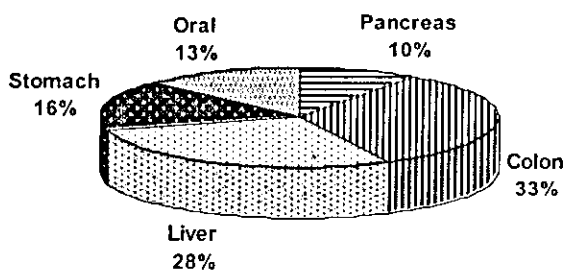


Figure 3.5. (a) Distribution of GI Cancer Cases According to Gender (b) GI Cancer Incidence in Males, (c) GI Cancer Incidence in Females.

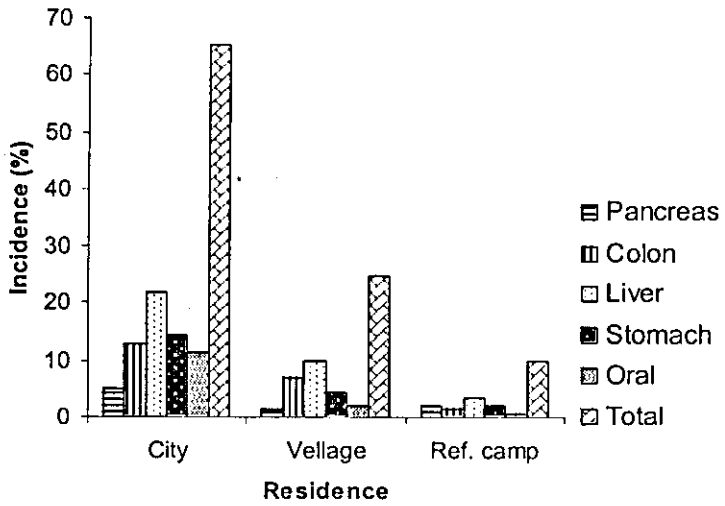
3.2.3 GI Cancers and Residence

The patients who participated in this study were divided into three groups according to the place of their residence (65% city, 25% village and 10% refugee camp). The statistical analysis of the data revealed that there is no significant association between the place of residence and the different GI cancer types (p=0.541). However, it is clear from the data of **Table 3.5** that there are partial correlations, where it was clear that there are significant differences in the incidence frequencies of some GI cancers according to the place of residence; for pancreas cancer (about 3-folds higher among refugee camp residents, 21.4%), colorectal cancer (about 2-folds higher among village residents, 28.6 %) and oral cavity cancer (about 2-folds higher among city residents, 17.4%), but there were no significant differences in the incidence frequencies of liver and stomach cancers related to the place of residence, as shown in **Table 3.5** and **Figure 3.6**.

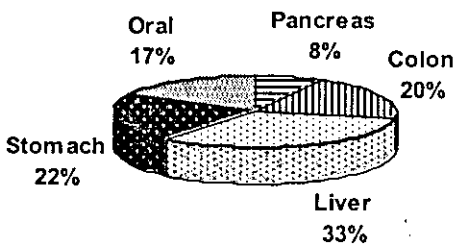
Table 3.5. Distribution of the 141 GI Cancer Cases According to their Residence.

		Different types of Cancers					
		Pancreas	Colon	Liver	Stomach	Oral	Total
City	Count	7	18	31	20	16	92
	%within group	7.6%	19.6%	33.7%	21.7%	17.4%	100.0%
	% of total	5.0%	12.8%	22.0%	14.2%	11.3%	65.2%
Village	Count	2	10	14	6	3	35
	%within group	5.70%	28.60%	40.00%	17.10%	8.60%	100%
	% of total	1.40%	7.10%	9.90%	4.30%	2.10%	24.80%
Refugee Camp	Count	3	2	5	3	1	14
	%within group	21.40%	14.30%	35.7%	21.40%	7.10%	100%
	% of total	2.10%	1.40%	3.50%	2.10%	0.70%	9.90%
Total	Count	12	30	50	29	20	141
	%within group	8.50%	21.30%	35.50%	20.60%	14.20%	100%
	% of total	8.50%	21.30%	35.50%	20.60%	14.20%	100%

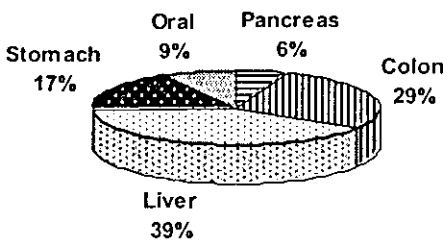
(a)



(b)



(c)



(d)

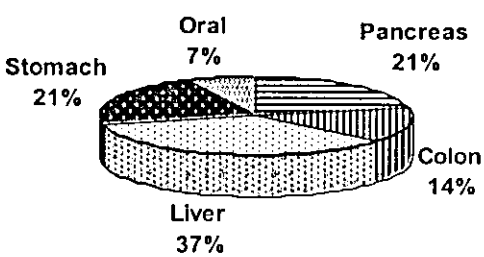


Figure 3.6. (a) Distribution of the 141 GI Cancer Cases According to Residence, (b) Distribution of the GI Cancer Cases Among City Residents, (c) Distribution of the GI Cancer Cases Among village Residents, and (d) Distribution of the GI Cancer Cases Among Refugee Camp Residents.

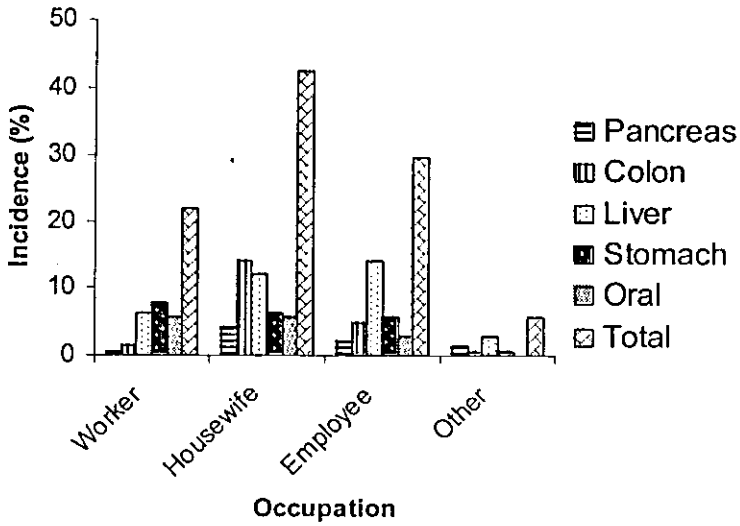
3.2.4 GI Cancers and Occupation

The patients who participated in this study were divided into three groups according to their occupation (22% workers, 42.6% housewives and 29.8% employees). The statistical analysis of the data revealed that there is slight significant association between the occupation and the different GI cancer types (p=0.05). It is clear from the data of **Table 3.6** that there are significant differences in the incidence frequencies of the different GI cancers according to occupation; for pancreas and colorectal cancers highest among housewives (10% and 33.3%, respectively), for liver cancer highest among employees (47.6%), for stomach and oral cavity cancers highest among workers (35.5% and 25.8%, respectively), as shown in **Table 3.6** and **Figure 3.7.**

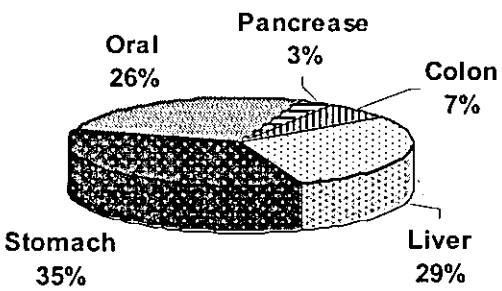
Table 3.6. The Distribution of the 141 Cancer Cases According to Occupation.

		Different types of Cancers					
		Pancreas	Colon	Liver	Stomach	Oral	Total
Worker	Count	1	2	9	11	8	31
	%within group	3%	6.5%	29%	36%	26%	100%
	% of total	0.7%	1.4%	6.4%	7.8%	5.7%	22%
Housewife	Count	6	20	17	9	8	60
	%within group	10.0%	33.3%	28.3%	15.0%	13.3%	100%
	% of total	4.3%	14.2%	12.1%	6.4%	5.7%	42.6%
Employee	Count	3	7	20	8	4	42
	%within group	7.1%	16.7%	47.6%	19.1%	9.5%	100%
	% of total	2.1%	5%	14.2%	5.7%	2.8%	29.8%
Other	Count	2	1	4	1		8
	%within group	25%	13%	50%	13%		100%
	% of total	14%	1%	3%	1%		6%
Total	Count	12	30	50	29	20	141
	%within group	8.5%	21.3%	35.5%	20.6%	14.2%	100%
	% of total	8.5%	21.3%	35.5%	20.6%	14.2%	100%

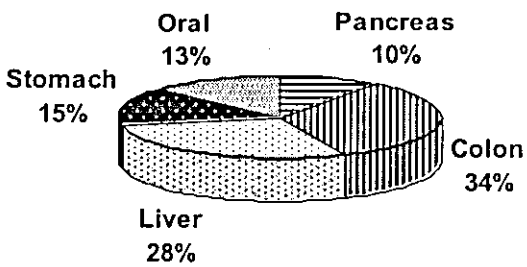
(a)



(b)



(c)



(d)

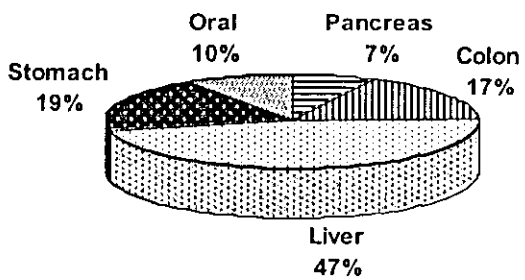


Figure 3.7. (a) The Distribution of the 141 Cancer Cases According to Occupation, (b) GI Cancer Incidence Among Workers, (c) GI Cancer Incidence Among Housewives, and (d) GI Cancer Incidence Among Employees.

3.2.5 GI Cancers and Smoking

It was found that, from the 141 patients who participated in the study, there were 79 smoker (56%) and 62 nonsmokers (44%). The statistical analysis of the data revealed that there is a significant association between the different GI cancer types and smoking (p=0.001). The differences in incidence frequencies of liver and stomach cancers were not so significant between smokers and nonsmokers. However, there were significant differences in the incidence frequencies, between both groups, for pancreas cancer (more than 8-folds higher in smokers "13.9%" compared to nonsmokers "1.6%"), colorectal cancer (more than 2-folds higher in smokers "27.8%" compared to nonsmokers "12.9%") and oral cavity cancers (more than 3-folds higher in nonsmokers "24.2%" compared to smokers "6.3%"), as shown in **Table 3.7** and **Figure 3.8**. On the other hand, the statistical analysis showed no significant association between the incidence frequencies of the different GI cancer types and number of cigarettes smoked per day.

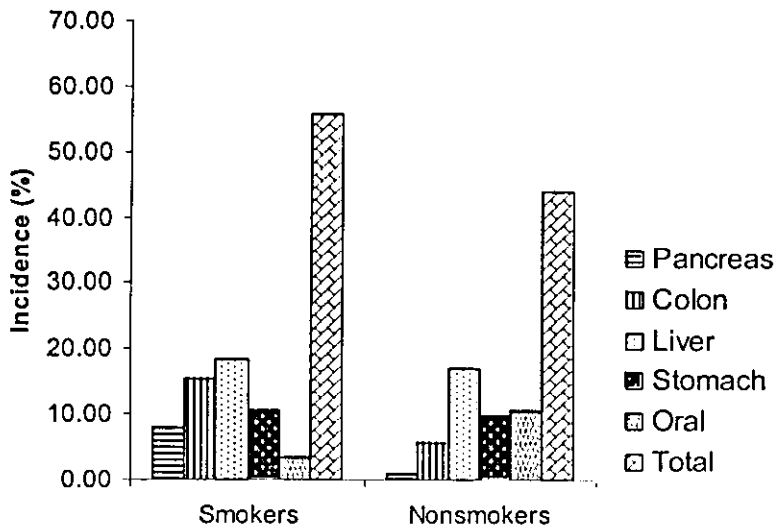
Table 3.7. The Distribution of the 141 GI Cancer Cases According to Smoking Habits.

		Different types of Cancers					
		Pancreas	Colon	Liver	Stomach	Oral	Total
Smoker	Count	11	22	26	14	15	79
	%within group	13.9%	27.8%	32.9%	19.0%	6.3%	100.0%
	% of total	7.8%	15.6%	18.4%	10.6%	3.5%	56.0%
Non smoker	Count	1	8	24	14	15	62
	%within group	1.6%	12.9%	38.7%	22.6%	24.2%	100.0%
	% of total	0.7%	5.7%	17.0%	9.9%	10.6%	44.0%
Total	Count	12	30	50	29	20	141
	%within group	8.5%	21.3%	35.5%	20.6%	14.2%	100.0%
	% of total	8.5%	21.3%	35.5%	20.6%	14.2%	100.0%

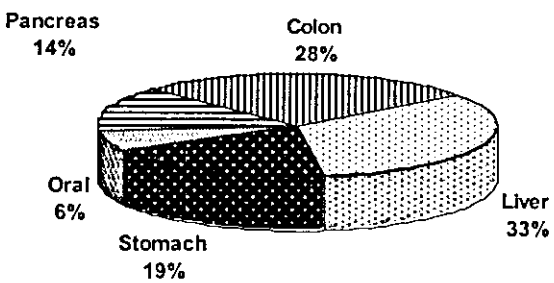
3.2.6 GI Cancers and Diet

Several variables concerning diet were included in the questionnaire to investigate their association to the incidence frequencies of the different GI cancer types. Although the statistical analysis of the data revealed either no or slight significant association, several significant partial internal correlations could be observed between the incidence frequencies of some GI cancer types and the type of food preferred in diet, coffee intake and carbonate beverages intake.

(a)



(b)



(c)

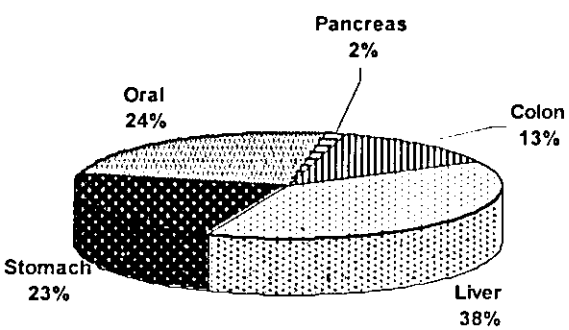


Figure 3.8. (a) The Distribution of the 141 GI Cancer Cases According to Smoking Habits, (b) GI Cancer Incidence Among Smokers, and (c) GI Cancer Incidence Among Nonsmokers.

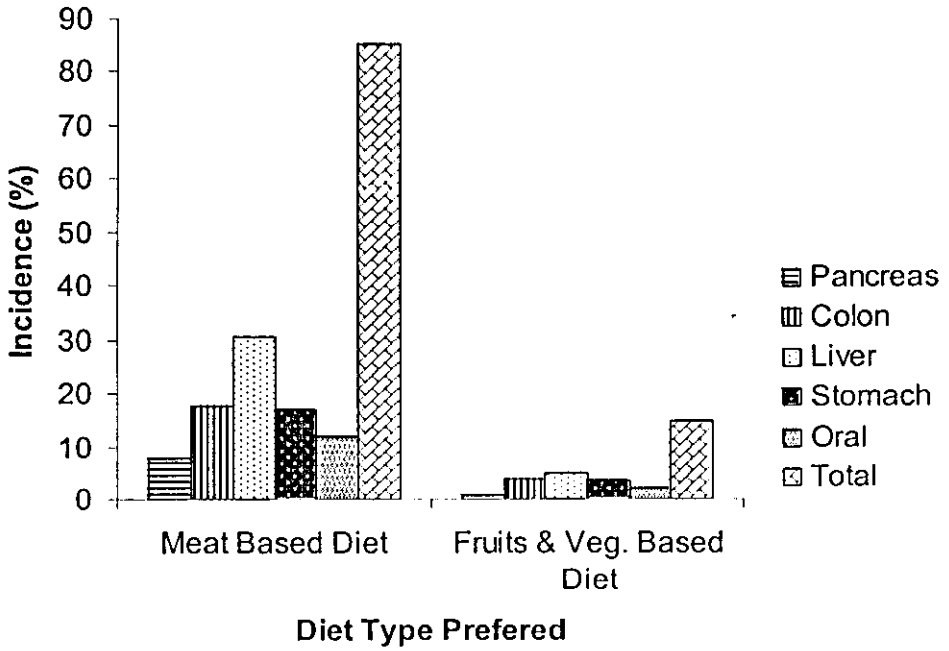
3.2.6.1 Correlation of GI Cancers Incidence to Diet Type

It was found that, the majority of the 141 patients who participated in the study, belonged to the group preferring meat based diet (85.1%), and only 14.9% belonged to the group preferring diet rich in fruits and vegetables. There were no statistically significant differences in the incidence frequencies of most GI cancer types according to the basic type of diet preferred (meat based or fruits and vegetables based). As shown in **Table 3.8** and **Figure 3.9**, the only significant difference was in the incidence of pancreas cancer, which was about 2-folds higher (9.2%) among the group preferring meat based diet than among the group preferring diet rich in fruits and vegetables (4.8%).

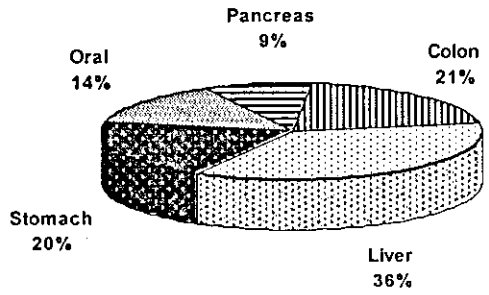
Table 3.8. The Distribution of the 141 GI Cancer Cases According to Diet Type (Meat Based or Fruits & Vegetables Based).

		Different types of Cancers					
		Pancreas	Colon	Liver	Stomach	Oral	Total
Meat based diet	Count	11	25	43	24	17	120
	%within group	9.2%	20.8%	35.8%	20.0%	14.2%	100%
	% of total	7.8%	17.7%	30.5%	17.0%	12.1%	85.1%
Fruits & Veg. based diet	Count	1	5	7	5	3	21
	%within group	4.8%	32.8%	33.3%	23.8%	14.3%	100%
	% of total	0.7%	3.5%	5.0%	3.5%	2.1%	14.9%
Total	Count	12	30	29	29	20	141
	%within group	8.5%	21.3%	35.5%	20.6%	14.2%	100%
	% of total	8.5%	21.3%	35.5%	20.6%	14.2%	100.0%

(a)



(b)



(c)

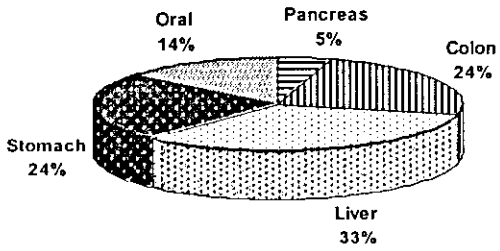


Figure 3.9. (a) The Distribution of the 141 GI Cancer Cases According to Diet Type, (b) GI Cancer Incidence Among the Group Preferring Meat Based Diet, and (c) GI Cancer Incidence Among the Group Preferring Fruits & Vegetables Rich Food.

3.2.6.2 Coffee Consumption and GI Cancer

It was found that, from the 141 patients who participated in the study, there were 78% consuming coffee regularly (at least 2 times/day) and 22% absolutely not drinking coffee. The statistical analysis of the data revealed no significant association between the different GI cancer types and coffee consumption. However, it is clear from the data of **Table 3.9** that there are partial internal correlations between some types of GI cancers and coffee consumption. While the incidence frequencies of pancreas and colorectal cancers were higher among coffee drinking group, liver and oral cavity cancers were higher among the group not drinking coffee and there was no significant difference in the incidence frequencies of stomach cancer related to coffee consumption (**Table 3.9** and **Figure 3.10**).

Table 3.9. The Distribution of the 141 GI Cancer Cases According to Coffee Consumption.

		Different types of Cancers					
		Pancreas	Colon	Liver	Stomach	Oral	Total
Yes	Count	7	21	41	23	18	110
	%within group	6.4%	19.1%	37.3%	20.9%	16.4%	100%
	% of total	5%	14.9%	29.1%	16.3%	12.8%	78%
No	Count	5	9	9	6	2	31
	%within group	16.1%	29%	29%	19.4%	6.5%	100%
	% of total	3.5%	6.4%	6.4%	4.3%	1.4%	22%
Total	Count	12	30	50	29	20	141
	%within group	8.5%	21.3%	35.5%	20.6%	14.2%	100%
	% of total	8.5%	21.3%	35.5%	20.6%	14.2%	100%

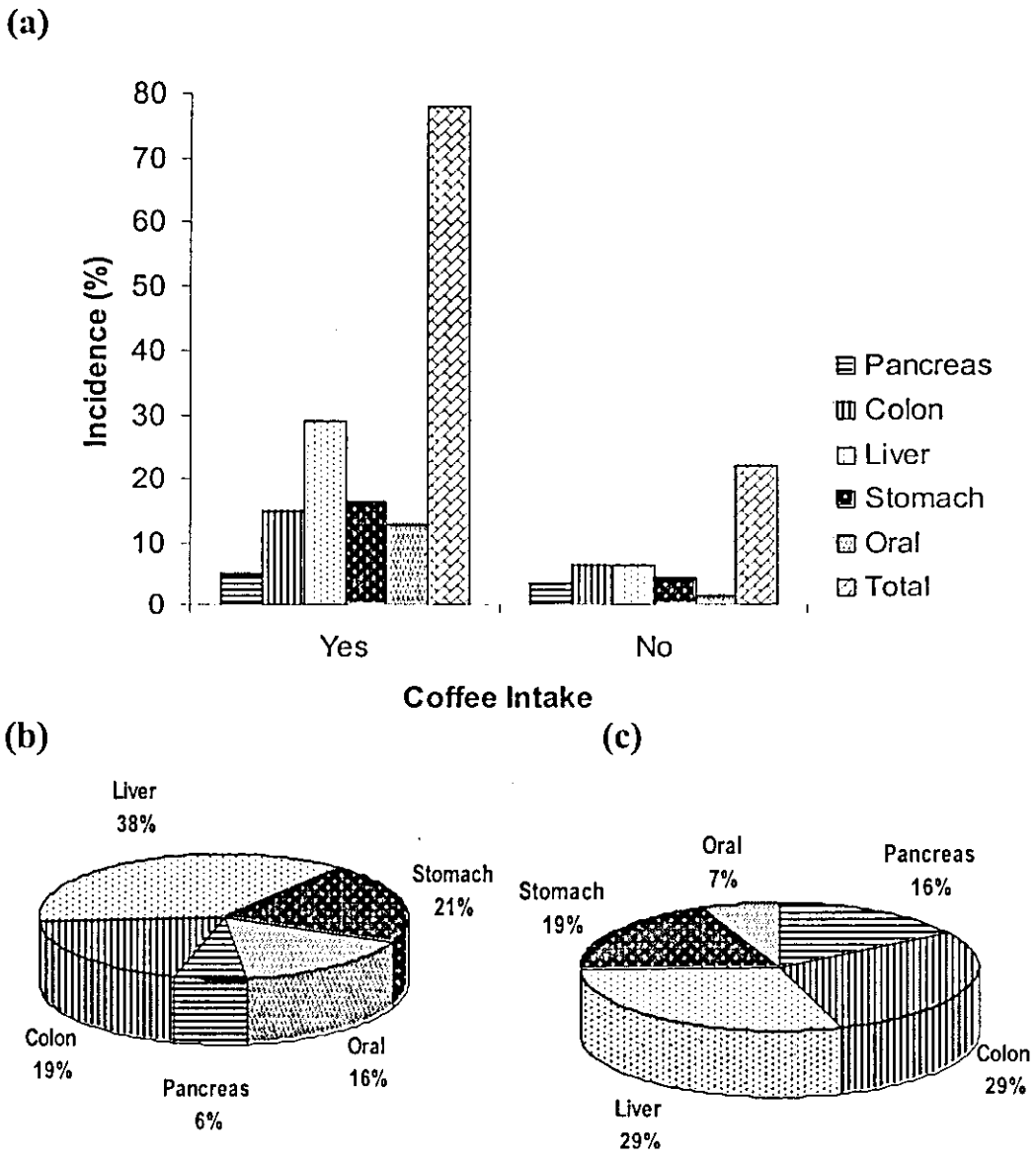


Figure 3.10. (a) The Distribution of the 141 GI Cancer Cases According to Coffee Consumption, (b) GI Cancer Incidence Among People Drinking Coffee, and (c) GI Cancer Incidence Among People not Drinking Coffee.

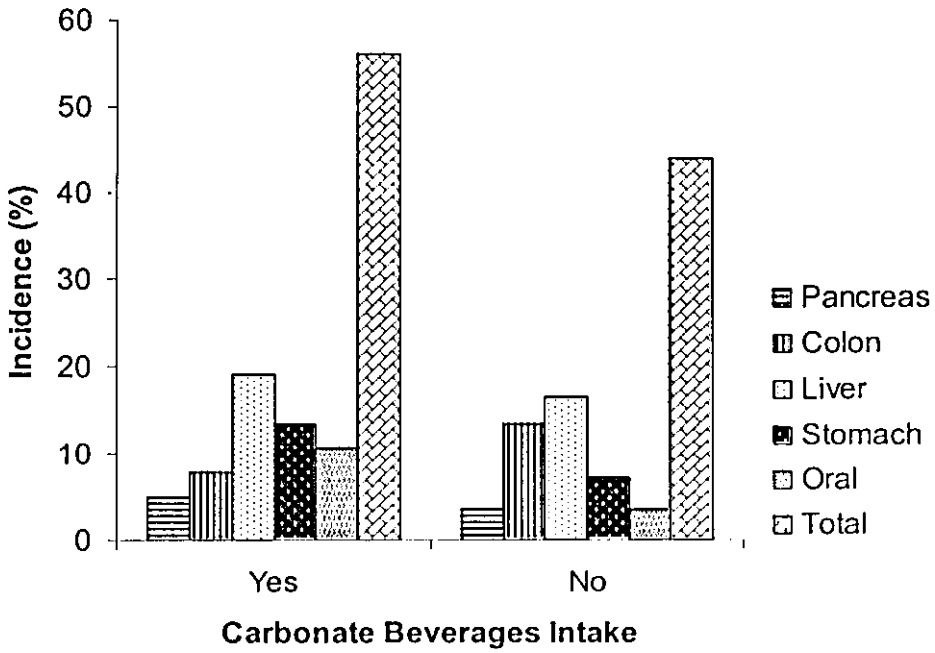
3.2.6.3 Carbonate Beverages Consumption and GI Cancer

It was found that, from the 141 patients who participated in the study, there were 56% consuming carbonated beverages regularly (1 to 3 times/day) and 44% rarely consuming or absolutely not consuming carbonated beverages. The statistical analysis of the data revealed no significant association between the different GI cancer types and consumption of carbonated beverages. However, it is clear from the data of **Table 3.10** that there are partial internal correlations between some types of GI cancers and consumption of carbonated beverages. While the incidence frequency of stomach and oral cavity cancers were higher among carbonated beverages consuming group, colorectal cancer was significantly higher among the group not consuming carbonated beverages, and there was no significant difference in the incidence frequencies of liver cancer related to carbonated beverages consumption (**Table 3.10** and **Figure 3.11**).

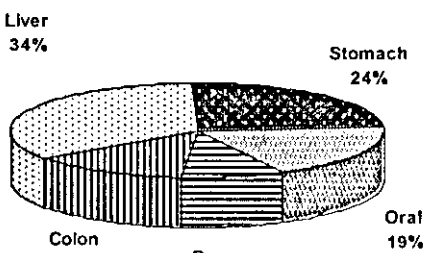
Table 3.10. The Distribution of the 141 GI Cancer Cases According to Carbonate Beverages Consumption.

		Different types of Cancers					
		Pancreas	Colon	Liver	Stomach	Oral	Total
Yes	Count	7	11	27	19	15	79
	%within group	8.9%	13.9%	34%	24%	19.0%	100%
	% of total	5.0%	7.8%	19.1%	13.5%	10.6%	56.0%
No	Count	5	19	23	10	5	62
	%within group	8.1%	30.6%	37.1%	16.1%	8.1%	100%
	% of total	3.5%	13.5%	16.3%	7.1%	3.5%	44.0%
Total	Count	12	30	50	29	20	141
	%within group	8.5%	21.3%	35.5%	20.6%	14.2%	100%
	% of total	8.5%	21.3%	35.5%	20.6%	14.2%	100%

(a)



(b)



(c)

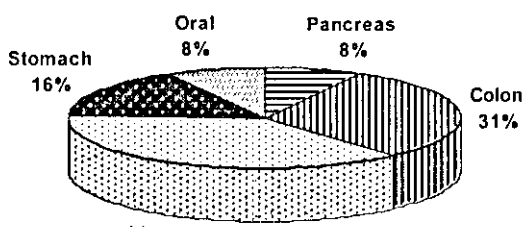


Figure 3.11. (a) The Distribution of the 141 GI Cancer Cases According to Carbonate Beverages Consumption, (b) GI Cancer Incidence Among Carbonate Beverages Consuming group, and (c) GI Cancer Incidence Among Carbonate Beverages Non-consuming Group.

3.2.7 Correlation of Other Variables to the Incidence of GI Cancer

The association between the incidence of the different GI cancer types and several other variables (physical activity, number of family members, education, and the presence of first degree relatives having chronic or cancer diseases) was also investigated. Although statistical analysis of the obtained data gave no significant correlation between any of these variables and the incidence of GI cancers, some partial correlations with specific type(s) of GI cancers could be observed.

The results relating the incidence of GI cancers to education showed that the highly educated group had less incidence frequency of colorectal cancer (15.5%) compared to the less educated group (27.1%).

The results relating the incidence of GI cancers to the presence of chronic diseases(s) in the family members showed that incidence frequencies of both colorectal and pancreas cancers were higher (30.4% and 12.5%, respectively) within the group having family member(s) with chronic disease(s) compared to the group living with healthy members (15.3% and 5.9%), respectively.

The results relating the incidence of GI cancers to the presence of first degree relative(s) having cancer showed that incidence frequencies of both colorectal and stomach cancers were higher (29.8% and 26.3%,

respectively) within the group having cancer diseased relative(s) compared to the group with no family history of cancer (15.5% and 16.7%), respectively.

CHAPTER IV

DISCUSSION & CONCLUSION

According to our knowledge, no previous studies were carried out in Palestine concerning the prevalence of the different GI cancers and the associated risk factors. Consequently, this study aimed at screening the Palestinian population of the West Bank for the incidence of the different types of GI cancer (colon, rectum, stomach, pancreas and liver) and investigating correlations with different variables and possible risk factor.

However, the prevailing political situation complicated the task of covering all the districts in the West Bank of Palestine. As a result, the study was restricted on the northern districts of the West Bank (Nablus, Jenin, Tulkarem, Qalqilia and Salfeet). The registries of cancer patients from all of these districts were available at Al-Watani Hospital since all cancer patients from the northern regions of the West Bank are referred to this main oncology center for treatment. We found that the available complete registries were covering only the period of the last four years from 1999 to 2002.

During this period, 1000 cancer patients were referred to the hospital. When we reviewed the report of the Palestinian National Cancer Registry (PNCR, 2001) for the incidence of cancer in Palestine during 2 years (1998 and 1999), we found that 940 cancer cases were reported for patients from the northern districts of West Bank. So, a higher number, of cancer cases,

was expected during the period of the four years (1999-2002). It is clear that the lower number of cases reported doesn't reflect a real decrease in the rate of cancer incidence, but it reflects a decline in the number of patients who could reach the hospital or who preferred to go abroad for treatment due to the prevailing political situation.

Our results showed that, the highest incidence frequencies of all cancers and GI cancers were found in Nablus district followed by Jenin, Tulkarem, Qalqilia and Salfeet districts, respectively (**Table 3.2**). These results were in accordance with the data published by the PNCR, 2001 for the geographical distribution of cancer cases (**Table 1.3**). The results obtained revealed that the most frequent cancer is breast cancer (18.4%) followed by lung and liver cancers, bladder cancer and colorectal cancer as shown in **Table 3.1** and **Figure 3.1**. However, it should be emphasized that the reported high incidence frequency of liver cancer is not accurate due to the fact that the records obtained from Al-Watani Hospital, in most of the cases, did not specify wither liver cancer were primary or secondary. When the incidence frequencies of the different GI cancers was estimated, it was found that GI cancers as a group are the most frequent (25.5%). This incidence frequency is near to the worldwide reported rates of incidence. As an example, the estimated incidence rate of GI cancers in the United State

was 21.7% of all cancer cases, responsible for 25.1% of all cancer deaths in USA in 2002 from both sexes (ACS, 2002).

It should be noted that although there are no great worldwide variations in the incidence frequencies of GI cancers as a group, the incidence frequencies of individual GI cancer types were found to vary greatly among the population of different regions in the world. For example, the world wide incidence of colon cancer is highest in the United States (annual rate of 34 per 100,000) and lowest in India (annual rate of 1.8 per 100,000) – a nineteen-fold difference. In Palestine, an incidence frequency of colon cancer was reported to be 6.6 per 100,000 in the year 1998 (PNCR, 2001). Moreover, while colon cancer is among the most common cancers in the United States, it is rare in Japan. Conversely, stomach cancer, which is rare in the United States, is the most common cancer in Japan. Changes in cancer incidence are observed among other migratory populations. For this reason, the characteristic patterns of cancer incidence in different countries appear to be determined primarily by environmental factors rather than by genetic differences (Kelley and Duggan, 2003). It has been estimated that environmental factors are responsible for up to 80% of all cancers (Cooper, 1993).

Human cancers show striking variations based on factors such as age, sex, race, socioeconomic status, and genetics as well as many occupational and lifestyle factors. This study aimed at investigating correlations between GI cancer types and with different variables and possible risk factor. To achieve this purpose, we tried to follow up the 255 patients who were definitely diagnosed for the presence of any of the gastrointestinal (GI) cancers and referred to Al-Watani Hospital during the period of the 4 years (1999-2002) from the different districts of northern West Bank. Information regarding age, sex, residence and type of diagnosed cancer for most patients were available from their records in the hospital. We could obtain the personal history and information of 141 GI cancer patients (55.3% of all GI cancer cases) who responded to the questionnaire (Appendix). It was impossible to reach all of the patients during the course of this study since some of them were in late stages and passed away, others went abroad for treatment and also the prevailing political situation complicated the task. For this reason, we suggest that a standard comprehensive questionnaire should be prepared, approved by the Ministry of Health, and distributed to all official and private oncology centers in Palestine to be filled directly when the patients are diagnosed for cancer incidence. Such a strategy would

certainly provide complete information and database and make it available for research projects in this field.

Upon the analysis of the collected data, it was found that for all types of GI cancer, incidence increases with age. The incidence frequency of GI cancers, as a group, was very low before the age 35 years (2.8%), and then it increased to 30.5% within the age group 35-55 years, and to 66.7% within the age group 55-75 years. However, the incidence of individual GI cancers showed the same trend of increase with age but with different extents. For example, oral cavity cancers incidence increased marginally but pancreas cancer incidence increased by more than 5-folds within the older group. Similar results were reported in the literature for cancer incidence in Palestine and worldwide showing that cancer cases become much more common as we grow older, and its incidence and mortality rates increase dramatically with age during most of life (**Figures 1.2** and **1.3**). For example, several studies reported that the incidence of gastric cancer rises progressively with age, with most patient being between the ages of 50 and 70 years at presentation. Cases in patients younger than 30 years were very rare. The increasing incidence of cancer with age reflects a fundamental feature of the biology of cancer cells where many years are required to accumulate the multiple abnormalities needed to generate most cancer cells,

so the majority of cancers develop relatively late in life (Cooper, 1993). (Cooper, 1993; Thun and Wingo, 2000; PNCR, 2001; Kelley and Duggan, 2003).

The results of this study showed that there is a significant association between the different GI cancer types and sex. For example the incidence frequency liver and stomach cancers were more frequent in males compared to females by a ratio of approximately 1.5 to 1 (**Table 3.4** and **Figure 3.5**). According to the report of the Palestinian National Cancer Registry for cancer incidence in Palestine, in the years 1997-1998, stomach cancer was more common in males than females by a ratio of 1.3 to 1 (PNCR, 2001). Parkin *et al.*, 1997, reported that gastric cancer is more common in males than females by a ratio of approximately 2 to 1 in US (Kelley and Duggan, 2003). The same results were reported by Sipponan and Correa, 2002, in the Finnish population. In general, this gender disparity in cancer incidence may be partially due to historical differences between males and females in occupational exposures and cigarette smoking behaviors.

The findings of this study revealed partial significant association between both place of residence and occupation and incidence of some types of GI cancers (**Tables 3.5 & 3.6** and **Figure 3.6 & 3.7**). Several studies, in this regard, showed similar correlations. It has been estimated

that environmental factors are responsible for up to 80% of all cancers and the characteristic patterns of cancer incidence in different regions appear to be determined primarily by environmental factors. Consequently, it is expected that individuals living in different environments and having different occupations, are exposed to different factors, and have variable style of life, physical activity, and diet habits. Furthermore, socioeconomic status has been consistently shown to be associated with an increased risk of several types of cancer (Howson, *et al.*, 1986; Powell and McConkey, 1992; Cooper, 1993; Kelley and Duggan, 2003).

The findings of this study showed that there is a significant association between the different GI cancer types and smoking. Particularly, the incidence frequency of pancreas cancer was more than 8-folds higher in smokers compared to nonsmokers, and also the incidence frequency of colorectal cancer was more than 2-folds higher in smokers compared to nonsmokers (**Table 3.7** and **Figure 3.8**). The association between increased risk of pancreatic cancer and cigarette smoking has been firmly established. The relative rate of smoking at least a pack per day is approximately four-fold, compared with that of nonsmokers (Wynder, 1975; WCRF & AICR, 1997)

The association between several variables, concerning diet, and the incidence frequencies of the different GI cancer types was investigated in this study. Significant difference was found in the incidence of pancreas cancer, which was about 2-folds higher among the group preferring meat based diet than among the group preferring diet rich in fruits and vegetables **Table 3.8** and **Figure 3.9**. Several studies suggested that diet and nutrition may contribute to the pathogenesis of pancreatic cancer due to the important roles for nutrients in regulating normal pancreatic growth and function. The exocrine pancreas, which is the origin for 90% of pancreatic cancers, readily alters the pattern of digestive enzyme secretion in response to the nutrient content of the diet. Descriptive studies have suggested associations between an increased risk for pancreatic cancer and a number of components that are characteristic of the affluent diet, such as meat, fat, protein, eggs, milk, and alcohol (Mack, 1982; MacMahon, 1982; NAC, 1982; NAC, 1989; WCRF & AICR, 1997). In contrast, however, the majority of epidemiologic studies suggest that the frequent consumption of fruits and vegetables may reduce the risk of pancreatic cancer (Block *et al.*, 1992; WCRF & AICR, 1997; Soler *et al.*, 1998). Additionally, obesity was associated with a 50 to 60% higher risk of pancreatic cancer (Silverman *et*

al., 1998). Thus, both animal and human studies support a relationship between total energy intake and pancreatic cancer risk.

The results of this study showed that there are partial correlations between some types of GI cancers and coffee consumption. Pancreatic and colorectal cancers were more frequent among people drinking coffee frequently (**Table 3.9** and **Figure 3.10**). Some studies have reported a positive association between high coffee intake and pancreatic cancer risk while other studies show that moderate amounts of coffee (1 to 3 cups per day) pose no risk or may be protective (Gulol *et al.*, 1995).

Concluding Remarks and Recommendations

1- It is clear that the lower number of cases reported doesn't reflect a real decrease in the rate of cancer incidence, but it reflects a decline in the number of patients who could reach the hospitals and clinics or who preferred to go abroad for treatment due to the prevailing political situation.

2- We suggest that a standard comprehensive questionnaire should be prepared, approved by the Ministry of Health, and distributed to all official and private oncology centers in Palestine to be filled directly when the patients are diagnosed for cancer incidence. Such a strategy would certainly provide complete information and database and make it available for research projects in this field.

3- Human cancers show striking variations based on factors such as age, sex, race, socioeconomic status, and genetics as well as many occupational and lifestyle factors, such as cigarette smoking, diet habits, and physical activity The potential for complex interactions between these factors and nutrients is enormous, and this emphasizes the difficulties in demonstrating causal associations with the same clarity as is demonstrable for high-risk environmental exposures.

REFERENCES

American Cancer Society (ACS). Cancer Facts & Figures 2002. *http://www.cancer.org/downloads/STT/CancerFacts&Figures2002TM.pdf*

Block, G., Patterson, B., and Subar, A., 1992. "Fruit, Vegetables, and Cancer Prevention: a review of the epidemiological evidence", *Nutr. Cancer*, Vol.18, pp.1.

Blot, W.J., McLaughlin, J.K., Winn, D.M., Austin, D.F., Greenberg, R.S., Preston-Martin, S., Bernstein, L., Schoenberg, J.B., Stemhagen, A., and Fraumeni, J.F.Jr., 1988. "Smoking and Drinking in Relation to Oral and Pharyngeal Cancer", Cancer Res., Vol.48, pp.3282-3287.

Chu, K.C., Tarone, R.E., Chow, W.H., Hankey, B.F., and Rise, L.A., 1994. "Temporal Patterns in Colorectal Cancer: Incidance, Survival and Mortality from 1950 through 1990", J. Natl. Cancer Inst., Vol.86, pp.997-1006.

Clinton, S.K., Miller, E.C., and Giovannucci, E.L., 2000. Cancer medicine (Edition 5), Sec. 6, Chapter 26, Bast, Jr., R. C., Kufe, D. W.,

Pollock, R. E., Weichselbaum, R. R., Holland, J. F., and Frei, E. (Editors), B. C., Decker Inc. U.S.A..

Cooper, G.M., 1993. The Cancer Book: A guide to understanding the causes, prevention and treatment of cancer, Jones and Bartlett Publishers International, London, England.

Engel, L.S., Taioll, E., Pfeiffer, R., Garcia-Closas, M., Marcus, P.M., Lan, Q., Boffetta, P., Vineis, P., Autrup, H., Bell, D.A., Branch, R.A., Brockmoller, J., Daly, A.K., Heckbert, S.R., Kalina, I., Kang, D., Katoh, T., Lafuente, A., Lin, H.J., Romkes, M., Taylor, J.A., and Rothman, N., 2002. "Pooled Analysis and Meta-Analysis of Glutathione S-Transferase M1 and Bladder Cancer: A Huge Review", Am. J. Epidemiol., Vol.156, No.2, pp.95-109.

Fernandez, E., Bosetti, C., La Vecchia, C., Levi, F., Fioretti, F., and Negri, E., 2000. "Sex Differences in Colorectal Cancer Mortality in Europe", Eur. J. Cancer Prev., Vol.9, pp.99-104.

Franceschi, S., Gallus, S., Talamini, R., Tavani, A., Negri, E., and La Vecchia, C., 2000. "Menpause and Colorectal Cancer", Br. J. Cancer, Vol.82, pp.1860-1862.

Giovannucci, E., Ascherio, A., and Rimm, E.B., 1995. "Physical Activity and Risk for Colon Cancer and Adenoma in Men", Ann. Intern. Med, Vol.122, pp.327-332.

Gullo, L., Pezzilli, R., and Morasilli-Labate, A.M., 1995. "Coffee and Cancer of the Pancreas: an Italian multicenter study", The Italian Pancreatic Cancer Study Group, Pancreas, Vol.11, pp.223.

Hill, M.J., 2000. "Molecular and Clinical Risk Markers in Colon Cancer Trials", Vol.36, pp.1288-1291.

Howson, C.P., Hiyama, T., and Wynder, E.L., 1986. "The decline of gastric cancer: epidemiology of an unplanned triumph", Epidemiol. Rev., Vol.8, pp.1-27.

Kelley, R.J., and Duggan, M.J., 2003."Gastric cancer epidemiology and risk factors", J. Clin. Epidemiol., Vol.56, pp.1-9.

Kim Y.I., 1999. "Folate and Carcinogenesis: Evidence, Mechanisms, and Implications", J. Nutr. Biochem., Vol.10, pp.66-88.

Kim Y.I., Baik, H.W., Fawaz, K., Knox, T., Lee, Y.M., Nortron, R., Libby, E., and Mason, J.B., 2001."Effect of Folate Supplement on Two

Provision Molecular Markers of Colon Cancer", A. J. Gastroenterology, Vol. 96, No.1, pp.184-195.

Kiss, A., and Meyrn, S., 2001. "Effect of Sex and Gender on Psychosocial Aspect of Prostate and Breast Cancer", BMJ, Vol.323, pp.1055-1058.

Le Marchand, L., Wilkins, L.R., and Mi, M.P., 1992. "Obesity in Youth and Middle Age and Risk of Colorectal Cancer in Men", Cancer Cause Control, Vol.3, pp.349-354.

Lipkin, M., Reddy, B., Newmark, H., and Lamperecht, S.A., 1999. "Dietary Factors in Human Colorectal Cancer", Annu. Rev. Nut., Vol.19, pp.545-586.

Mack, T.M., 1982.Cancer Epidemiology and Prevention, Schottenfeld, D., and Fraumeni Jr, E.F. (editors), W.B. Saunders, Philadelphia, PA.

MacMahon, B., 1982. "Risk Factors for Cancer of the Pancreas", Cancer, Vol.50, pp.2676.

Mahley, R.W., Pepin, J., Palaoglu, K.E., Malloy, M.J., Kane, J.P., and Bersot, T.P., 2000. "Low Levels of High Density Lipoprotein in Turks, a Population with Elevated Hepatic Lipase: High Density Lipoprotein Characterization and Gender-Specific Effects of Lipoprotein E Genotype", J. Lipid Res., Vol.41, pp.1290-1301.

Mason J.B., and Folate L.T., 1996. "Effects on Carcinogenesis and the Potential for Cancer Chemoprevention", Oncology, Vol.10, pp.1727-1743.

Mayoclinic, 2003. "Stomach Cancer", http://www.mayoclinic.com/invoke.cfm?id=DS00301.

Meyer, F., and White, E., 1993. "Alcohol and Nutrients in Relation to Colon Cancer in Middle-aged Adults", Am J Epidemol., Vol.138, pp.225-236.

NAS (National Academy of Sciences), 1982. Committee on diet, Nutrition, and Cancer. In: Diet, nutrition, and cancer. Washington, DC: National Academy Press.

NAS (National Academy of Sciences), 1989. Committee on diet, and Health, Food and Nutrition Board, Commission on Life Sciences, National Research Council. In: Diet and Health: implications for reducing chronic disease risk. Washington, DC: National Academy Press.

Ng, M.K.C., Jessup, W., and Celermajer, D.S., 2001. "Sex-Related Differences in the Regulation of Macrophage Cholesterol Metabolism", Curr. Opin. Lipidol., Vol.12, pp.505-510.

Parkin, D.M., Whelan, S.L., Ferlay, L., and Young, J., 1997. "Cancer Incidence in Five Continents", Vol. VII. Lyon: IARC, pp.822-823.

PNCR (Palestinian National Cancer Registry), 2001 Cancer Incidence in Palestine, Ministry of Health, Palestinian National Authority.

Potter, J.D., 1999. "Colorectal Cancer: Molecules and Populations:, J. Natl. Cancer Inst., Vol.91, pp.916-932.

Powell, J., McConkey,C.C., 1992. "The Rising Trend in Oesophageal Adenocarcinoma and Gastric Cardia", Eur. J. Cancer Prev., Vol.1, pp.265-269.

Rex, D.K., 1995. "A Review of its Yeild for Cancer and Adenomas by Indication", Am. J. Gastroenterol., Vol.90, pp.353-356.

RMH, 2003. "Gastrointestinal (GI) Cancer", RMHC (Royal Marsden Hospital), UK

Roebuck, B.D., YagerJr, J.D., and Longnecker, D.S., 1981. "Dietary Modulation of Azaserine-induced Pancreatic Carcinogenesis in the Rat", Cancer Res., Vol.41, pp.888-893.

Silverman, D.T., Swanson, C.A., and Gridley, G., 1998." Dietary and Nutritional Factors and Pancreatic Cancer: a case-control study based on direct interviews", J. Natl. Cancer Inst., Vol.90, pp.1710.

Soler, M., Chatenoud, L., and La Vecchia, C., 1998. "Diet, Alcohol, Coffee and Pancreatic Cancer: final results from an Italian study", Eur. J. Cancer Prev., Vol.7, pp.455.

Thun, M.J., and Wingo, P.A., 2000. Cancer medicine (Ed. 5), Sec. 4, Chapter 23, Bast, Jr., R.C., Kufe, D.W., Pollock, R.E., Weichselbaum, R.R., Holland, J.F., and Frei, E. (Editors), B. C., Decker Inc. U.S.A..

Watson, M.A., Gay, L., Stebbing, S.L., Speakman, C.T.M., Bingham, S.A., and Loktionov, A., 2003. "Apolipoprotein E Gene Polymorphism and Colorectal Cancer: Gender-Specific Modulation of risk and Prognosis", Clinical Science, Vol.104, pp.537-545.

WCRF & AICR (World Cancer Research Fund and American Institute for Cancer Research). Food, nutrition and the prevention of cancer: a global perspective. Washington, DC: American Institute for Cancer research.

West, D.W., Slattery, M.L., Robison, L.M., Schuman, K.L., Ford, M.H., Mahoney, A.W., Lyon, J.L., and Sorensen, A.W., 1989. "Dietary Intake and Colon Cancer: Sex and Anatomic Site-Specific Associations", AM. J. Epidemiol. Vol.130, pp.883-894.

White, E., Shanno, J.S., and Patterson, R.E., 1997. "Relationship Between Vitamin and Calcium Supplement Use and Colon Cancer", Cancer Epidemol. Biomarkers Prev. Vol.6, pp.769-774.

Winawer, S., Fletcher, R., Rex, D., Bond, J., Burt, R., Ferrucci, J., Ganiats, T., Levin, T., Woolf, S., Johnson, D., Kirk, L., Litin, S., and Simmang, C., 2003. "Colorectal Cancer Screening and Surveillance:

Clinical Guidelines and Rationale-Update Based on New Evidance", Gastroenterology, Vol.124, pp. 544-560.

Winawer, S.J., Flehinger, B.J., Schhottenfeld, D., and Miller, D.G., 1993. "Screening for Colorectal Cancer with Fecal Occult Blood Testing and Sigmoidscopy", J. Natl. Inst., Vol.85, pp.1311-1318.

Wynder, E.L., 1975." An Epidemiological Evaluation of the Causes of Cancer of the Pancreas", Cancer Res., Vol.35, pp.2228.

APPENDIX

هذه الاستبانه صممت لأغراض البحث العلمي والدراسه فقط ، وجميع هذه المعلومات تعتبر سريه وهي ليست للنشر ، ولن يتم نشر أي منها بدون اذن مسبق من صاحبها. مع جزيل الشكر.....

استبانه

1- الاسم: ..... 2- العمر: .....

3- الجنβ: ذكر □ انثى□

4- العنوان:

رقم الهاتف: .....

5- عدد أفراد الأسره: 6- العمل: .....

7- التعليم: أقل من توجيهي □ توجيهي □ جامعي □

8- سبب الزيارة الحالية لمركز العلاج:

مراجعه دورية □ وجود اعراض مرضيه جديده □

9- اذا كانت الأعراض جديده، فما نوعها:

تقيؤ□ آلآم في البطن □ دوار□ اسهال □

غير ذلك □ ، وضح .....

10- خاضع للعلاج حالياً نعم □ لا □

اذا كان الجواب نعم فما نوع العلاج: .....

من تاريخ:.....

11- هل تتناول أي من الأدوية للعلاج النفسي؟: نعم □ لا□

اذا كان الجواب نعم

فما نوع العلاج:.....

من تاريخ: .....

كمية الجرعة:.....

12- هل أنت مدخن؟ نعم □ لا□

اذا كان الجواب نعم

فهل تدخن أقل من 10 سجائر يومياً □ 20 سيجاره يومياً□ أكثر من 20 يومياً□

13- هل تمارس أي من النشاطات الرياضيه؟ نعم □ لا □

اذا كان الجواب نعم، عدد المرات التي تمارس بها النشاط الجسدي أسبوعيا

مرتين أسبوعياً□ أربع مرات □ أكثر من ذلك □

14- هل تتناول الكحول؟ نعم □ لا□

اذا كان الجواب نعم، فهل تتناولها أسبوعياً:

مرتين □ أربع مرات □ أكثر من ذلك □

15- هل تتناول القهوة؟ نعم □ لا□

اذا كان الجواب نعم، عدد المرات التي تتناول فيها القهوة يوميا:

مرة واحدة □ مرتين □ ثلاث مرات □ أكثر من ذلك □

16- هل تتناول المشروبات الغازية؟ نعم □ لا□

اذا كان الجواب نعم، عدد المرات يوميا:

مرة واحدة □ مرتين □ ثلاث مرات □ أكثر من ذلك □

17- هل تتبع نظام الحمية الغذائية؟ نعم □ لا □

اذا كان الجواب نعم، أي الأنواع التي لا تتناولها:

اللحوم الحمراء □ اللحوم البيضاء □ الأسماك □ السكر □ الملح □ مواد دهنية □

غير ذلك □ وضح: .....

18- كم من الوقت أنت ملتزم بهذه الحمية؟

شهر□ ستة أشهر □ سنه □ أكثر من ذلك □ اذكر .....

19- أسباب الحمية:

طبية□ تخفيف الوزن □ سبب أخر □ ، وضح .....

20- هل تتناول الخضار والفواكه بشكل منتظم ؟ نعم □ لا □

اذا كان الجواب نعم، فهل الكمية التي تتناولها :

كبيرة □ متوسطة □ منخفضه □

21- نوع الغذاء المفضل:

اللحوم البيضاء □ لحوم المواشي □ الأسماك □ الخضروات □ الفواكه □

الحلويات □ غير ذلك □ وضح: .....

22- هل يعاني أو سبق أن عانى أحد من من أفراد العائلة من أمراض مزمنه؟

نعم □ لا □

اذا كان الجواب نعم، فهل هي:

ضغط الدم □ السكري □ أمراض وراثية أخرى □ ، وضح:.....

23- ما هي صلة القرابة بهذا المريض؟

درجة أولى □ درجة ثانية □ الزوجة/ الزوج □

اذا كانت الزوجة/الزوج فهل هو/ يه من نف β العائلة □ عائلة أخرى □

24- هل يعاني أحد أفراد العائلة من احدى أمراض السرطان؟ نعم □ لا □

اذا كان الجواب نعم، فما نوعه:

سرطان الدم □ سرطان الأمعاء □ سرطان الثدي □ غير ذلك □، وضح:

.....

25- ما هي صلة القرابة بهذا المريض؟

درجة أولى □ درجة ثانية □ الزوجة/ الزوج □

اذا كانت الزوجة/الزوج فهل هو/هي من نف β العائلة □ عائلة أخرى □

26- هل قمت بعمل تحاليل طبية لأي من الأمراض التي ورد ذكرها؟ نعم □ لا □

اذا كان الجواب نعم فهل كانت نتائج الفحص:

طبيعية □ غير واضحة(غيرمؤكده) □ غير طبيعية □ وضح: .....

27- هل سبق وأن تبرعت بالدم؟ نعم □ لا □

اذا كان الجواب نعم، متى كانت آخر مرة

أقل من ستة أشهر □ ستة أشهر □ أكثر من سنة □ أكثر من سنتين □

(للاستخدام الخاص)

28- آخر مرة زرت فيها الطبيب: .....

29- هل تم تشخيص المرض من قبل المختصين ؟ نعم ☐ لا ☐

اذا كان الجواب نعم، فما نوع التشخيص: .....

اسم العضو المصاب: ..... النوع: .....

مدى انتشاره: ..... تاريخ التشخيص النهائي: .....

30- تاريخ الفحص: .....

31-نوع و نتيجة الفحص: .....

الملخص

لقد تم في هذا البحث دراسة انتشار السرطانات الجوفمعوية في مناطق شـمال الضـفة الغربية- فلسطين، بحيث تم دراسة 1000 حالة تم جمع بياناتهم من المستشفى الوطني في مدينة نابلس بين الأعوام 1999-2002 ميلادي.

تبين من تحليل البيانات المتوفرة أن سرطان الثدي يحتل المرتبة الأولى بين السرطانات بشكل عام وكانت نسبته 18.4% ،كما تبين أن 25.5% من هذه الحالات كان من السـرطانات الجوفمعوية. وأظهرت الدراسة أيضا أن أكثر السرطانات الجوفمعوية انتشارا هو سرطان الكبد يليه سرطان القولون ، المعدة ، تجويف الفم وأخيرا سرطان البنكرياس. واحتلت محافظة نابلس المرتبة الأولى في عدد الحالات المسجلة وكانت نسبة هـذه الحـالات 47% يليهـا محافظـة جينين،محافظة طولكرم، محافظة قلقيلية وأخيرا محافظة سلفيت.

وقد تبين من دراسة 141 حالة أن السرطانات الجوفمعوية كانت أوسـع انتشـاراً بـين الأعمار(55-75) . وقد أوضحت الدراسة أن سرطانات الكبد والمعدة كانت أعلى في الـذكور منها في الاناث، كذلك كان سرطان البنكرياس أوسع انتشاراً بين سكان مخيمات اللاّجئين بينما كان سرطان القولون أوسع انتشاراً بين سكان القرى، أما سرطانات تجويف الفم فكانـت أوسـع انتشاراً بين سكان المدن.

كما دلت هذه الدراسة أن سرطانات البنكرياس والقولون كانتأعلى بين ربات البيوت من غيرها، وسرطان الكبد أعلى بين الموظفين، أما سرطان تجويف الفم والمعدة فكانت أعلى بـين طبقة العمال. وقد تبين أيضا أن سرطانات البنكرياس والقولون أعلى بين المدخنين. أمـا فـي

العائلات التي كان فيها أفراد مصابون بأحد الامراض المزمنه، فقد أوضحت الدراسة بأن سرطان القولون والبنكرياس كان أعلى لدى الأشخاص الذين لهم أقارب من الدرجة الاولى مصابون بأمراض مزمنة، أما بالنسبة للأشخاص الذين يوجد لهم أقارب من الدرجة الاولى مصابون بالسرطان فقد كان سرطان القولون والمعدة أعلى بين هؤلاء الأشخاص بالمقارنة مع الاشخاص الذين لا يوجد بين أقاربهم صابين بهذا المرض.

نستنتج من النتائج السابقة أن الأنواع المختلفة للسرطانات الجوفمعوية تتأثر بشكل غير متساوي مع العوامل المسببة لهذا المرض، ولهذا يجب دراسة كل عامل من هذه العوامل بشكل منفصل عند دراسة كل نوع من أنواع هذه السرطانات.

جامعة النجاح الوطنية
كلية الدراسات العليا

فحص انتشار السرطانات الجوفمعوية في المجتمع الفلسطيني

اعداد
أسامه حمد أحمد حمد

اشراف
الدكتور عوني أبو حجلة
الدكتور محمد مسمار

قدمت هذه الأطروحة استكمالاً لمتطلبات درجة الماجستير في العلوم الحياتية في كلية الدراسات العليا، جامعة النجاح الوطنية
نابلس- فلسطين

آب 2003