A case – control Study to identify the digestive system cancer cause in Sudan Radiation and Isotopes Centre Khartoum (RICK) 2010

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Abstract

The digestive system GIT cancer, from the oesophagus to the rectum, remains one of the most common types of cancer and causes of death worldwide in both men and women. A case-control study was conducted in Radiation and Isotopes Centre Khartoum RICK targeting the digestive system cancer patients who came to get treatment or follow-up during 2010. A total of 200 digestive system cancer patients and 200 control cases were interviewed using purposively designed questionnaires.

The objective of this research is to investigate what is of cause of digestive system cancer. Contingency table as statistical analysis tool to find out that a person developed digestive system cancer by expose for this risk factor: age, gender, canned food, spicy food, diabetic, hypertensive, AIDS, jaundice with type (HA, HB and HC), anaemia, regular tab, any digestive surgery and past history of digestive system disease and cancer in the patients and family, gastroesophageal reflux, endoscopy, achalasia disease, gallstone and chclecstystilis of the gallbladder, gallbladder polyps, chronic typhoid, chronic pancreatitis, heartburn, a persistent malaria, Helicobacter pylori infection and hypertrophic gastropathy, schistosomiasis, polyps, ulcerative colilis, Crohn disease, inflammatory bowel disease and sigmodiscopy, smoking, shaisha, snuff, consumed of alcohol; and the time period for each of that, drinking very hot liquids, physical activities and herbs used for treatment .

The study was important as it revealed there high risk for digestive patient with digestive system cancer. Thus intensive and effective health educational programs are needed to enrich the knowledge about cancer and causes and to eradicate the early detection.

Introduction:

Digestive system (GIT) cancer refers to malignant conditions of the gastrointestinal tract, including the oesophagus, stomach, liver, gallbladder, pancreas, colon, bowel and anus. Prognosis is variable, and depends almost entirely on the specific type of cancer. Oesophageal cancer has a dismal prognosis, largely because it is often detected late, while colon cancer has an excellent prognosis, when detected early. Pancreatic cancer also has a very poor prognosis, with only 5% of patients surviving more than 5 years after diagnosis. Patients present with trouble swallowing, gastrointestinal

haemorrhage or metastases (mainly in the liver). Intestinal obstruction is rare, due to the tumour's outward pattern of growth. Often, there is a history of vague abdominal pain or discomfort, and the tumour has become rather large by time the diagnosis made (Lan, 2005).

Generally, the definitive diagnosis is made by a biopsy, which can be obtained endoscopically, percutaneously by CT or ultrasound guidance or at the time of surgery. A biopsy sample will be investigated under the microscope. The histopathology's identifies the characteristics of GISTs (spindle cells in 70-80%, epitheloid aspect in 20-30%). Smaller tumours can usually be found to the muscular is propria layer of the intestinal wall. Large ones grow, mainly outward, from the bowel wall until the point where they outstrip their blood supply and necrose (die) on the inside, forming a cavity that may eventually come to communicate with the bowel lumen. Digestive system cancer occurs in 10-20 per one million people. The true incidence might be higher, as novel laboratory methods are much more sensitive in diagnosing digestive system. In all, there are approximately 3500-5000 cases of digestive system per year in the United States. This makes digestive system the most common form of sarcoma, which constitutes more than 70 types of cancer, but in all forms constitutes less than 1% of all cancer. (Patton, 2005).

Digestive cancer in Sudan:

The study unit of this survey in Radiation and Isotopes Centre in Khartoum (RICK) which is specialize hospital for cancer treatment since 1967 .The number of patient that hospital takes care of increase sharply from year to year because has the following common epidemiological features which contribute to the profile of cancer problem:

(1) high incidence of infection and malnutrition.

 (2) young age of the population.

(3) increasing industrialization and urbanization unaccompanied by protective measures

(4) high solar exposure.

 (5) inadequate public awareness leading to late presentation of cases.

The most common malignancy of digestive system carcinoma among Sudanese both gender , it obtusely in top ten type of cancer in statistical report in RICK as the below table (1,2 and 3) show oesophagus, stomach, bladder and liver in top ten and which is a part of digestive system that indicate high frequent of digestive system cancer is most common cancer as system cancer in RICK.

Table (1): The ten common cancer in RICK – 2008

No.	Common cancers	%
1	Breast	17.2
2	Prostate	5.1
3	***Oesophagus***	5.0
4	Ovary	4.4
5	CML	4.0
6	Brain	3.9
7	NHL	3.4
8	Lymphoma	2.9

| 9 | Lung | 2.7 |
| 10 | **Liver** | 2.7 |

Source: Biostatistics and cancer research units RICK, 2008

Table (2):The ten common cancer in RICK – 2009

No.	Common cancers	%
1	Breast	16.5
2	Blood, Spleen	11.3
3	Lymph nodes	6.6
4	Prostate	4.9
5	*Oesophagus*	*3.7*
6	Cervix Uteri	3.7
7	Ovary	3.4
8	*Bladder*	*3.3*
9	*Liver*	*3.2*
10	Nasopharynx	3

Source: Biostatistics and cancer research units RICK, 2009

Table (3):The GIT system cancer in RICK (2000 – 2010)

Year	Cancer cases in RICK	GIT cancer cancers case in RICK	%
2000	2541	380	15.0
2001	2963	453	15.3
2002	3070	477	15.5
2003	3185	505	15.9
2004	3450	600	17.4
2005	3705	630	17.0
2006	3505	659	18.8
2007	4813	731	15.2
2008	5156	716	13.9
2009	5739	978	17.0
Total	38127	6129	16.1

Source: Biostatistics and cancer research units RICK, 2000-2013

The incidence rate of Digestive system cancer from 2000 to 2009 is

$$(6129/ 38127)*100 = 16.1\%$$

from total malignancies in RICK which is represent the annual rate of digestive system cancer incidence and therefore the number of new cases would be successive increase in each year .

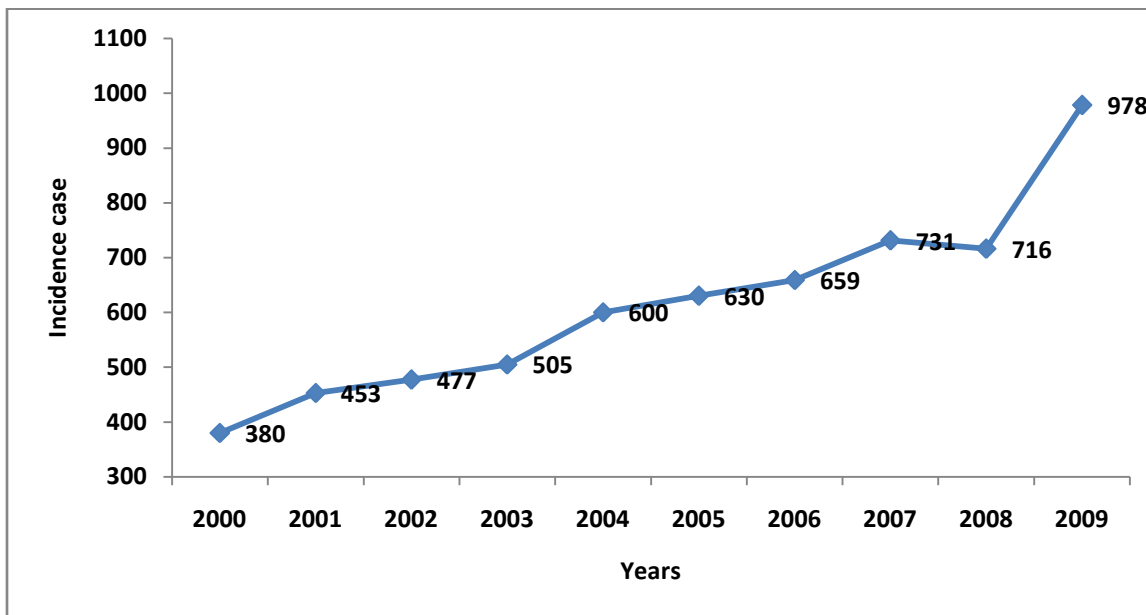**Figure No.(1): The Incidents cases of GIT cancer 2000-2009**

Table (4):The GIT system cancer in RICK (1967 – 2009)

Cancer type	Top ten Frequency	%
Breast	6921	28.6
Blood, spleen	3965	16.4
Lymph nodes	3025	12.5
Oesophagus	*2101*	*8.7*
cervix uteri	1885	7.8
Prostate	1539	6.4
Ovary	1357	5.6
Nasopharynx	1185	4.9
Skin	1183	4.9
Bladder	1014	*4.2*
Top ten	**24175**	**60.6**
Other cancer types	**15726**	**39.4**
Grand total	**39901**	**100**

Source: Biostatistics and cancer research units RICK, 2009

The top ten table (4) for 43 year data in RICK represent that the oesophagus in the top ten which is around 8.7% of total cancer case, oesophagus indicate GIT system have high incidence rate than other system.

Methodology:

A contingency table is essentially a display format used to analyse and record the relationship between two or more categorical variables. It is the categorical equivalent of the scatter plot used to analyse the relationship between two continuous variables. As always, since we are dealing with verification in this module, the variables to be compared are the forecast and the observation of a weather forecast element, both of which are categorical. The term contingency table was first used by the

statistician Karl Pearson in 1904. Contingency tables will normally have as many rows as there are categories in the forecast. For verification purposes, the definition of the forecast and observation variable must be consistent, so a contingency table will have an equal number of rows and columns. Since dichotomous (two-category) variables are of special interest in meteorology, the emphasis in this module is on the verification methods for the 2*2 contingency tables used to summarize verification datasets for dichotomous variables. Extensions to verification of variables with three or more.

A categorical forecast is a forecast of the occurrence or non-occurrence of a specific event, which must be clearly defined. For example, we may be interested in predicting whether or not the temperature will go below freezing at a particular place. Following the forecast of below freezing (yes) or not below freezing (no), the event will actually occur or not. This leads to four possibilities as laid out in the table shown below. The values of the table are obtained by tallying up the number of times each of the four possible combinations of forecast and observed category occurred. (Agresti, 1996).

In epidemiology a measures of association compares the outcome measurement in groups of subjects that are defined by categories of a risk factor of interest (exposure). Mathematically, measures of association are either ratios or differences of an outcome measure in these groups the study use chi-square test to investigate the expose to digestive cancer between case and control .(Breslow et al ,1980).

Data analysis and interpretation:

A case control study conduct in Radiation and Isotopes Centre Khartoum RICK 200

digestive system cancer consist of all registered patients whether the patient diagnosed as new case of digestive system cancer or old patients who come to follow up radiotherapy and chemotherapy treatment in the RICK hospital and 200 control were recruited randomly without any history of cancer or digestive system diseases, residing in the same geographical region, demographical and risk factors data were collected using the same purposively designed questionnaire age was above 18 years old, this was the inclusion criteria after informed consent to participate in the study.

Characteristics of patients and control cases:

The main purpose of the present study is to examine from an empirical point of view the factor that may be risk factor of GIT system cancer among Sudanese treated in RICK .Before doing so however it might be useful to discuss some preliminary result relating to some characteristics of the study sample of GIT system cancer cases and controls, it is primary tool for the study of factor related to disease incidence.

A case- control study in which disease case and disease free control study subject are identified and followed back to certain their exposure level. In particular, we calculate the frequency distribution of case and control according to risk factors. Based on these distributions apply chi-square test to test for equality among proportion of these distribution.

1.Gender:

Gender is known to have important effect on all aspects on human life .Table (5) gives the distribution of the cases and control according to gender. It is clear the gender distribution is close to be equal gender (male & female) in cases is (25.5%, 24.5%) respectively , also in control is (25.3%, 24.8%)   respectively.

Table (5): distribution of the cases and control according to gender:

Gender	Case		control		Total	
	Freq.	%	Freq.	%	Freq.	%
Male	102	25.5%	101	25.3%	203	50.8%
Female	98	24.5%	99	24.8%	197	49.3%
Total	200	50.0%	200	50%	400	100.0%

Source: Own calculation from study data

2. Age:

Age is one of the most important factors that affect the incidence of GIT system cancer .It has been noted long time ago that the incidence of GIT system cancer increase steadily with increase in age.

Descriptive statistics were calculated separately for the case and control .The age for the case ranged from 18 to 90 years with (mean ± S.D.) 54.1 ±15.7 and median 55 years. The maximum number of patients was presented at age 70 (mode = 70).Table (6) illustrates age distribution of patients (2.3%, 5.5%) were at age (18 – 27,28 – 37 years) respectively and most patient in (11%, 10.3%,9.8%) were at age (48 – 57, 38 – 47, 58 – 67 years) respectively and fewer of them (8.3%, 3%) were at age (68- 77, 78+ years) respectively , so that this finding indicate that GIT system cancer occurs with higher age group .This could be explained by the fact that disease among any population is strongly related to their life expectancy at birth (e$_0$), e$_0$ for the Sudanese is 54.2 (2008 census table).This explain the mean age for GIT system cancer revolves around 54 years.

The age for the control ranged from 20 to 81 years with (mean ± S.D.) 47.5 ±15.7 and median 45 years. The maximum number of control was presented at age 35 (mode = 35).Table (6) illustrates age distribution of control (4.3.3%, 6.5%) were at age (18 – 27,38 – 47 years) respectively and most patient in (13.3%, 11.0%,8.8%) were at age (28 – 37, 48 – 57, 58 – 67 years) respectively and fewer of them (5%, 1.3%) were at age (68- 77, 78+ years) respectively. To estimate 95% confidence interval for the population mean age of all GIT system cancer patients

$$\bar{\chi} \; + \; Z\left(\frac{S.D}{\sqrt{n}}\right)$$

so that 95% confidence intervals of the mean age of GIT system cancer patients found to range 51.9 to 56.3 years old. This result goes on harmony with the international trend indicates that get old more risky to get GIT system cancer.

Table (6): distribution of the cases and control according to age :

Age group	Case		control		Total	
	Freq.	%	Freq.	%	Freq.	%
18 - 27	9	2.3%	17	4.3%	26	6.5%
28 - 37	22	5.5%	53	13.3%	75	18.8%
38 - 47	41	10.3%	26	6.5%	67	16.8%
48 - 57	44	11.0%	44	11.0%	88	22.0%
58 - 67	39	9.8%	35	8.8%	74	18.5%
68 - 77	33	8.3%	20	5.0%	53	13.3%
78+	12	3.0%	5	1.3%	17	4.3%
Total	200	50.0	200	50.0	400	100.0

Source: Own calculation from study data

3. Dietary habits

Table (7): Distribution of the cases and control according to Dietary habits

Dietary habits	Case		control		Total		P-value
	Freq.	%	Freq.	%	Freq.	%	
diet	130	32.5%	34%	8.5%	164	41.0%	*0.000*
canned food	117	29.3%	109	27.3%	226	56.5%	0.420
spicy food	170	42.5%	151	37.8%	321	80.3%	0.903
drinking very hot liquids	167	41.8%	143	35.8%	310	77.5%	*0.004*
food containing aflatoxin	158	39.5%	157	39.3%	315	78.8%	*0.017*

Source: Own calculation from study data

The development of colorectal cancer appears to be associated with diets that contain high amount of fat and calories and subsequently is low in fibber. High intake of meat may be associated with GIT system cancer. The exact role of dietary factors in causation of colorectal cancer is not clear at this time. Ongoing research is expected to increase our understanding of this critical issue. Table (7) show who follow diet in case and control are (32.5%, 8.5%) respectively. The study find the GIT cancer patient who follow diet is 66% of case which is very high rate than control.

Processed foods have been altered from their natural state for safety reasons and for convenience. The methods used for processing foods include canning, freezing, refrigeration, dehydration and aseptic processing. Eating these foods may increase your risk of GIT system cancer. Table (7)

show who eat canned foods in case and control are (29.3%, 27.3%) respectively. The study find the GIT cancer patient who follow diet is 66% of case which is mean may be consider is risk factor. The study find the GIT cancer patient who eat canned food is 58.5% of out of cases which is very high rate.

There were some speculations that perhaps eating very hot food and drinking hot beverages day in and day out may increase the risk for the development of cancer of the GIT system or any part in it as specific. The jury is still out there on this issue. But it is prudent to allow hot food or drink to simmer down a bit before ingesting them. There is no scientific evidence to prove that ingesting spicy food causes GIT system cancer. The caveat in almost everything is "moderation. Table (7) shows who eat spicy food in case and control are (42.5%, 37.8%) respectively, drinking very hot liquid in case and control are (41.8%,35. 8%) respectively. The study find the GIT cancer patient eat spicy food and drinking very hot liquid   is (85%, 83.5%)of out of cases which is very high rate.

Aflatoxin are naturally occurring mycotoxins that are produced by many species of Aspergillus, a fungus, most notably Aspergillus flavus and Aspergillus parasiticus. Aflatoxin are toxic and among the most carcinogenic substances known. After entering the body, aflatoxin may be metabolized by the liver to a reactive epoxide intermediate or be hydroxylated and become the less harmful aflatoxin, particularly affected by aflatoxin exposure which leads to stunted growth and delayed development to a high risk of developing liver cancer. Table (7) show who eat food containing aflatoxin in case and control are (39.5%, 39.3%) respectively. The study find the GIT cancer patient eat food with aflatoxin(ground nut) is 79% of out of cases which is very high rate than control.

4.Medical history

Diabetics: Many studies have identified an association between type 2 diabetes and colon cancer. Both diseases share common risk factors of obesity and physical inactivity, but diabetes itself is a risk factor for colorectal cancer ,Other studies have determined that people with diabetes have a 60% increased risk of developing colon cancer, Table (8) show the prevalence of diabetics in case and control is (3%,2.2%) respectively. The study find the case or GIT cancer patient who are diabetics is 6% of cases.

Hypertensive: Hypertension appears to be associated with an increased risk of mortality from cancer, particularly renal cell carcinoma, Table (8) show the prevalence of Hypertensive in case and control is (8%,3%) respectively. The study find the case or GIT cancer patient who are hypertensive is 16% of cases.

Hepatitis & jaundice : The vast majority of liver cancer that is associated with chronic hepatitis virus occurs in individuals who have been infected most of their lives. In areas where hepatitis B virus is not always present (endemic) in the community. Hepatitis C virus patients, the risk factors for developing liver cancer include the presence of cirrhosis ,the way in which hepatitis C virus causes liver cancer is not well understood. On the other hand, there are some chronic hepatitis C virus-infected individuals who have liver cancer without cirrhosis. So, it has been suggested that the core protein of hepatitis C virus is the culprit in the development of liver cancer in GIT system , Table (8) show the prevalence of jaundice in case and control is (23.8%,8.2%) respectively , the study find prevalence viral hepatitis as general in case is 7.8.% and prevalence by type is hepatitis HA , HB and HC is (0.8% , 0.5% and 6.5%) respectively and the control the hepatitis is 2.8% and prevalence by type is hepatitis

HA , HB and HC is (0.2%,0.5% , 2%) respectively . The study find the case or GIT cancer patient who are viral hepatitis & jaundice is (14.5% ,45.5 %) respectively of cases .

Pernicious anaemia: People with pernicious anaemia have a higher risk of developing stomach cancer. Pernicious anaemia, also called megaloblastic anaemia, is a rare disorder in which the body does not absorb enough vitamin B_{12} from the digestive tract, leading to decreased production of red blood cells (RBCs). Pernicious anaemia is caused by a lack of a substance called intrinsic factor, which is normally in the digestive tract and is essential for the absorption of vitamin B_{12} from food. table (8) show the prevalence of pernicious anaemia in case and control is (5.8%,3%) respectively. The study find the case or GIT cancer patient have diagnoses   pernicious anaemia is 11.5% of cases.

Regular tabs: Some studies suggest that taking a daily tabs (multi-vitamin , folic acid, or folate) may be GIT cancer risk factors , but not all studies have found this. In fact, some studies have hinted that some tabs drugs might help existing tumours to grow. More research is needed in this area, table (8) show the prevalence of regular tabs in case and control is (12%,11%) respectively. The study find the case or GIT cancer patient that take regular tab is 24% of cases.

History of GIT Surgery : It is increasing risk of developing stomach cancer starting at about 15 years after having had stomach surgery, such as a partial gastrectomy (removal of part of the stomach or any GIT system part) and vagotomy (surgery involving the vagus nerve), table (8) show the prevalence of history of GIT surgery in case   and   control   is   (17.2%,1.8%) respectively. The study find the case or GIT cancer patient who make surgery in GIT system is 34.5% of cases.

Family History   GIT disease: Risk of developing stomach cancer is increased if others in your family have had stomach diseases . You are also at higher risk if your family has a history of hereditary nonpolyposis colon diseases , table (8) show the prevalence of family history GIT disease in case and control is (12.8%, 14.5%) respectively. The study find case or GIT cancer patient GIT disease history in family is 51% which increasing of get GIT disease then developing to GIT cancer.

Family cancer history: The family member with any cancer type , a first-degree relative (parents, siblings or children) with a history of cancer have twice the risk of getting it. The risk is higher if more than one first-degree relative has that history or if someone in the family suffered the cancer at an early age. Physicians usually recommend those with a family history of colorectal cancers to start screening earlier than age 50 and to get them more often, table (8) show the prevalence of Hypertensive in case and control is (17.8%,17.5%) respectively. The study find case or GIT cancer patient cancer history in family is 35% which increasing developing GIT cancer.

Table (8): Distribution of the cases and control according to medical history

Medical history	Case		control		Total		P-value
	Freq.	%	Freq.	%	Freq.	%	
diabetic	12	3.0%	9	2.2%	21	5.2%	0.487
hypertensive	32	8.0%	12	3.0%	44	11.0%	*0.002*
jaundice	95	23.8%	33	8.2%	128	32.0%	*0.000*
viral hepatitis	29	7.2%	11	2.8%	40	10.0%	*0.004*
Jaundice HA	3	0.8%	1	0.2%	4	1.0%	
Jaundice HB	2	0.5%	2	0.5%	4	1.0%	*0.009*
Jaundice HC	26	6.5%	8	2.0%	34	8.5%	
Anemia	23	5.8%	12	3.0%	35	8.8%	0.052
regular tab	48	12.0%	44	11.0%	92	23.0%	0.635
digestive surgery	69	17.2%	7	1.8%	76	19.0%	**0.000**
past history of GIT disease	51	12.8%	58	14.5%	109	27.3%	0.646
cancer in the family	71	17.8%	70	17.5%	141	35.3%	0.917

Source: Own calculation from study data

5.Upper GIT system risk factor

Gastroesophgeal reflux: A recent Gallup poll found that 44% of adults in the United States have heartburn at least once per month. About 30% of oesophageal cancer cases can be linked to GERD, table (9) show the prevalence of gastroesophgeal reflux disease in case and control is (25.8%,2.5%) respectively. The study find the prevalence of gastroesophgeal reflux who have already diagnosed among cases is 51.5% thus they are expose to developing to GIT cancer.

Achalasia: The reason that achalasia is a risk factor for oesophageal cancer is not clear, but roughly 6% of all achalasia patients develop squamous cell-type oesophageal cancer, table (9) show the prevalence of achalasia in case and control is (27%,2%) respectively. The study find the prevalence of achalasia who have already diagnosed among cases is 54%.

Gallstone and chclecstystilis of the gallbladder: People with one or several large (3 cm or 1.2 inches) gallstones are 10 times more likely to develop gallbladder

cancer than those with small (1 cm or 0.4 inches) gallstones. However, gallstones are a very common condition and gallbladder cancer is quite rare. The vast majority of people with gallstones never develop gallbladder cancer, table (9) show the prevalence of gallstone and chclecstystilis of the gallbladder in case and control is (17.8%,2%) respectively. The study find the prevalence of gallstone and chclecstystilis of the gallbladder who have already diagnosed among cases is 35% thus they are exposed to developing to GIT cancer.

Gallbladder polyps: Polyps larger than 1 centimetre (a little less than half an inch) are more likely to be malignant, table (9) show the prevalence of gallbladder polyps in case and control is (0.8%, 0%) respectively. The study find the prevalence of gallbladder polyps who have already diagnosed among cases is 3 %.

Chronic typhoid: People chronically infected with salmonella (the bacterium that causes typhoid) and those who are carriers of the disease are 6 times as likely to develop gallbladder cancer as those not

infected, table (9) show the prevalence of chronic typhoid in case and control is (20%,4.2%) respectively. The study find the prevalence of chronic typhoid who have already diagnosed among cases is 40 %. thus they are expose to developing to GIT cancer and it consider as risk factor.

 Chronic pancreatitis: People with this inherited form of chronic pancreatitis seem to have a high lifetime risk for developing pancreatic cancer (about 40% to 75%), table (9) show the prevalence of chronic pancreatitis in case and control is (3%,0.5%) respectively. The study find the prevalence of chronic pancreatitis who have already diagnosed among cases is 12%. *A persistent malaria:* Research is also looking at whether a persistent malaria is increase the risk of digestive system cancer , table (9) show the prevalence of a persistent malaria in case and control is (21%,5.5%) respectively. The study find the prevalence of a persistent malaria among case is 42%.

Heartburn: Only about 56% of these people with Barrett oesophagus had symptoms of "heartburn," while the others had no symptoms at all. Barrett oesophagus is a risk factor for the adenocarcinomas type of cancer of the oesophagus, table (9) show the prevalence of heartburn in case and control is (27%,19.8%) respectively The study find the prevalence of heartburn ,who have already diagnosed among cases is 54% thus they are expose to developing to GIT cancer.

Helicobacter pylori infection: Infection of the stomach with the ulcer-causing bacteria called Helicobacter pylori (H. pylori) may increase the risk of developing pancreatic cancer. Also, some researchers believe that excess stomach acid may also increase the risk, table (9) show the prevalence of helicobacter pylori infection in case and control is (6%,2.5%) respectively. The study find the prevalence of H. Pylori, who have already diagnosed among cases is 24%.

Hypertrophic gastropathy: This is a condition in which excess growth of the stomach lining forms large folds in the lining and leads to low levels of stomach acid. Because this disease is rare, it is not known exactly how much this increases the risk of stomach cancer, table (9) show the prevalence of hypertrophic gastropathy in case and control is (7.8%,2%) respectively. The study find the prevalence of hypertrophic gastropathy ,who have already diagnosed among cases is 31% thus they are exposed to developing to GIT cancer.

Table (9): Distribution of the cases and control according to upper GIT system risk factor

Upper GIT system risk factor	Case		control		Total		P-value
	Freq.	%	Freq.	%	Freq.	%	
gastroesophgeal reflux disease	103	25.8%	10	2.5%	113	28.3%	*0.000*
achalasia disease	108	27.0%	8	2.0%	116	29.0%	*0.000*
gallstone & chclecstystilis of the gallbladder	71	17.8%	8	2.0%	79	19.8%	*0.000*
gallbladder polyps	3	.8%	0	.0%	3	0.8%	*0.000*
chronic typhoid	80	20.0%	17	4.2%	97	24.2%	*0.000*
chronic pancreatitis	12	3.0%	2	.5%	14	3.5%	*0.001*
a persistent malaria	84	21.0%	22	5.5%	106	26.5%	*0.000*
heartburn	108	27.0%	79	19.8%	187	46.8%	*0.004*
Helicobacter pylori infection(ulcer)	24	6.0%	10	2.5%	34	8.5%	*0.035*
hypertrophic gastropathy	31	7.8%	8	2.0%	39	9.8%	*0.001*

Source: Own calculation from study data

6. Lower GIT system risk factor

Schistosomiasis: Carcinoma of the urinary bladder is the most common malignancy in the Middle East and parts of Africa where Schistosomiasis is a widespread problem. Much evidence supports the association between Schistosomiasis and bladder cancer, table (10) show the prevalence of Schistosomiasis in case and control is (12.2%,3.5%) respectively. The study find the prevalence of Schistosomiasis, who have already diagnosed among cases is 24.5%.

Polyps: Tissue growths, usually benign that develop in the colon or rectum, most often in patients over 50 years of age, table (10) show the prevalence polyps infection in case and control is (0.8%,0%) respectively. The study find the prevalence of , who have already diagnosed among cases is 1.5%.

Ulcerative colilis Crohn disease: People who have ulcerative colitis for 8 years or longer have a greater chance of getting colon cancer, table (10) show the prevalence of ulcerative colilis crohn disease in case and control is (20.8%,1%) respectively. The study find the prevalence of ulcerative colilis crohn disease ,who have already diagnosed among cases is 41.5% .

Inflammatory bowel disease (IBD) : People with inflammatory bowel disease especially men and those with ulcerative colitis may be at increased risk for developing pancreatic cancer, preliminary research suggests that, table (10) show the prevalence of Inflammatory bowel disease in case and control is (44.2%,1%) respectively. The study find the prevalence of IBD ,who have already diagnosed among cases is 88.5% thus they are expose to developing to GIT cancer.

Table (10): Distribution of the cases and control according to lower GIT system risk factor

Lower GIT system risk factor	Case		control		Total		P-value
	Freq.	%	Freq.	%	Freq.	%	
Schistosomiasis	49	12.2%	14	3.5%	63	15.7%	*0.000*
polyps	3	0.8%	0	0.0%	3	0.8%	*0.000*
ulcerative colilis Crohn disease	83	20.8%	4	1.0%	87	21.8%	*0.000*
inflammatory bowel disease	177	44.2%	37	9.2%	214	53.4%	*0.000*

Source: Own calculation from study data

7. Habits of patient and control case

Smoker: Smoking also increases the risk of over a dozen other cancers including cancers and is the most common cause of cancer death in the UK, table (11) show the smoker in case and control is   (11.5%,9.8%) respectively and who smoking shaisha in case and control is (1.2%,6.8%) respectively. The study find the smoker among cases are 23% and the smoking shaisha is 2.5% so that increase of getting GIT cancer.

Snuff: Researchers in the United Kingdom looked at 89 studies from the United States and Scandinavia, they said they could find link between snuff and the risk of cancer, table (11) show the snuffer in case and control is (7.5%,6%) respectively. The study find the snuffer among cases are 15% and the snuffer and smoker in same time shaisha is 8% so that increase of getting GIT cancer.

Tobacco: According to the National Cancer Institute, smoking causes 30% of all cancer deaths in the U.S. and is responsible for 87%

of cases of lung cancer. Not only does it affect the lungs, it can cause kidney, pancreatic, cervical, and stomach cancers and acute myeloid leukaemia.

Alcohol: The consequences of drinking too much alcohol go well beyond the evening's embarrassing antics or the morning's hangover. Scientific studies have confirmed that alcohol can also cause cancer. Obviously, not everyone who drinks will develop cancer. But on the whole, scientists have found that cancer is more common in people who drink alcohol than people who don't table (11) show the s alcohol consumer in case and control is (4.2%,3.2%) respectively. The study find the drinker of alcohol in cases are 8.5% so that increase of getting GIT cancer.

Chemicals environment: Some people have a higher risk of stomach cancer if you work in a job, such as a mechanic or contractor, which exposes you to high levels of heavy metals, rubber, , asbestos and dealing with chemicals daily , table (11) show who work in unhealthy or risky environment in case and control is (25.5%,26.5%) respectively. The study find the work in risk environment in cases are 51% so that increase of getting GIT cancer .

Physical activity: Physical activity is a critical component of energy balance, the term researchers use to describe how weight, diet, and physical activity influence health. There is strong evidence that physical activity is associated with reduced risk of cancers . Table (11) show who have physical activity in their life in unhealthy in case and control is (41.2%,37.2%) respectively. The study find who have physical activity in cases are 82.5% so that increase of getting GIT cancer .

Herbs for treatment: Herbs are safe when you use them the way they were meant to be used. But when you start increasing your estrogen dramatically by increasing certain herbs, then, yes, the chances of cancer increase. anything that raises estrogen levels in an unnatural way can cause cancer, table (11) show who have take herbs for treatment in their life in case and control is (21.8%,11.2%) respectively. The study find who take herbs as treatment in cases are 43.5% so that may be increase of getting GIT   cancer   .

Table (11): Distribution of the cases and control according to habits

Habits	Case		control		Total		P-value
	Freq.	%	Freq.	%	Freq.	%	
smoker	46	11.5%	43	10.8%	89	22.3%	0.718
Snuff	30	7.5%	24	6.0%	54	13.5%	0.380
smoker & snuffer	16	4.0%	12	3.0%	28	7.0%	0.433
Shaisha	5	1.2%	27	6.8%	32	8.0%	*0.000*
Alcohol	17	4.2%	13	3.2%	30	7.4%	0.448
chemicals environment	102	25.5%	105	26.2%	207	51.7%	0.764
physical activity	165	41.2%	149	37.2%	314	78.4%	0.074
herbs for treatment	87	21.80%	45	11.20%	132	33.0%	*0.000*

Source: Own calculation from study data

Conclusion:

In dietary habit the high rate of diet, canned food , spicy food , drink hot liquids and food containing aflatoxin in case rather than control that ensure that is risk or lead to GIT system cancer and which is statistically significances difference between case and control where p- value of chi-square (P-value < 0.05) of the diet(vegetable), drinking very hot liquids and food containing aflatoxin so that diseases may be consider as risk factor of habits to GIT system caner and be more expose.

The medical history, the high rate of hypertensive, jaundice, viral hepatitis, pernicious anaemia and digestive surgery , in case rather than control with slide differences rate in diabetic, regular tab, past history of GIT disease and cancer in the family between case and control ,to ensure that is risk or lead to GIT system cancer and which is statistically significances difference between case and control where p-value of chi-square (P-value< 0.05) of the hypertensive, jaundice, viral hepatitis and digestive surgery , so that diseases may be considered as risk factor of medical history to GIT system caner and may be more expose to developing GIT cancer than free of diseases.

Upper digestive system the cases are the high rate of gastroesophgeal reflux disease, achalasia disease, gallstone & chclecstystilis of the gallbladder, gallbladder polyps, chronic typhoid , chronic pancreatitis , a persistent malaria, heartburn , Helicobacter pylori infection(ulcer) and hypertrophic gastropathy in case rather than control that ensure that is risk or lead to GIT system cancer and which is statistically significances difference between case and control where p- value of chi-square (P-value< 0.05) for all upper GIT system disease , so that diseases may be consider as risk factor for GIT system caner and the cases will be more exposed than other free form this diseases .

In the lower digestive , the high rate of Schistosomiasis, polyps, ulcerative colilis Crohn disease and inflammatory bowel disease(IBD) in case rather than control that ensure that is risk or lead to GIT system cancer and which is statistically significances difference between case and control where p- value of chi-square (P-value< 0.05) for all lower GIT system disease , so that diseases may be considered as risk factor for GIT system caner and the cases will be more expose than other free form this diseases .

The high rate of herbs for treatment in case rather than control only , slide difference rate of smoker, Snuff , smoker & snuffer , Alcohol and physical activity in between case and control and high rate of smoking shaisha in control rather than case to ensure that is risk or lead to GIT system cancer or and which is statistically significances difference between case and control where p- value of chi-square (P-value< 0.05) of the smoking shaisha and herbs for treatment , so that habit may be consider as risk factor for GIT system caner and be more expose.

References:

[1.] **Agresti, A.** (1996). An introduction to categorical data analysis. John Wiley and Sons, Inc.

[2.] **Breslow, N. and Day, N. (**1980). Statistical method in cancer research; the analysis of case control studies. *International Agency on Cancer*, Lyon. France, Vol. **1**

[3.] **Federal Ministry of Health FMOH Sudan**. (2000-2008). Annual Health Statistics Reports.

[4.] **Lan F**. (2005). The basic of oncology 4th Edition ,McGraw-hill. New York.

[5.] **Central Bureau of Statistics CBS**, Fifth Sudan Census, (2008).

[6.] **Patton D.,(**2005)(Reviewed paper by, Donna Patton, MD ,2005 www.kidshealth.com/parent/misc/reviewrers /.html.