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Charnley AK (1992). Mechanisms of fungal pathogenesis in insects with particular reference to locusts. In: Lomer CJ, Prior C (eds), Pharmaceutical Controls of Locusts and Grasshoppers: Proceedings of an international workshop held at Cotonou, Benin. Oxford: CAB International. pp 181-190.

Jake OO (2002). Pharmaceutical Interactions between *Striga hermonthica* (Del.) Benth. and fluorescent rhizosphere bacteria Of *Zea mays*, L. and *Sorghum bicolor* L. Moench for *Striga* suicidal germination In *Vigna unguiculata*. PhD dissertation, Tehran University, Iran.

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**ARTICLE**

**Retrospective study on gastrointestinal tract tumors in humans in Zaria, Kaduna State, Nigeria**

**1**

Mbuk E. U. and Amber E. I.

*Full Length research Paper*

## Retrospective study on gastrointestinal tract tumors in humans in Zaria, Kaduna State, Nigeria

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**A retrospective study of gastrointestinal tract (GIT) tumors of humans in Zaria was carried out to determine the prevalence rates. Of the 124 human cases recorded in Ahmadu Bello University Teaching Hospital (ABUTH) Zaria, 39 (31.45%) had upper GIT tumors while 42 (33.87%) had tumors located in the lower GIT. All age groups were affected. The risk for developing tumors increased with age in cases studied. The affected age groups varied from 0.75 to 89 years with median of 44.5 years. Males were over represented with sex ratio of 1.5:1. Adenocarcinomas and squamous cell carcinomas were predominant.**

**Key words:** Gastrointestinal tract, tumors, humans, Zaria.

### INTRODUCTION

Cancer is a group of diseases in which normal cells undergo uncontrolled growth. It is characterized by a loss of control of one or more of the specific control mechanisms that regulate the activities of a normal cell division and metabolic processes (Lochhead et al., 2015). All ages are affected in humans, with the disease more prevalent in the aged. Cancer may affect any organ or tissue (Suggars, 2000; Ducimetière et al., 2011).

It has been established that cancer cases are higher in males than females (Huguley, 1999; Yan et al., 2008). Evidence from studies of populations that migrated from one geographic area to another suggests that these variations are due to differences in lifestyle rather than ethnic origin. This is consistent with other evidence that most cancers are predominantly related to environmental causes rather than hereditary, although the two factors

interact (Polk and Peek, 2010; Rugge et al., 2013; Uehara et al., 2013). Cancer is the second most common cause of mortality in the western world after cardiovascular disease (Xiong et al., 2014; Assumpção et al., 2015).

While incidences of tumors are well documented in other parts of the world, this is not the case in Nigeria. This study is one in a series aimed at documenting hospital based incidence of gastrointestinal tract tumors with the objective of determining the prevalence rates and predisposing factors in the country.

### Classification of tumors

There are broadly two classifications of tumors – behavioural and histological. This classification aids

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diagnosis, prognosis and therapy. Behavioural classification distinguishes between benign and malignant tumors. Benign tumors are generally slow growing expansive masses encapsulated with distinct margins (Rugge et al., 2013; Uehara et al., 2013). Malignant tumors are usually rapidly growing, invading local tissues and spreading to distant sites - metastasizing (Nguyen et al., 2013). Histological classification group tumors according to tissues of origin and cell types but some tissues in anaplastic state make tissue or organ of origin of some tumors uncertain (Yang et al., 2012; Kauppila et al., 2013).

Both classification pose problems. Some tumors with benign nomenclature are obviously malignant, for example; lymphoma, myeloma. Problems of classifying neuroendocrine tumors with diverse tissues of origin exists (Polk and Peek, 2010; Xiong et al., 2014). There exist also tumors of mixed cell phenotype which have posed a problem of histological classification, for example; tumors of salivary glands, teratomata also called "Monsters" (Irrazábal et al., 2014; Assumpção et al., 2015).

### Causes of cancer

Several causes of cancer have been advanced based purely on positive associations. These ranges from dietary habits, social habits, environmental factors, infectious agents like viruses, bacteria and other parasites have been associated with most cancers (Cuzick, 2001; Yan et al., 2008; Agarwal et al., 2012). Chemicals, hormones, X-rays and ultra-violent irradiations have been positively known to cause tumors (Griffith, 2001). There is now substantive proof that cancer is a genetic disease but differs from other genetic diseases by the proof that; it arises not from germ-line mutation but somatic mutations (Irrazábal et al., 2014; Halland et al., 2015).

It has been postulated that several sequential mutations are required for individual cancers to arise (Yang et al., 2000). This explains why tumors occur predominantly among aged humans (Huguley, 1999; Newschaffer, 2001). Current theory of oncogenesis links the existence of cancer genes known as oncogenes to carcinogenesis and in their normal forms; protooncogenes pose no problems (Grimmig et al., 2015). However, in mutated forms, they behave uncontrollably in tissue function and tissue formation. Thus, most of the previously observed causes of cancer are now known to act as either; initiators or promoters of malignant transformation (Pisters et al., 2001; Tsukamoto et al., 2001). Cancer is known to progress from healthy state through a precancerous, preclinical and clinical state. The duration of the precancerous is long and variable leading to the state of clinical cancer diagnosis. Thus

oncogenesis is a multistage process with both extrinsic and intrinsic factors acting as initiators and promoters to transform normal cells to neoplasia. The process of oncogenesis is monoclonal, multi-causal and multistage. A carcinogen may pose some degree of risk to a population at any dose by exerting effects that may be addictive with those which account for spontaneous baseline incidence of cancer (Perera, 2000; Yang et al., 2014).

### Tumor diagnosis

Clinical diagnosis usually begins with a thorough history and physical examination, including inspection, both visually and manually, of all accessible areas of the body, especially the skin, neck, breast, abdomen, testicles, and the areas that contain lymph nodes. It specifically includes examination of body openings, particularly rectal examination for cancers of the rectum or prostate and pelvic examination for cancers of the cervix or uterus (Ducimetière et al., 2011). Laboratory diagnosis usually done using a small amount of blood to test for genes believed to cause certain cancers; medical imaging techniques that view internal areas of the body, a physician can biopsy a tumor in almost any part of the body using a thin, flexible needle. Also, endoscopy, scintigraphy, computed tomography, magnetic resonance imaging, test of blood in the stool (Haemoccult), sigmoidoscopy to find benign polyps and measurement of tumor specific antigens (London, 2000; Liebermann, 2001; Assumpção et al., 2015).

### Tumor treatment

Treatment is usually by removal of malignant cells by surgical operation then subsequently followed by radiotherapy and chemotherapy if the cancer extends into neighbouring tissues that cannot be removed or distant metastases are already present (Theon, 2000; Moore and Frimberger, 2000; Geh et al., 2001; Gutt, 2001; Todoroki, 2001). Also, hormone therapy, immunotherapy, gene therapy and a drug – Endostatin used to shrink tumors by suppressing their ability to produce capillaries and interleukin 2 used to stimulate a patient's lymphokine-activated killer lymphocytes (LAK cells) (Biesterfeld et al., 2001; Cuzick, 2001; Griffith, 2001).

### Gastrointestinal tract tumors

#### Oral tumors

Carcinoma of the tongue is mainly a male disease but there is increasing incidence in females in some countries (S.E. Asia and India). It is estimated to account

for 20% of all malignancies. Most patients are 50 to 70 years. Predisposing conditions are sepsis, syphilis, smoking, especially of pipe and cigar, chewing of betelnut and tobacco, marijuana and spices (Irrazábal et al., 2014). The risk is 15 times greater in alcohol-drinking smokers. Benign lip tumors are hemangioma and lymphangioma which cause macrocheilia. Papillomas also exist. Lip carcinomas are common in Caucasians and accounts for 25% of mouth cancer with 98% of the patients being males. Salivary gland tumors have an estimated incidence of 0.25 to 2.5 per 100,000 persons and accounts for 3% of all tumors in Caucasians, with 84% principally in the parotid gland (Yang et al., 2012; Kauppila et al., 2013; Hardefeldt et al., 2014).

### **Gastric tumors**

Benign oesophageal tumors include papilloma, lipoma, leiomyoma found accidentally on barium swallow presenting as dysphagia and neurofibroma which makes up 3% of stomach tumors. Cavernous hemangiomas rarely occur and cause haematemesis. Malignant tumors are leiomyosarcoma and carcinoma with the most vulnerable age group in Africa as 40 to 60 years with males predominantly affected due to the consumption of large quantities of alcohol made from maize (East Africa), smoking, traces of nitrosamines in alcoholic drinks brewed in metal drums, also linked to the intake of tannic acid and certain dietary deficiencies (Agarwal et al., 2012; Hardefeldt et al., 2014). Carcinoid tumor of the appendix may obstruct the human and become a mucocele which is slow growing without metastases; ages affected are 16 to 70 with an average of 34 in both sexes. 20% of patients with pernicious anaemia may develop it with signs of bleeding and epigastric pain. Carcinoma is the commonest malignant gastrointestinal tumor in the world, commonly in the 40 to 70 age groups with the highest prevalence in 55 to 65 age groups. Causes are excessive intake of smoked fish, probably because of benzopyrene a carcinogen resulting from the smoking process, nitrosamines, *Helicobacter pylori* infection, remnant stump of partial gastrectomy and a lack of fruit and vegetables (Polk and Peek, 2010; Rugge et al., 2013; Uehara et al., 2013; Xiong et al., 2014; Assumpção et al., 2015).

### **Intestinal tumors**

Adenoma and leiomyoma cause bleeding and obstruction in the duodenum, while, lymphomas cause abdominal pain, bleeding, intestinal obstruction and obstructive jaundice. Carcinomas of the large bowel are more common in western countries and are the second commonest cause of death among malignant diseases next to cancers of the lungs (Luo et al., 2014). Large bowel cancer is associated with high fat, low fiber diets

and inextricably linked to heavy meat consumption (Lecouteur and Withrow, 2007; Agarwal et al., 2012; Nojiri et al., 2013; Rogler, 2014).

### **Hepatic tumors**

Most primary cancers of the liver are hepatocellular carcinomas and usually arise in a cirrhotic liver caused by hepatitis B virus (HBV) infection or alcohol consumption (Yang et al., 2000; Yamada and Alpers, 2009; Mazzanti et al., 2016).

## **MATERIALS AND METHODS**

Records from Pathology Department of the Faculty of Medicine, Ahmadu Bello University Teaching Hospital, Zaria, Nigeria were retrospectively reviewed for diagnoses of GIT tumors over a three year period (1999-2001). Only cases with complete histologic diagnosis were used for the study. Data was collected for age, sex and histopathologic diagnosis of the tumor types. Other GIT associated tumors were also reviewed for record purposes only. Only malignant tumors were recorded in this study.

## **RESULTS**

On Table 1, one hundred and twenty-four cases of GIT tumors were reviewed with the median age of 44.5 years recorded. The age range of 26 to 65 had the highest prevalence of 72.6% (90). The male:female ratio was 1.5:1 with 60.5% (75) males diagnosed with GIT tumors as against 39.5% (49) females. There was no appreciable difference between upper and lower GIT tumor numbers.

Table 2 showed, lower GIT tumors had the highest prevalence of 33.87% (42) while upper GIT tumors came second highest with 31.45% (39); most of these were in the oral cavity and majority of the cases were seen from 40 years and above.

On Table 3, nine colonic and 21 rectal tumors were recorded. Hodgkins and non-hodgkins lymphoma were associated predominantly with upper GIT tract.

## **DISCUSSION**

In this study, a total of 124 cases of GIT tumors were reviewed with the median age of 44.5 years recorded. This age falls below the tumor age of 55 in western civilization and could be purely because of the lower life expectancy ages in third world countries. The age range of 26 to 65 recorded the highest prevalence of 72.6% (90) during the study period (1999-2001). This agrees with the report that for decades in the United States the number of patients within this age range with GIT cancer has risen rapidly and steadily, from 298,000 in 1965 to more than 564,800 in 1998 (Newschaffer, 2001).

**Table 1.** Patient characteristics of GIT tumor as reported at ABUTH Zaria from 1999 to 2001.

Total no of affected persons	124
Age range (years)	0.75 - 89
Median age	44.5
No of affected males	75 (60.5%)
No of affected females	49 (39.5%)
Male: Female	1.5: 1
Age range:	
<25	24 (19.4%)
26-65	90 (72.5%)
>65	10 (8.1%)

**Table 2.** Percentages of GIT tumor as reported at ABUTH, Zaria.

Site affected	No. of cases (%)
Upper gastrointestinal tract	39 (31.45)
Lower gastrointestinal tract	42 (33.87)
*Associated gastrointestinal tract organs	43 (34.68)
Total	124 (100)

\*Noted for the study record purpose only.

However, these figures are affected by increasing population and the growing percentage of middle aged adults and older adults, who traditionally have a higher incidence of cancer. Age is a major risk factor for bowel cancer where 95% of cases occur in the United States after the age of 40; only 1% is diagnosed before 20 years and 5% before 40 years. Younger adults are more at risk if there is a family history of the disease (Rustgi and El-Serag, 2014). The result indicates that like other cancers elsewhere, it is primarily an old age associated disease.

The ratio of male: female in this study was 1.5: 1 (Table 1), showing that 60.5% (75) males were diagnosed with GIT tumors as against 39.5% (49) females. This agrees with the findings of Newschaffer (2001) and may be explained by the fact that men are more adventurous moving and eating a variety of risk factors indicating that this could be as a result of lifestyle of the patients geographically, as more males smoke cigarette and consumed alcohol which are predisposing factors. Although, this does not agree with the report from South East Asia and India which have increasing incidence in females where older women smoke pipe, chew betelnut and tobacco, marijuana and spices (Brooks et al., 2009; Islami et al., 2009; Shigaki et al., 2012). In the United Kingdom, the male:female ratio is approximately the same as there are about 31,500 new cases annually (15,700 male and 15,800 female) and 18,100 deaths (9,037 men and 9,063 women), the reason being that both males and females are exposed to the same predisposing factors for example, occupational factors

and lifestyles (Suggars, 2000). There was no appreciable difference between upper and lower GIT tumor numbers possibly due to the common factors initiating and promoting tumors in these sites.

Worldwide, the incidence of cancer varies enormously among different geographic areas. The death rate from all cancers in males is 311 per 100,000 in Luxembourg (the highest) as compared to 38 in El Salvador (the lowest). For women it is 175 in Denmark and 49 in El Salvador. The figures for the United States are 163 per 100,000 men and 110 per 100,000 women. For particular cancers, the difference between countries may be as high as 40 fold (Pimentel-Nunes et al., 2013). Evidence from studies of populations that migrated from one geographic area to another suggests that these variations are due to differences in lifestyle rather than ethnic origin. This is consistent with other evidence that most cancers are predominantly related to environmental causes rather than hereditary, although the two factors interact.

Table 2 showed lower GIT tumors had the highest prevalence of 33.87% (42). The reason for the increase in the number of bowel cancer might be because it is not discovered early enough for cure as is the case in UK (Suggars, 2000). While Table 3 showed that, 9 colonic and 21 rectal tumors were recorded. In the developed countries, it is reputed that up to 20 times more people get bowel cancer compared with the rest of the world and about 66% of the differences could be due to the proportions of dietary fiber and fats in the diet (Rogler, 2014). The action of bacteria on some types of fiber

**Table 3.** Distribution of GIT tumors as reported at ABUTH, Zaria.

Tumor location	Squamous cell carcinoma	Adeno carcinoma	Burkitt's lymphoma	Non-Hodgkin's lymphoma
<b>Upper gastrointestinal tract</b>				
Buccal mucosa	6	5	2	-
Palate	1	1	-	-
Parotid gland	-	7	-	1
Tongue	4	-	-	-
Pharynx	2	-	-	-
Oesophagus	3	-	-	-
Stomach	-	6	-	-
<b>Lower gastrointestinal tract</b>				
Duodenum	-	-	-	-
Jejunum	-	-	-	-
Ileum	-	-	-	2
Caecum	-	4	-	-
Colon	-	9	-	-
Rectum	3	21	-	-
Anus	-	2	-	-
Appendix	-	1	-	-
Total	19	56	2	4

releases certain fatty acids that are thought to stimulate the multiplication of cells lining the bowel. Some studies have shown that anything that make cells multiply more quickly may cause changes leading to tumors (Yamada and Alpers, 2009; Mazzanti et al., 2016).

Upper GIT tumors from this study (Table 2) came second highest with 31.45% (39); most of these were in the oral cavity. Majority of the cases were seen from 40 years and above and agrees with the findings of Agarwal et al. (2012). This could be as a result of easy contact with carcinogens like tobacco and betelnut chewing, consumption of alcohol, sepsis, syphilis, smoking especially of pipe and cigar, marijuana and spice which are common among the people of this region of the country.

Hodgkins and non-hodgkins lymphoma (Table 3), were shown to be associated predominantly with upper GIT tract. The reasons for these are not obvious but it is possible that, the small number of data collected is inadequate to explain this association.

## Conclusion

This study shows that GIT malignancies can occur in all ages and both sexes in humans though the incidence is higher in men due to factors such as lifestyle and occupation.

## CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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