



WJG 20th Anniversary Special Issues (8): Gastric cancer

Gastric cancer in Africa: Current management and outcomes

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Received: October 27, 2013 Revised: January 10, 2014

Accepted: February 17, 2014

Published online: April 14, 2014

Abstract

Gastric cancer is the fourth most common cancer and second most common cause of cancer death worldwide. Globally, gastric cancer poses a significant public health burden - both economically and socially. In 2008, the economic burden from premature cancer deaths and disability was \$895 billion and gastric cancer was the second highest cancer responsible for healthy life lost. With the expected increase in cancer deaths and non-communicable diseases, these costs are expected to rise and impact patient care. World Health Organization, estimates a 15% increase in non-communicable disease worldwide, with more than 20% increase occurring in Africa between 2010 and 2020. Mali, West Africa, is ranked 15th highest incidence of gastric cancer worldwide at a rate of 20.3/100000, yet very scarce published data evaluating etiology, prevention or management exist. It is understood that risk factors of gastric cancer are multifactorial and include infectious agents (*Helicobacter pylori*, Epstein-Barr virus), genetic, dietary, and environmental factors (alcohol, smoking). Interestingly, African patients with gastric cancer are younger, in their 3rd-4th decade, and present at a late stage of the disease. There is sparse data regarding gastric cancer in Africa due to lack of data collection and under-reporting, which impacts incidence and

mortality rates. Currently, GLOBOCAN, an International Agency for Research on Cancer resource, is the most comprehensive available resource allowing comparison between nations. In resource limited settings, with already restricted healthcare funding, data is needed to establish programs in Africa that increase gastric cancer awareness, curtail the economic burden, and improve patient management and survival outcomes.

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Key words: Gastric cancer; Africa; Cancer outcomes; Cancer survival; Cancer management; Non-communicable diseases

Core tip: There is a paucity of published data regarding gastric cancer in Africa and a need for more research to elucidate etiology and management. There is a growing opportunity for partnerships between African nations and more developed nations to advance the understanding and management of gastric cancer and thus improve overall patient outcomes. Such partnerships would provide a bilateral learning opportunity and help set a platform for training opportunity amongst health-care providers.

Asombang AW, Rahman R, Ibdah JA. Gastric cancer in Africa: Current management and outcomes. *World J Gastroenterol* 2014; 20(14): 3875-3879 Available from: URL: <http://www.wjgnet.com/1007-9327/full/v20/i14/3875.htm> DOI: <http://dx.doi.org/10.3748/wjg.v20.i14.3875>

INTRODUCTION

Gastric cancer is the fourth most common cancer worldwide, and second most common cause of cancer death^[1]. In 2008, the economic burden from premature cancer deaths and disability was \$895 billion and gastric cancer

was the second highest cancer responsible for healthy life lost^[2]. With the expected increase in cancer deaths and non-communicable diseases, these costs are expected to rise and impact patient care. World Health Organization (WHO), estimates a 15% increase in non-communicable disease worldwide, with more than 20% increase occurring in Africa between 2010 and 2020^[3].

In Africa, gastric cancer is ranked twelfth most common cancer^[1]. The estimated incidence and mortality rates of gastric cancer in Africa is 4/100000 and 3.8/100000 respectively^[1]. The incidence is higher in men (4.7/100000) than in women (3.3/100000), as is mortality rate at 4.5/100000 and 3.2/100000 respectively^[1]. There is a great deal of variation in reported incidence and mortality within the individual African countries. For instance, in Mali, West Africa, gastric cancer is the most common cancer in men with an incidence rate 21.6/100000 and mortality rate 21.1/100000^[1]. These rates are markedly higher than developed nations such as United States/United Kingdom, yet very scarce published data evaluating etiology, prevention or management exist^[4]. The lack of published reports may have to do with the focus on communicable diseases and less attention to non-communicable disease (NCDs). The variation in reported incidence and mortality within the individual African countries is most likely related to etiology. Recognized carcinogens include diet, infectious agents, inflammatory process or genetic variability^[5]. Low incidence and mortality rates reported for some regions may be due to the limited diagnostic capability and inadequate data recording. Interestingly, gastric cancer in African patients are younger, in their 3rd-4th decade^[6], and present at a late stage of the disease^[7].

It has been recognized that there is an upward trend in NCDs, including cancers within developing nations^[8]. WHO estimates an increase in cancer deaths of 45% between the years 2007 to 2030^[9]. Cancer kills more people than AIDS, tuberculosis and Malaria combined^[10], yet it has received less focus. Understanding risks, etiology and management of gastric cancer impacts the survival outcome. With the increasing westernization of diet, obesity, lifestyle (alcohol and smoking), there is increased risk of gastric carcinogenesis. It is prudent to increase research related to cancer in Africa, including gastric cancer.

INCIDENCE AND MORTALITY RATES

A comprehensive and comparable resource for incidence and mortality rates is the GLOBOCAN database. The Globocan database is part of the International Agency of Research on Cancer-World Health Organization (IARC-WHO)^[1]. Globocan database is one of the world's largest, most reliable and organized incidence and mortality data resources for gastric cancer in Africa, however, it has its limitations^[1]. Globocan recognizes the limitations in data collection. First, the development of the database relies on the cancer registries with the individual countries, which may not capture the realities or may be an underrepresentation of the incidence and mortality rates^[1]. Sec-

ond, some countries do not have a cancer registry thus reliance on data from individual hospitals^[1].

There is significant variation from country to country in Africa with estimated incidence rates as high as 20.3/100000 in Mali to as low as 0.3/100000 in Botswana^[1]. Table 1 details the incidence and mortality rates in Northern, Eastern, Central, Southern and Western Africa. The geographic demarcation is that from the Globocan database recognizing 53 African countries, with the highest incidence and mortality from Eastern Africa 4.7/100000 and 4.6/100000 respectively^[1]. Other countries with high incidence and mortality rates are La Reunion (12.6/100000, 9.3/100000), Western Sahara (11.9/100000, 11.9/100000), Burundi (9.8/100000, 8.4/100000), Uganda (9/100000, 8.7/100000), Rwanda (8.3/100000, 8/100000), Kenya (7.6/100000, 7.3/100000) and Democratic Republic of Congo (7.3/100000, 7.2/100000)^[1]. These rates are higher than Western nations such as United States (4.1/100000, 2/100000) and United Kingdom (5.5/100000, 2/100000), but lower than Eastern nations such as Japan (31.1/100000, 13.5/100000), South Korea (62.2/100000, 22.5/100000) and China (29.9/100000, 22.3/100000). Some African countries with lower incidence and mortality rates are Botswana (0.3/100000, 0.3/100000), Namibia (1.1/100000, 1.1/100000), Lesotho (1.3/100000, 1.3/100000), Equatorial Guinea (1.6/100000, 1.6/100000), Sudan (1.6/100000, 1.8/100000), Malawi (1.7/100000, 1.6/100000), Central Republic of Africa (1.9/100000, 1.8/100000), Swaziland (1.9/100000, 1.9/100000) and The Gambia (1.9/100000, 1.9/100000)^[1].

This variation in reporting may be related to the late patient presentation and lack of cancer reporting systems. It is also unclear if these are autopsy reports or live cases. Some of the differences in the rates can be attributed to the degree of advances in medicine within the country and available expertise. McFarlane *et al.*^[11] conducted a retrospective survey in the Eastern part of Kenya with a population of approximately 1.2 million. The researchers reviewed medical records between 1991-1993, and compared to data from the same area obtained in the 1970s. There was a 10 fold increase in the incidence rate between 1965-1970 and 1991-1993. The authors note that endoscopy services were established in the Eastern part of Kenya in 1980s, which could have impacted diagnostic capabilities. Similar finding of increased gastric cancer incidence over decades in Uganda has been documented but attributed to an increased access to healthcare and endoscopy availability^[11]. In Uganda, East Africa, most recent data shows a seven fold increase incidence of gastric cancer from 0.8/100000 in the 1960s to 5.6/100000^[12]. This has led to development and implementation of guidelines regarding management of patients presenting with dyspepsia^[12].

MANAGEMENT AND OUTCOMES

Initial diagnosis of gastric cancer is typically via an upper endoscopy with biopsy of an abnormal appearing lesion

Table 1 Gastric cancer incidence and mortality rates

	Incidence ¹			Mortality ¹		
	Males	Females	Both	Males	Females	Both
Africa ²	4.7	3.3	4.0	4.4	3.2	3.8
Northern	3.9	2.4	3.2	3.7	2.3	3.0
Eastern	5.6	4.0	4.7	5.4	3.8	4.6
Central	5.3	4.7	4.0	5.2	4.6	4.8
Southern	4.1	2.2	3.0	3.9	1.8	2.8
Western	4.5	3.3	3.8	4.3	3.1	3.7
Asia	25.9	11.7	18.5	18.3	8.9	13.4
North America	5.8	2.8	4.2	2.8	1.8	2.1
South America	17.3	8.4	12.4	14.2	6.9	10.2
Europe	14.5	7.0	10.3	11.3	5.3	7.9
Australia	7.4	3.4	5.3	4.3	2.1	3.1

¹Incidence and mortality are represented as age-standardized rates (per 100000); ²Countries within each geographic region (per GLOBOCAN) is listed below: Africa: Northern: Algeria, Egypt, Libya, Morocco, Sudan, Tunisia, Western Sahara; Eastern: Burundi, Comoros, Djibouti, Eritrea, La Reunion-France, Kenya, Madagascar, Malawi, Mauritius, Mozambique, Rwanda, Somalia, Tanzania, Uganda, Zambia, Zimbabwe; Central: Angola, Cameroon, Central African Republic, Congo, Democratic Republic of Congo, Republic of Congo, Equatorial Guinea, Gabon; Southern: Botswana, Lesotho, Namibia, South African Republic, Swaziland; Western: Benin, Burkina Faso, Cape Verde, Cote d'Ivoire, the Gambia, Ghana, Guinea-Bissau, Guinea, Liberia, Mali, Mauritania, Niger, Nigeria, Senegal, Sierra Leone, Togo; Asia: Eastern: China, Japan, South Korea, Mongolia, Taiwan; South-Eastern: Brunei Darussalam, Cambodia, Indonesia, Lao, Malaysia, Myanmar, Philippines, Singapore, Thailand, Timore-Leste, Vietnam; South-Central: Afghanistan, Bangladesh, Bhutan, India, Iran, Kazakhstan, Kyrgyzstan, Maldives, Nepal, Pakistan, Sri Lanka, Tajikistan, Turkmenistan, Uzbekistan; Western: Armenia, Azerbaijan, Bahrain, Gaza Strip and West Bank (Palestine), Iraq, Israel, Jordan, Kuwait, Lebanon, Oman, Qatar, Saudi Arabia, Syria, Turkey, United Arab Emirates, Yemen; North America: United States, Canada; South America: Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, French Guyana, Guyana, Paraguay, Peru, Suriname, Uruguay, Venezuela; Europe: Central and Eastern: Belarus, Bulgaria, Czech Republic, Hungary, Republic of Moldova, Poland, Romania, Russia, Slovakia, Ukraine; Northern: Denmark, Estonia, Finland, Iceland, Ireland, Latvia, Lithuania, Norway, Sweden, United Kingdom; Southern: Albania, Bosnia, Croatia, Cyprus, Greece, Italy, Former Yugoslav Republic of Macedonia, Malta, Montenegro, Portugal, Serbia, Slovenia, Spain; Western: Austria, Belgium, France, Germany, Luxembourg, The Netherlands, Switzerland.

confirmed by histopathology. Staging options include endoscopic (endoscopic ultrasound, EUS) and radiographic [computed tomography (CT), magnetic resonance imaging, positron emission tomography and abdominal ultrasound], with CT being the most common^[13]. EUS is not an option in most African countries due to the absence of technology and trained personnel, thus radiology is the mainstay of staging. There are also limitations to staging related to patient financial constraints, which impacts overall patient care. Screening modalities (barium study, gastroscopy and serum pepsinogen) have been implemented in high risk Asian countries such as Japan, South Korea, and Taiwan^[14], however these are not part of the management of patients at risk for gastric cancer in Africa. Late presentation plays a significant role in the poor outcome in most African countries; hence increased awareness amongst the general population and more training of healthcare providers have an important role.

After the initial diagnosis of gastric cancer, staging

should be performed to determine next step in management. The staging system evaluates nodal and other organ involvement. Staging extends from 0 to 4, with 0 being localized (also known as carcinoma *in situ*) and stage IV representing metastatic disease to distant organs in the body. This staging has implications on the overall prognosis and treatment plan. With surgical intervention, the 5 year survival outcomes for patients with localized disease are estimated to be 75%, and for those with lymph node involvement the prognosis is poorer, 10%-30%^[13]. Factors impacting outcome can be broadly defined as tumor specific or patient specific. The tumour related risk factors are: stage, grade, size, gastric location of primary tumour, lymph node or vascular involvement^[13]. The patient specific factors are age, gender, co-morbidities and performance status^[13]. Delayed presentation, limited radiotherapy and surgical capability also impact management^[7].

Surgery plays a role in diagnosis, palliative therapy or curative therapy^[12]. The role of surgery as curative modality seems to be limited to patients who present in the early stage^[12,13]. Mabula *et al.*^[15] conducted a retrospective analysis of gastric cancer patients in Kenya, East Africa, evaluating the clinicopathology and outcome over a 4 year period. They enrolled 232 patients, median age was 52, 92% presented in late stage of the disease, 223 (96%) underwent surgery (commonly gastrojejunostomy) as primary treatment, 56 (24%) chemotherapy and 12 (5.1%) radiotherapy^[15]. The post-operative complication and mortality was 37.1% and 18.1% respectively^[15]. The 5 year survival was 32.8%^[14]. Ahmed *et al.*^[16] conducted a retrospective study in Nigeria, West Africa, evaluating clinical pattern, management and outcome of 179 patients. The mean age was 51 ± 6 years, 155 (86%) underwent surgical intervention, (mainly gastrectomies), the overall median survival was 13.6 mo^[16]. For patients who underwent gastrectomy, the one and five year survival were 70.1% and 21.8% respectively^[16]. The post-operative complication and mortality were 43 (27.7%) and 25 (16.1%) respectively^[16]. These studies also highlight significant post-operative complications and mortality, which seem related to the late patient presentation. Table 2 summarizes the treatment, post surgical complications and outcomes of gastric cancer in some African countries.

CONCLUSION

Published data regarding gastric cancer management and outcome within most African countries is scarce. It is plausible that overall incidence and mortality in some nations is lower due to the underreporting and lack of an organized, adequate database. What's clear is the consistency of poor prognosis and lower overall survival rates which are related to advanced stage at diagnosis, lack of disease awareness and limited health access. The increase post-operative mortality could be related to the late/advanced stage at presentation, poor performance status of the patient, and other co-morbidities such as non-communicable disease. The healthcare focus has predominantly

Table 2 Treatment and survival outcome

Country	Year of publication and study design	Author	Sample size	Overall survival	Treatment	Post-operative complication	Post-operative mortality	Incidence and Mortality rate per Globocan
Tanzania	2012, retrospective review	Mabula <i>et al</i> ^[15]	232	5 yr survival: 32.8%	Surgery: 223/232 (96.1%) Chemotherapy: 56 (24%) Radiotherapy: 12 (5.1%)	37.1%	18.1%	2/100000 2/100000
Mali (Abstract, French article)	2012	Dembele <i>et al</i> ^[17]	425	1 yr survival: 15.5%	200 (65%): surgery 105 (34.3%): no surgery 4 (1.3%): chemotherapy	-	-	20.3/100000 19.7/100000
Nigeria	2011, retrospective review	Ahmed <i>et al</i> ^[16]	179	13.6 mo 1 yr post gastrectomy: 70.1% 5 yr post gastrectomy: 21.8% 5 yr survival: 20%	Surgery: 155 (86.6%)	43 (27.7%)	25 (16.1%)	2.2/100000 2.1/100000
Zimbabwe	2011	Chokunonga <i>et al</i> ^[18]	-	-	-	-	-	5.3/100000 5/100000
Nigeria	2010, retrospective	Osime <i>et al</i> ^[19]	-	mortality rate 39.1; 66% died within one year of diagnosis	30.4% presented within in year	-	-	2.2/100000 2.1/100000
Tunisia (Abstract, French article)	2006, retrospective	Arfaoui <i>et al</i> ^[24]	140	26.5 mo, 13 mo and 5 mo after curative resection, palliative resection and without resection	Curative and palliative resection	-	-	-
Tunisia (Abstract, French article)	2004	Ayite <i>et al</i> ^[23]	63	3 mo: 21% 1 yr survival: 7%	-	-	-	4.2/10000000 3.9/100000
Senegal (Abstract, French article)	2003	Fall <i>et al</i> ^[20]	60	Total overall survival : 20%	-	-	-	6.1/100000 5.9/100000
Uganda	2001, prospective, descriptive	Ibingira ^[21]	35	1 yr survival after partial gastrectomy: 39.1%	94.5% presented with advanced cancer, and no curative surgery possible	-	-	9/100000 8.7/100000
Ethiopia	2000, prospective	Johnson <i>et al</i> ^[22]	96	-	90% presented in advanced stage; 40% had resectable lesions	-	18.6%	3.5/100000 3.4/100000

been in communicable diseases, however recent data show an increasing trend of non-communicable diseases such as obesity, hypertension and cardiovascular diseases which impact both the risk and management of gastric cancer in Africa. More research into gastric cancer management and outcomes in Africa, along with training of healthcare providers to improve patient survival is needed.

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P- Reviewers: Carneiro F, Lee SH **S- Editor:** Zhai HH

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ISSN 1007-9327

