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Assessment of the causes of mortality among HIV patients admitted in Morogoro Regional Referral Hospital, Tanzania

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Human immunodeficiency virus (HIV) affects immune system, thereby impairing the normal functions of immune system. Causes of mortality among HIV patients have become more diverse and deaths from AIDS-related diseases have continued to change over the years. This study aimed to assess causes of death among HIV patients admitted in Morogoro Regional Referral Hospital, Tanzania. A retrospective hospital-based study involving 164 HIV patients admitted in the medical wards of Morogoro Regional Referral Hospital from January to September, 2018. Information concerning the causes of death were accessed through the medical records and copies of death certificates. The results showed that out of the 164 HIV patients admitted in Morogoro Regional Referral Hospital from January to September, 2018, 98(59.76%) died due to *Pneumocystis carinii* pneumonia, 31(18.90%) died due to *Cryptococcal meningitis,* 26(15.85%) died due to tuberculosis, 04(2.44%) died due to toxoplasmosis, and 05(3.05%) died due to opportunistic diarrhea. This study has found that the leading cause of mortality among the HIV patients admitted in Morogoro Regional Referral Hospital from January to September, 2018 was *P. carinii* pneumonia followed by *C. meningitis*.

Key words: HIV patients, retrospective, immune system, mortality.

INTRODUCTION

Human immunodeficiency virus (HIV) is a virus that targets and alters the immune system, thereby increasing the risk and impact of other infections and diseases. HIV infection has been identified to be a worldwide pandemic and a major cause of morbidity and mortality for many years now and Sub-Saharan Africa has the highest

burden of disease with 68% of the global burden (WHO, 2010). Advanced HIV has been defined as cluster of differentiation 4 (CD4) count lesser than 200 cells/µl (severe immune suppression) and/or presentation with WHO clinical stage 3 or 4 (Mhozya et al., 2015). Significant effort has been put into scaling up antiretroviral therapy coverage globally, increasing the coverage from 7% in 2003 to 37% in 2008 in Sub-Saharan Africa. Effective antiretroviral therapy reduces HIV-related morbidity and mortality with marked improvement in the survival of HIV-positive persons. Causes of mortality among HIV positive persons have become more diverse and deaths from AIDS-related diseases have continued to change over the years (Patella, 2006). Studies in the past have investigated factors that influence mortality among HIV positive individuals including highly active anti-retroviral therapy (HAART) treatment, late diagnosis and poverty (Wajanga, 2014). Mortality is attached to late initiation of antiretroviral therapy when patients have advanced disease with increased risk of opportunistic infections and immune reconstitution inflammatory syndrome (Muller et al., 2010). According to World Health Organization, a person who is HIV positive can resume a high quality of life with treatment and that 20.9 million people globally were receiving antiretroviral therapy (ART) as of mid-2017.

According to Global AIDS Response Country Progress Report, Dar es Salaam, Tanzania in 2014, approximately 1.4 million people were living with HIV/AIDS representing 6% of Sub-Saharan Africa burden of HIV/AIDS and 4% of all people living with HIV/AIDS worldwide. In 2018, 1.6 million people were living with HIV in Tanzania. This equates to an estimated HIV prevalence of 4.6% (UNAIDS, 2018). In the same year, 72,000 people were newly infected with HIV and 24,000 people died from an AIDS-related illness (UNAIDS, 2018). Tanzania has done well to control the HIV epidemic over the last decade despite the number of HIV-infected individuals. Scaling up access to antiretroviral treatment has helped Tanzania minimize the impact of the epidemic. As a result, between 2010 and 2018, the number of new infections declined by 13% and the number of people dying from an AIDS-related illness halved (UNAIDS, 2018). In 2018, women were heavily burdened by HIV in Tanzania where 880,000 women aged 15 and above were living with HIV compared with 580,000 adult men (UNAIDS, 2018). In 2016 UNAIDS reported, HIV prevalence for women as 5.8% compared to 3.6% for men. In 2012, women aged 23-24 years were also twice as likely to be living with HIV than men of the same age. HIV prevalence among women ranged from 1% among those aged 15-19 years to 10% among women aged 45-49 years (Tanzania Ministry of Health, 2014). This study aimed at assessing various causes of mortality among HIV positive individuals admitted in Morogoro Regional Referral Hospital medical wards from January to September, 2018.

MATERIALS AND METHODS

Study design and setting

This was a retrospective hospital- based study which was conducted in Morogoro Regional Referral Hospital, Tanzania involving HIV positive patients admitted in the medical wards of Morogoro Regional Referral Hospital, Morogoro, Tanzania. Morogoro is the capital of Morogoro region and is in the eastern part of Tanzania.

Sample size

This study involved 164 male and female HIV positive patients admitted in the medical wards of Morogoro Regional Referral Hospital, Tanzania from January to September, 2018.

Data collection tool

Patients' medical records and copies of death certificates were used to access various causes of death among these HIV positive patients. Among the information found in the medical records and were used in this study were age, sex, HIV status and the cause of death. Data were compiled, coded and analyzed using frequency statistics.

Diagnosis criteria for opportunistic infections (OIs)

Pneumocystis carinii pneumonia (PCP) and tuberculosis (TB) were diagnosed using chest radiograph (chest X-ray), *Cryptococcal meningitis* was diagnosed using *Cryptococcal* antigen testing, toxoplasmosis was diagnosed using serologic testing and opportunistic diarrhea through stool analysis.

Ethical clearance

The permission to conduct this study was granted by St. Francis University College of Health and Allied Sciences research and ethical committee. Patients' medical records were handled strictly by the researcher and the patients' identities such as names were not included to protect the confidentiality of the patients.

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Table 1. Age distribution of male and female HIV positive patients.

Age (years)	Male		Female	
	Frequency	Percentage	Frequency	Percentage
10-19	02	2.74	01	1.10
20-29	20	27.40	25	27.47
30-39	22	30.14	26	28.57
40-49	22	30.14	23	25.27
50-59	05	6.85	13	14.29
60-69	01	1.37	01	1.10
70-79	01	1.37	02	2.20
Total	73	100.00	91	100.00

Table 2. HIV positive patients who died due to *P. carinii* pneumonia with respect to their age groups.

Age (years)	Male		Female	
	Frequency	Percentage	Frequency	Percentage
10-19	02	4.08	01	2.04
20-29	12	24.49	14	28.57
30-39	16	32.65	18	36.73
40-49	15	30.61	10	20.41
50-59	02	4.08	03	6.12
60-69	01	2.04	01	2.04
70-79	01	2.04	02	4.08
Total	49	100.00	49	100.00

RESULTS

Out of 164 HIV patients admitted in the medical wards of Morogoro Regional Referral Hospital from January to September, 2108, 73(44.51%) were male. Male HIV patients belonging to age groups 30-39, 40-49 (30-49) had the highest frequency of HIV infection while those in age groups 60-69, 70-79 (60-79) had the least frequency of HIV. 91(55.49%) out of the total of 164 HIV patients admitted in Morogoro Regional Referral Hospital medical wards from January to September, 2018 were female. Female HIV patients belonging to age group 30-39 had the highest frequency of HIV infection while those in age groups 10-19, 60-69 had the least frequency of HIV infection (Table 1).

Male HIV patients in the age group 30-39(32.65%) had the highest mortality due to *P. carinii* pneumonia. However, male HIV patients aged 60-69(2.04%), 70-79(2.04%) had the lowest mortality due to *P. carinii* pneumonia. Out of 49 female HIV patients who died due to *P. carinii* pneumonia, those in the age group 30-39 years (36.73%) recorded the highest mortality due to *P. carinii* pneumonia whereas those in age groups 10-19 years (2.04%), 60-69 years (2.04%) recorded the lowest mortality due to *P. carinii* pneumonia (Table 2).

This study found that out of 12 male HIV patients who died due to *C. meningitis*, the highest percentage (41.67%) were in the age group 40-49 years. However, those in the age groups 10-19 years, 60-69 years, 70-79 years recorded no mortality due to *C. meningitis*. It was found that 19 female HIV patients died as a result of *C. meningitis*. Thus, those in the age groups 20-29 years (26.3%), 40-49 years (26.3%), 50-59 years (26.3%) recorded the highest mortality due to *C. meningitis* (Table 3).

This study found that 10 male HIV patients died due to tuberculosis in which those in the age group 20-29 years (40%) had the highest mortality due to tuberculosis. Medical records showed that 16 female HIV patients died due to tuberculosis. However, female HIV patients belonging to the age group 40-49 years recorded the highest mortality due to tuberculosis (Table 4).

This study found that the leading cause of death among the HIV patients admitted in Morogoro Regional Referral Hospital from January to September, 2018 was *P. carinii* pneumonia (59.76%). Toxoplasmosis was the least underlying cause of death among these HIV patients (Table 5).

Table 3. HIV positive patients who died due to *C. meningitis* with respect to their age groups.

Age (years)	Male		Female	
	Frequency	Percentage	Frequency	Percentage
10-19	00	0.00	00	0.00
20-29	03	25.00	05	26.3
30-39	02	16.67	04	21.1
40-49	05	41.67	05	26.3
50-59	02	16.67	05	26.3
60-69	00	0.00	00	0.00
70-79	00	0.00	00	0.00
Total	12	100.00	19	100.00

Table 4. HIV positive patients who died due to tuberculosis with respect to their age groups.

Age (years)	Male		Female	
	Frequency	Percentage	Frequency	Percentage
10-19	00	0.00	00	0.00
20-29	04	40.00	03	18.80
30-39	03	30.00	04	25.00
40-49	02	20.00	05	31.20
50-59	01	10.00	04	25.00
60-69	00	0.00	00	0.00
70-79	00	0.00	00	0.00
Total	10	100.00	16	100.00

Table 5. Summary of the underlying causes of mortality among the HIV patients (Male and female HIV positive patients).

Causes of death	Frequency	Percentage
P. carinii pneumonia	98	59.76
C. meningitis	31	18.90
Tuberculosis	26	15.85
Toxoplasmosis	04	2.44
Opportunistic diarrhea	05	3.05

DISCUSSION

This retrospective hospital-based study has found out that a total of 164 HIV positive patients were admitted in the medical wards of Morogoro Regional Referral Hospital from January to September, 2018. Out of these 164 HIV positive patients, 73(44.51%) were males and 91(55.49%) were females. Majority of these male HIV positive patients were in the age groups 30-39 years (30.14%), 40-49 years (30.14%). Also, most of the female HIV positive patients were in the age group 30-39 years (28.57%). This study was designed to assess various causes of mortality among HIV patients admitted in the medical wards of Morogoro Regional Referral Hospital from January to September, 2018.

This study has found that male HIV patients in the age group 30-39 years (32.65%) had the highest mortality due to *P. carinii* pneumonia and at the same time female HIV patients belonging to age group 30-39 years (36.73%) recorded the highest frequency of death due to *P. carinii* pneumonia. However, male HIV patients aged 60-69 years (2.04%), 70-79 years (2.04%) had the lowest mortality as a result of *P. carinii* pneumonia and the female HIV patients aged 10-19 years (2.04%), 60-69 years (2.04%) recorded the lowest number of death due to *P. carinii* pneumonia. In general 98(59.76%) out of the total of 164 HIV patients died as a result of *P. carinii* pneumonia. This study has found that *P. carinii*

pneumonia was the leading cause of death among these HIV patients admitted in Morogoro Regional Referral Hospital from January to September, 2018. This is in contrast to a study done in Thailand where 14% of HIV positive patients died due to *P. carinii* pneumonia (Cain et al., 2009).

This study has also found that out of twelve male HIV positive patients who died due to *C. meningitis*, the highest percentage (41.67%) were in the age group 40-49 years and those in the age groups 10-19 years, 60-69 years, 70-79 years recorded no mortality due to *C. meningitis.* Also, it was found that out of nineteen female HIV patients who died as a result of *C. meningitis*, those in the age groups 20-29 years (26.3%), 40-49 years (26.3%), 50-59 years (26.3%) recorded the highest frequency of death due to *C. meningitis* and thus those belonging to age groups 10-19 years, 60-69 years and 70-79 years had no record of death due to *C. meningitis*. Therefore, 31 (18.90%) HIV positive patients in total were found to have died as a result of *C. meningitis* and thus *C. meningitis* was the second leading cause of death among the HIV patients admitted in Morogoro Regional Referral Hospital from January to September, 2018. Past studies conducted among cohorts of HIV positive individuals seen in out-patients clinics have reported *Cryptococcal* disease, tuberculosis, septicaemia, malignancy and HIV wasting syndrome to be the leading causes of death (Lawn et al., 2008). Also, according to a study done in Uganda where 19% of the HIV positive patients died due to *C. meningitis* and 24% died due to tuberculosis (Namutebi et al., 2013).

Tuberculosis is one of the most common causes of death among HIV infected individuals globally (WHO, 2004). It was found that out of ten male HIV patients who died due to tuberculosis, those in the age class 20-29 years (40%) had the highest mortality due to tuberculosis and no death record due to tuberculosis for those in age groups 10-19 years, 60-69 years and 70-79 years. Also, sixteen female HIV patients died due to tuberculosis. However, female HIV patients aged 40-49 years had the record of highest mortality due to tuberculosis. So, 26 (15.85%) HIV patients in total were found from the medical records to have died due to tuberculosis in Morogoro Regional Referral Hospital from January to September, 2018. In contrast to a study done in Thailand where 27% of HIV patients died due to tuberculosis (Cain et al., 2009). Also, a study done in Bugando, Tanzania revealed that 26.6% of HIV patients died due to tuberculosis (Gunda et al., 2017).

Moreover, only one male HIV patient was found to have died as a result of toxoplasmosis and this one patient was in the age group 30-39 years. Also, three female HIV patients died due to toxoplasmosis. In total, 4 (2.44%) HIV patients were recorded to have died due to toxoplasmosis in Morogoro Regional Referral Hospital from January to September.

Furthermore, only one male HIV patient died due to opportunistic diarrhea and this patient was in the age group 20-29 years and also four female HIV patients died due to opportunistic diarrhea. Thus, a total of 5(3.05%) HIV patients died due to opportunistic diarrhea in Morogoro Regional Referral Hospital from January to September, 2018.

Conclusion

This study has found that *P. carinii* pneumonia was the leading cause of death among the HIV positive patients admitted in Morogoro Regional Referral Hospital from January to September, 2018.

CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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