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RESEARCH ARTICLE

PATTERNS OF SUSCEPTIBILITY TESTING OF ANTITUBERCULOSIS DRUGS AMONG PATIENTS ATTENDING TUBERCLOSIS CLINIC IN KAKAMEGA TEACHING AND REFERALL HOPITAL KENYA

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Abstract

Drug Resistance Tuberculosis (DR TB) is a form of tuberculosis infection that is resistance to treatment with Rifampicin and Isoniazid with or without resistance to one or more other drugs used in the first line treatment of tuberculosis (Mitchison, 2012). Kenya is ranked 13th among the 22 high TB burden countries worldwide (WHO, 2013). MDR TB is a global health security risk and carries grave consequences for those affected (WHO, 2014). Its development is associated with high mortality rates and low levels of productivity among workers due to the high cost of care which imposes a heavy economic burden on the nation (Eduardo, 2011). DR TB therefore poses a major challenge to tuberculosis care and control (Ellen & McNerney, 2008). Limited literature talks about the exact prevalence of resistance to anti-tuberculosis drugs in populations with high rates of tuberculosis (WHO, 2015). In addition, only a few isolated cases of multiple drug resistant tuberculosis have been reported in Kenya (Ogaro*et.al.,* 2012). This study aimed at determining the burden of pattern of Drug Restance TB via determination of the prevalence of TB and the gene resistance patterns to the two most commonly used anti-TB drugs; Rifampicin and Isoniazid. A cross-sectional study was conducted among new and re-treatment cases of tuberculosis referral patients in Kakamega county teaching and referral hospital between June and August 2018. A total of 138 patients were enrolled for the study and the health facility TB register questionnaire was used to obtain data on demographic factors of the patients. Data generated was analyzed using the statistical package for social sciences (SPSS) version 22.0 to find case summaries. Descriptive statistical tests were performed on the data including means, modes, percentages, standard deviations and percentiles. Data was then presented in pie-charts, bar graphs and tables. Out of the 138 cases seventy (50.7%) were male and sixty-eight (49.3%) female. All the study cases were new. Twenty-eight (20.3%) of the isolates became positive for MTB. Of these, eight (5.7%) isolates showed resistance to either of the two first line drugs tested while twenty (14.5%) were fully susceptible. None of the isolates tested became positive for Drug resistant tuberculosis. Notably most of

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the resistant cases were found to be among HIV positive patients (4.3%) with (1.4%) of the cases being from HIV negative patients. This study revealed high levels of drug resistance among new cases of untreated patients. This implies ongoing transmission of drug resistant strains in the community.

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Introduction:-

Drug resistance tuberculosis (DR TB) is a form of tuberculosis infection that is resistance to treatment with Rifampicin and Isoniazid with or without resistance to one or more other drugs used in the first line treatment of tuberculosis. The emergence of drug resistant strains of tuberculosis was documented soon after the first tuberculosis drugs became available in the late 1940s (Mitchison, 2012). Resistance to anti-tuberculosis drugs develops naturally through mutations, non-adherence to drugs and inadequate TB treatment (Ogaro et.al 2012). It presents as either primary DR TB or secondary DR TB. Primary DR TB is the development of anti-tubercular treatment in an individual without history of anti-tubercular treatment whereas secondary MDR is the emergence of anti-tubercular resistance during the course of infection and anti-tubercular treatment. DR TB is a global health security risk and carries grave consequences for those affected. WHO therefore called for MDR TB to be addressed as a public health crisis in 2013. In 2013 alone the approximately 480,000 people developed MDR TB worldwide (WHO, 2014) an estimated 29%% of the world's tuberculosis cases occurs in the African region. However, Countries in the sub-Saharan Africa have amongst the highest transmitted rates of MDR TB in the world (Musa.et al., 2008) According to WHO Kenya ranks 15th among 22 high burden tuberculosis countries and estimates that 2.2% of new TB cases have MDR TB

There is limited data available about MDR TB in Kenya with the latest drug resistance surveillance reports by WHO dating back to the mid 1990's. (WHO, 2015) this makes it difficult to determine the exact prevalence of resistance to anti- tuberculosis drugs in a country like Kenya which has a high TB burden. In addition, only a few cases of MDR TB have been reported in Kenya (Ogaro*et.al.,* 2012). This is attributed to very low rate of detection as the diagnostic methods available in public health facilities are still largely based on sputum smear slide microscopy (Ndung'u et.al., 2012) This technique has limitations due to its lack of specificity for mutant TB strains that confer resistance to the approved Mycobacterium tuberculosis (MTB) regimens

Objectives:-

General Objective.

To determine the burden of MDR TB among patients attending Kakamega county Teaching and Referral Hospital

Specific Objectives.

To determine the prevalence TB among patients attending Kakamega teaching and referral hospital.

Materials And Methods:-

This study was carried out in Kakamega County Teaching and Referral Hospital. A cross section study design was used to assess the prevalence and susceptibility patterns to first line anti – TB drugs among TB patients who presented with new and retreatment TB cases in Kakamega provincial Teaching and referral hospital between February 2018 to June 2018. The study population comprised of patients of all genders presenting with new and retreatment cases of Tuberculosis at the Kakamega provincial Teaching and referral Hospital.Consecutive sampling was used to recruit patients to participate in this study.A structured questionnaire was administered to respondents to obtain their demographic information e.g. age, gender, marital status HIV status, education level, occupation and some aspects clinical history for each patient as indicated. The laboratory request form designed by the Ministry of Health for the Stop TB campaign was used to collect data on clinical history of the suspected TB patients. The request form was also used to record results of the GeneXpert system upon completion of the test.The laboratory procedures were carried out by a qualified laboratory technologist who is licensed by the Kenya Medical Laboratory Technologists and Technicians Board. Scientific and ethical approval for this study was obtained from Masinde Muliro University of science and Technology Ethical Review Board to allow the commencement of the study. Permission was then sought from the hospital administration to carry out the study in

the hospital. Patient's informed consent was sought prior to the collection of their sputum sample. Patients were made aware of their freedom to withdraw from the study.

Results:-

Demographic characteristics of the study population.

In this study a total of 138 patients were enrolled, out of these, 28(20.3%) became sputum gene expert positive with 110 (79.7%) becoming negative. Of the study participants, 70 (50.7%) were male and 68 (49.3%) female. The age of patients studied ranged from 1- 94 years Age distribution among the participants was normally distributed with a mean age of 38.0, Median of 35.0, mode of 32 and standard deviation of 19.9. Most study participants 50.7 % were aged 35years and below with 49.3% aged 36 years and above. Notably, of the 138 cases 37(26.8%) were HIV positive, 94(67.6%) were HIV negative and 7(5.0%) had unknown HIV status. All the study participants were new.

Table 1:- First line drugs susceptibility testing stratified by gender, age and HIV status.

CHARACTERISTIC	CATEGORY	MTB NEGATIVE n%	RIF RESISTANT n%	INH RESISTANT n%	FULLY SUSCEPTIBLE n%	TOTAL n%
GENDER	MALE	53 (38.4%)	1 (0.7%)	5 (3.6%)	11 (8.0%)	**70 (50.7%)**
	FEMALE	57 (41.3%)	1 (0.7%)	1 (0.7%)	9 (6.5%)	**68 (49.3%)**
AGE RANGE IN YEARS	< 18	26 (18.8%)	0 (0.0%)	0 (0.0%)	1 (0.7%)	**27 (19.6%)**
	18 – 35	32 (23.2%)	0 (0.0%)	3 (2.2%)	8 (5.8%)	**43 (34.8%)**
	36 – 53	28 (20.3%)	1 (0.7%)	3 (2.2%)	6 (4.3%)	**38 (27.5%)**
	54 – 71	20 (14.5%)	1 (0.7%)	0 (0.0%)	3 (2.2%)	**24 (17.4%)**
	72 – 89	3 (2.2%)	0 (0.0%)	0 (0.0%)	2 (1.4%)	**5 (3.6%)**
	>90	1 (0.7%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	**1 (0.7%)**
HIV STATUS	NEGATIVE	81 (58.7%)	0 (0.0%)	2 (1.4%)	11 (8.0%)	**94 (68.1%)**
	POSITIVE	22 (15.9%)	2 (1.4%)	4 (2.9%)	9 (6.5%)	**37 (26.8%)**
	UNKNOWN	7 (18.4%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	**7 (18.4%)**

Prevalence of TB among patients.

All the 138 cases were subjected to first line susceptibility test using the GeneXpert RIF assay. Out of these 28(20.3%) confirmed to be positive for MTB while 110 (79.7%) were negative for MTB. This gave a 20% overall prevalence of TB among the study participants. Of these 28 cases 17 (12.3%) were male and 11 (8.0%) were female. The age range 18 – 35 years had the highest number of TB positive cases 8%, followed closely by age 36 – 53 years with 7.2% and age range 54 – 71 years had the third highest number of TB cases with 2.9%. Stratification based on

HIV status of patients showed that 9.4% of the MTB positive patients were HIV negative. The highest burden of MTB was among the HIV positive patients 10.9%.

Discussions, Conclusions & Recommendations:-

Prevalence of Drug Restant TB

The emergence of MDR-TB poses an important challenge fortuberculosis treatment and control programs (Ndung'u et al., 2012) Strengthening thesurveillance and analysis of local rates of TB drug resistance can behelpful in the detection and monitoring the effectiveness oftuberculosis programs worldwide. This study was undertaken todetermine the resistance pattern of MTB isolates among patients w in Kakamega. Among the 138 cases tested for MTB and subjected to the sensitivity for first line drugs none of the patients was found to have MDR TB. These results coincide with those of Ombura et.al in coast general hospital where no case of MDR TB was reported among the 258 patients enrolled in the study (Ombura et.al., 2016) However the results differ with earlier studies in Nairobi by Ogaro where Two (0.54%) and 17 (8.54%) strains from newand previously treated patients respectively weremultidrug resistant TB (MDR TB) defined as resistant toat least both isoniazid and rifampicin. (Ogaro et.al 2012). Currently, MDR-TB poses a great threat to global TB control programs, however, in Kenya, the existing efforts at localand national levels tostrengthen TB control can be attributed to the low levels of MDR TB as shown in this study.

Overall burden of TB among patients

The overall burden of TB was 20.3%. The most affected age group was age 18 – 35 years and most infected patients were males 12.3%. These findings compare with earlier studies done by (mwabu et.al.,2017) at Mbagathi Hospital where the prevalence of TB was found to be 22.2% with the most affected age group being 21 – 30 years and the most infected patients being male. These findings also coincide with those of National TB prevalence survey in 2016 which showed that there were higher rates of TB in young men between ages 25-34 (NTLDP,2016). Among the TB positive cases 15 were found to be HIV positive as compared to 13 who were HIV negative. This suggests that broad efforts are needed at controlling TB in people with and without HIV.

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