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RELATIONSHIP BETWEEN DETECTION RATE OF TUBERCULOSIS IN HIV POSITIVE AND HIV NEGATIVE INDIVIDUALS

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ABSTRACT

In this paper, we investigate the relationship between Tuberculosis detection rate in HIV positive and HIV negative individuals.

Keywords: *HIV/AIDS, Tuberculosis, Detection rate.*

1.1 INTRODUCTION

Tuberculosis (TB) is a bacterial infection of the lungs (pulmonary tuberculosis) caused by bacterium Mycobacterium tuberculosis. It can also affect the central nervous system, the lymphatic system, the brain, spine and the kidneys. Only people who have pulmonary TB are infectious. One-third of the world's population is currently infected with the TB bacillus and new infections are occurring at a rate of one per second (WHO, 2007).Tuberculosis has a vaccine called BCG. Children are vaccinated with BCG at an early age. This has the effect of introducing the bacteria into the system making the child a latent slow rate case. Currently, one of the defining criteria for suspecting tuberculosis is cough for two weeks or more.

1.1.1THE MILLENNIUM VILLAGES PROJECT

The primary objective of the Tuberculosis (TB) Initiative of the Millennium Villages Project (MVP) is to assist local teams in reducing the impact of TB. This can only be accomplished by improving case detection rates and increasing treatment success rates in order to eventually decrease transmission and case-fatality rates.

1.1.2 Definition

The term "case detection", as used here, means that TB is diagnosed in a patient and is reported within the national surveillance system, and then to WHO. The case detection rate is calculated as the number of cases notified divided by the number of cases estimated for that year, expressed as a percentage.

Due to significant global efforts in case detection, TB patients are identified more quickly today, and are thus able to receive treatment.

• Globally, the case detection rate of new TB cases under DOTS increased from 11 percent in 1995 to 63 percent in 2007.

• The target set by the World Health Assembly in 1991 to detect 70 percent of new TB cases under DOTS programs by the year 2000 was achieved in 2007 in the Americas (73 percent) and the Western Pacific (77 percent), and the target was close to being met in Southeast Asia (69 percent). In Africa, the Eastern Mediterranean, and Eastern Europe, case detection has also been scaled up but remains below 70 percent. (WHO 2009)

1.1.3Associated terms

Smear-positive: TB case where TB bacilli are visible in the patient's sputum when examined under the microscope.

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New case: TB in a patient who has never received treatment for TB, or who has taken anti-TB drugs for less than one month.

DOTS: the internationally recommended approach to TB control, which forms the core of the Stop TB Strategy [1]. The five components of DOTS are (a) political commitment with increased and sustained financing, (b) case detection through quality-assured bacteriology, (c) standardized treatment with supervision and patient support, (d) an effective drug supply and management system and (e) monitoring and evaluation system, and impact measurement. In countries which have adopted the DOTS strategy, it may be implemented in all or some parts of the country, and by all or some health-care providers. Only those TB patients notified by health-care facilities providing DOTS services are included in this indicator.

Notification: the process of reporting diagnosed TB cases to WHO; the data collected by this process. (Here we are not referring to the systems in place in some countries to inform national authorities of cases of certain "notifiable" diseases.)

1.1.4 MDR-TB and XDR-TB

Multidrug-resistant tuberculosis (MDR-TB) is a form of tuberculosis that is resistant to at least isoniazid and rifampicin, the two most powerful first-line anti-TB drugs. The World Health Organization (WHO) defines extensively drug resistant TB (XDR-TB) as MDR-TB plus resistance to any fluoroquinolone and at least 1 of 3 injectable second-line drugs capreomycin, kanamycin

1.1.5 Isoniazid Preventive Therapy (IPT)

Isoniazid (also called isonicotinyl hydrazine or INH) is an organic compound that is the first line antituberculosis medication in prevention and treatment. In 1951, it was discovered that isoniazid was effective against TB. Isoniazid is never used on its own to treat active tuberculosis because resistance quickly develops. Isoniazid is used in the treatment of mycobacterial infection. Studies in the late 1980s and 1990s found that TB \preventive therapy" (treatment of latent TB infection) reduced TB incidence among HIV-infected persons, at least among those with positive tuberculin skin test results.

The tuberculin skin testing is the major method of diagnosing the tuberculosis infection. When the test result is positive it implies there is tubercle bacilli. It is normally used to distinguish infected individual from the exposed individual without infection. The infected individuals will then be put on the DOT strategy in order to reduce infections and also treat the disease.

1.1.9 Treatment

To estimate the detection rates q (the detection rate of TB in HIV negative individual) and q* (the detection rate of TB in HIV positive individual), we consider the situation in 2011 a rural area in Kenya. Adult population was estimated to be 15,208. The estimate for the prevalence of HIV-negative people with undiagnosed TB was 10/900 and that of HIV-positive people with undiagnosed TB was 19/900**.**

Now let;

$\pi_0 + \pi_1 =$Number of HIV negative people who have TB

$\pi_2 + \pi_3 =$ Number of HIV-positive people who have TB

Therefore from the information given above we obtain;

$\pi_0 + \pi_1 \approx 15208 \times 10/900 \approx 169$

- $\pi_0 + \pi_1 \approx 15{,}208 \times 19/900 \approx 321$

This reference also indicates that the number of TB notifications was 300 in 2011. Of these 90 were HIV-negative and 150 were HIV-positive. We finally evaluate the detection rates from the following equations as;

$q(\pi_0 + \pi_1) \approx 90$

$q^*(\pi_2 + \pi_3) \approx 150$

Hence

$q \approx 0.532$/year

And

$q^* \approx 0.467$/year.

CONCLUSIONS

Detection rates for TB is still low in the rural areas and an improvement will go along way in assisting in combating the effect of TB /HIV co-infection.

Taking into consideration the still increasing prevalence of TB/HIV co-infection, it may pay off to screen for TB regardless of cough duration, if we really intend to eradicate TB by year 2050 (WHO 2007).

Screening, regardless of cough duration will accelerate early TB case detection and treatment. This is critically important especially for individuals co-infected with HIV/AIDS, as it will reduce morbidity and mortality. In addition, it could shorten the duration of TB transmission, as it might reduce diagnostic delays, since whoever is coughing will be immediately investigated for TB. Increasing TB detection rates could be achieved by actively searching for TB cases instead of waiting for them to come to a clinic.

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