

A REVIEW ARTICLE ON OVERVIEW OF ANTIMICROBIAL RESISTANCE

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ABSTRACT

Antimicrobial is a substance includes antibiotic, antifungal, antiparasite, antiviruses, that use for the prevention, treatment, of diseases, history of antimicrobial by Egyptians scientist and classification of antimicrobial in a tabular form and some pathological condition related to antimicrobial resistance e.g tuberculosis, urinary track infection, Typhoid, some key point regarding antimicrobial resistance, and Image related all antimicrobial resistance showed and some mechanism causes of resistance antimicrobial agent, definition of antimicrobial resistance, is an occur when bacteria, fungi, viruses, parasite, change over period and longer response spread, severe illness and death, and factors that influences all antimicrobial resistance and world health organization response regarding antimicrobial resistance, that aims to guide policy makers researchers funder to implementing partners industry, civil society in generating new evidence to inform antimicrobial resistance, and take some review data analysis and graphical showed from region word areas percentage of mortality rate by 2050 AMR, and how to control antimicrobial resistance, by environmental hygiene control and follow medical professional instruction before taken antibiotics, due to avoided risk of resistance of antimicrobial also conclusion properly environmental sanitation, using antibiotic by medical professional prescribed, make sure keep diagnosis before start given antibiotics, if reduce the risk factors of resistance antimicrobial agent.

Keywords: Antimicrobial, Antifungal, Antiparasite, Antiviruse.

INTRODUCTION

Antimicrobial – including antibiotics, antivirals, anti fungal and anti parasitic – all are medicines used to prevent and treat infections in humans, animals and plants infection, Despite proposal initiatives in recent decades, the world has failed to keep proper action its so called antimicrobial resistance(AMR) any antibiotic use contributes to have no effect. AMR is thus an unavoidable phenomenon undermine the effectiveness of basic and modern medicine and is effecting people from birth to death¹⁻⁵.

Antibacterial Strategic based on metal uptake the rise antibiotic resistance require new strategic to development novel antimicrobial give that bacteria require metal metal uptake for their survival and proliferation drug that target these uptake path way are a promising approach the pert how specific metal uptake path way bacteria can used and provides examples of antibiotics that use this strategy ⁴⁻⁶.

Also antimicrobial resistance (AMR) poses a serious global threat of growing concern to human, animal and environmental health this due to the emergency spread and persistence of multi drug resistance (AMR) bacteria or super bugs MDR bacteria exist across the animal, human an environmental triangle or niche and there is interlinked sharing of these pathogens in this triad ⁷.

History

Antimicrobial was practice use almost 2000 years, ancient for treat infection.

In 19th era, microbiologist such as Louis Pasteur and Jules Francois Joubert analyzed antagonism between some bacteria and discussed the merits of controlling these interaction in medicine.

the Alexander Fleming on September 3,1928 was isolated staphylococcus separated in to colonies do to the antimicrobial fungus penicillium rubens.

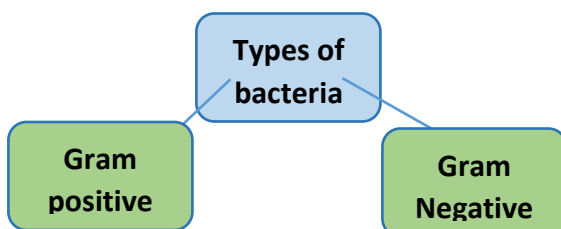
Classification of Antimicrobial Agents ⁸⁻¹⁰

- a) Antibacterial
- b) Antivirus
- c) Antifungal
- d) Anti parasite
- e) Disinfectants:- Is a agent used destroyed microorganism in non living surfaces.

e.g chlorine, calcium, phenol, quaternary ammonium compound. etc

f) Antiseptic:- Is also applying by living surfaces or during surgery to reduce the infection. e.g Hydrogen peroxide, isopropyl alcohol, chlorhexidine etc

Antibacterial : It is an agent that used for the kill or inhibit the growth of bacteria sp



Spectrum activities

- i. Narrow spectrum
- ii. Broad spectrum

Mode Of action

- a. Bacteria static
- b. Bactericidal

Pathological condition related to antibiotics.

- 1) Typhoid
- 2) Tuberculosis (TB)
- 3) Urinary Track Infection (UTI)

Typhoid : Is an infection that spread through contaminated food and water, cousin by salmonella typhi that change the physiological function of the body ¹³⁻¹⁵.

Symptoms:

High fever, headache, abdominal pain, weakness, vomiting, loose of stools.

Treatment

Ciprofloxacin, amoxicillin, Ceftriaxone, chloramphenicol, Cotrimoxazole. These are resistance for the typhoid fever, occur if the bacteria change in repose to use of these medicine.

Tuberculosis: serious condition course by mycobacterium, primary attack lungs that change the physiological function of the body ¹¹⁻²⁰.



Figure 1 TB Primary attacking lung

Symptoms

Fatigue, fever, loose of appetite, weigh loose, dry cough with blood, shortness of breath, swollen lymph nodes.

Types Of Tuberculosis

- a. Pulmonary TB
- b. Skeletal TB
- c. Brain TB
- d. GIT TB
- e. Miliary TB

Treatment Of Tuberculosis

First line drugs:

Rafampin ,isoniazid,ethambutol,pyrazinamide, streptomycin.etc

Second line drugs

Levofloxacin, Moxifloxacin, Amikacin, Bedaquiline, Cycloserine, kanamycin etc.

Urinary Track Infection: is a serious infection course by E.coli bacteria usually attack upper and lower urinary track.

- i. Upper urinary track: kidney
- ii. Lower urinary track: bladder

Symptoms

Pelvic pain,increased urge to urinate,pain with urination and blood in urine,

Kidney infection

Back pain, nausea,vomiting, fever.

Treatment Of Urinary Track Infection

Fluoroquinolone,penicillin,Cotrimoxazole,tetracycline,cephalosporin, amoxicillin.etc

Antimicrobial resistance (AMR):

Is an occur when bacteria, fungi,viruses, parasites, change over period to the medicines making infections harder to treat and increasing the risk of diseases spread,severe illness and death ²¹⁻²³.

Key point

Resistance (AMR) is world health and development threat.

WHO was declared (AMR) is part of top 10 world public health Lack of clean water and proper sanitation Without effective antimicrobial the success of modern medicine in treating diseases,including major surgery and cancer chemotherapy,would be at increased risk ²⁴⁻²⁸.

Why antimicrobial resistance?

Antimicrobial mostly resistance naturally, genetically occur, and lack of proper used antimicrobial especially antibiotic, over used one class of antibiotic, escaped dose, environmental and sanitation hazard ²⁹⁻³³.

Antibacterial resistance such as antibiotics

Example anti TB drugs Rifampin

Is a anti TB drug broad spectrum used combine drugs treatment due to avoided resistance e.g isoniazid, ethambutol, pyrazinamide ³⁴⁻³⁵.

Was discovered in 1965, marketed in Italy in 1968 approved in united state in 1971.

Mechanism of action

Rifampin usually inhibit bacterial DNA and dependent RNA polymerase.

Resistance Rifampin:

Is a broad subject not the mechanism of clinical resistance ,nearly always due to genetic change in the β sub unit bacteria RNA Polymerase.

In particular mycobacterium Tb interestingly ,change in the same codons of the consensus ³⁶⁻³⁸.

Side effect ³⁹⁻⁴⁰

hepatotoxicity,itching, flushing, drowsiness,headache,difficulty concentration,etc.

Note: before given Rifampin should being test the liver function and amount of blood in the body.

WHO agenda for antimicrobial resistance in human health prioritizes almost 40 research topic for evidence generation inform policy by 20230.

It aims to guide policy makers researchers founders, to implementing partners industry civil society in generating new evidence to inform antimicrobial resistance policies and intervention as part of efforts to address antimicrobial resistance in the human health, especially infection cause by WHO bacteria pathogen and WHO fungal pathogen with critical importance for antimicrobial resistance such as candida auris and Drug resistance treatment of mycobacterium tuberculosis ⁴¹.

Table 1 : Mortality Rate By 2050 (AMR) Region Area Worldwide

S/n	Region areas of (AMR)	Amount of resistance	% Of resistance
1	Asia	4,330,00	80%
2	Africa	4,150,00	75%
4	Latin American	392,000	64%
5	North American	317,000	55%
6	Oceania	22,000	35%

Different regions area percentage of antimicrobial resistance mortality rate by 2050 by used region area of the worldwide and taken the percentage of the resistance of antimicrobial at the difference region areas worldwide that is in mortality rata by 2050, the region areas of the worldwide are below:

1. Asia
2. Africa
3. Europe
4. Latin American
5. North American
6. Oceania

All these are part of the region that antimicrobial resistance, but any regions have different antimicrobial that highly resistance in their areas ³⁹.

Asia : Asia have issues of streptococcus pneumoniae have be found in Asia country, particularly erythromycin resistance increases dramatically many in Asian countries 75%.

African: African have issues of Ampicillin 84.5% and Cotrimoxazole 68.5% among the Gram negative bacilli (30) Gram positive cocci show resistance to Nalidixic acid (81%) and with E.coli showing high as 84% resistance to ampicillin and 68% to Cotrimoxazole.

Europe: Escherichia coli resistance to major antibiotic is increases in almost all countries in Europe.

Latin American:Latin American have issues resistance of carbapenem resistance according to the surveillance data from Latin American.

North American: by data pointed out that have issues of fluoroquinolone resistance of E.coli has be reported in 92 member state out of 194 and 5 out of 6 WHO global regions.

Oceania: according to the 2014 surveillance reported based on 2011/12 data,resistance of K pneumoniae isolated third generation cephalosporin in Kiribati was 1% ,only one reported of carbapenem resistance was identified and in o.7% isolated from hospital,also salmonella spp studied about typhoidal salmonella

was from eastern Highland province 58%(22/38) of isolates were resistant to chloramphenicol, 37% (14/38) to kanamycin, 53% (20/38) ampicillin.

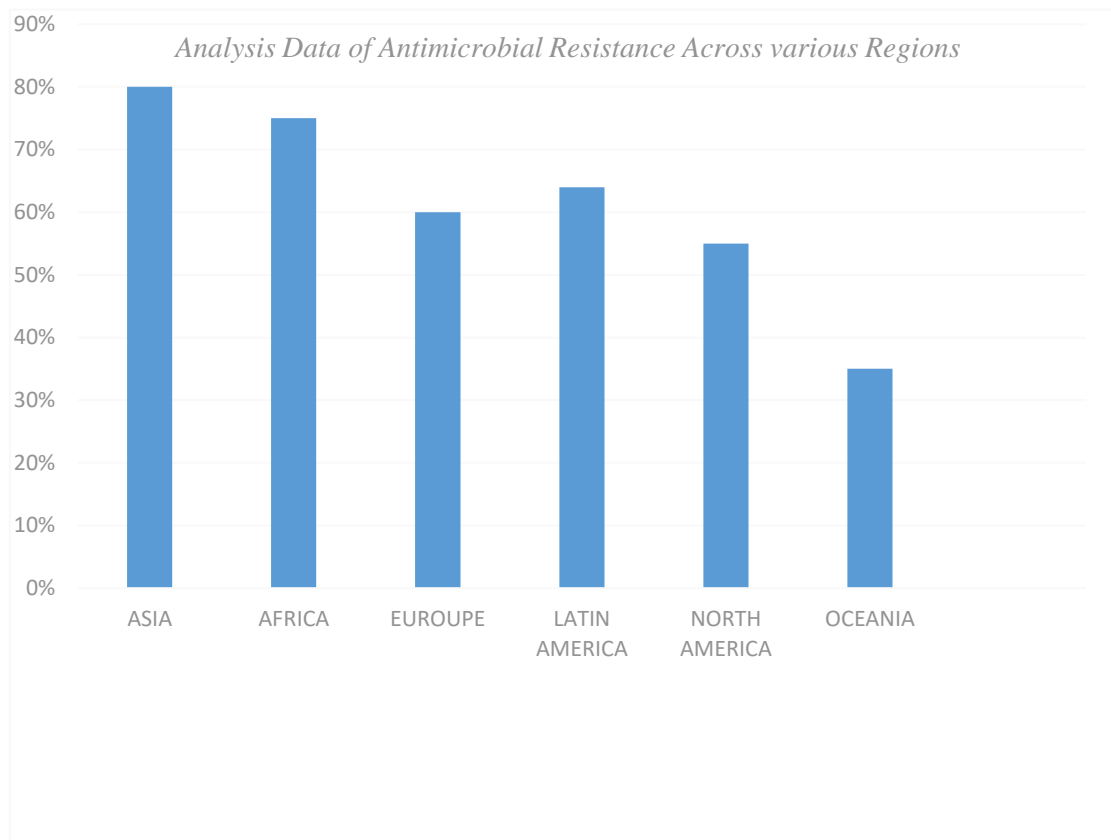


Figure 2 Chart for Analysis Data of Antimicrobial Resistance Various Regions

Control Of Antimicrobial resistance

- i. Use Of antibiotic by a certified health professional
- ii. Never demand antibiotic if your health workers say you don not need them
- iii. Always follow your health workers advice when using antibiotics
- iv. Environmental hygiene

Prevention Of Antimicrobial Resistance(AMR) ⁴⁰

- a. Screening for diagnosis
- b. Antibiotic prescribed by the patient required
- c. Follow antibiotic guideline
- d. Infection control e.g antiseptic, hand hygiene,use personal protective equipment and cleaning equipment room
- e. Antibiotic come under schedule H so avoid use as OTC medicine

Conclusion

Make sure to control environmental sanitation and follow instruction of medical professional during prescription, also don't take any antibiotics without diagnosis that is proper investigation of actual pathological Diseases in the patient body, and avoid safe medication.

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