STUDY ON ANTIBIOTICS AND THEIR DISPENSING CONTROL IN TRIPOLI PHARMACIES

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ABSTRACT—This research paper is based on studying the method of dispensing different antibiotics in the Tripoli city that used in treatment of infection through pharmacies in Tripoli, meaning do you know which antibiotics are prescribed by a specialist doctor or are they dispensed without a medical classification and according to patient's request or are the two previously mentioned methods of dispensing antibiotics dependent **?**

Through this study, it is necessary to emphasize the dispensing of antibiotics in one way, which is the medical prescriptions approved by the specialist doctor after detected of bacterial infection or disease, and determined the legal and ethical responsibility for infringement these laws and warnings due to some antibiotics has bad action can range from headache and nausea to fever. Also the dispense of antibiotics without prescription and in random quantity increase the probability of bacterial resistant to antibiotic, this lead to decrease pharmacological activity of antibiotics .

KEYWORDS—Antibiotic, Infection, Bacteria, Disease, Effect**.**

Figure 1: Antibiotic dispensing.

INTRODUCTION— Antimicrobial agents are compounds dispensing by pharmacists. see above fig. 1. That good action in the treatment of infections. The action to kill or inhibit an growth of microorganism without bad effects on the host. [1-3] Main Antibiotics are compounds produced by various types of microorganisms (Bacteria, Fungi) that inhibits the bacterial growth and also other microorganisms to killing them [4-6] . The most antibiotic extends to include synthetic antibacterial agents or antibiotics such as Quinolones and Sulphonamides. [5-13] fig. 2.

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Figure 2: Pharmacological forms of antibiotics.

I- MISUSE OF ANTIBIOTICS: Antibiotics are among the most significant medical discoveries of the 20th century. They have saved millions effectively. However, the misuse and overuse of antibiotics have become a global health problem, leading to antibiotic resistance, increased healthcare costs, and higher mortality rates. Understanding the causes, consequences, and solutions to antibiotics misuse is crucial for protecting public health.

***A- Main Causes Of Antibiotics Misuse*:**
1) Over prescription by doctors- sometimes antibiotics are prescribed for viral infections like colds or flu, where they have no effect.

2) Self-medication- many people use antibiotics without medical advice, either leftover from previous treatments or purchased without prescription.

3) Incomplete course - patients often stop taking antibiotics once they feel better, instead of completing the full course.

4) Use in agriculture - antibiotics are widely used in animals to promote growth and prevent disease, contributing to resistance in humans.

***B- Consequences Of Antibiotic Misuse*:**
1) Antibiotic resistance-bacteria evolve and become resistant, making infections harder to treat.

2)Treatment failure-common infections may no longer respond to standard drugs.

3) Increased healthcare costs - resistant infections require longer hospital stays and more expensive medicines.

4) Global health treat- resistant bacteria can spread quickly across borders.

***II- ANTIBIOTICS MECHANISM OF ACTION*:**
Mechanism of action is depended on two effects**:**

A- Bactericidal, these agents kill the bacteria. e.g. Penicillin's [12-15].

B- Bacteriostatic; they inhibit the growth of bacteria, lead to decrease the spread of infection, eliminate and immobilize the pathogens. Example of Bacteriostatic agents is Sulphonamides. [8-21] fig. 3.

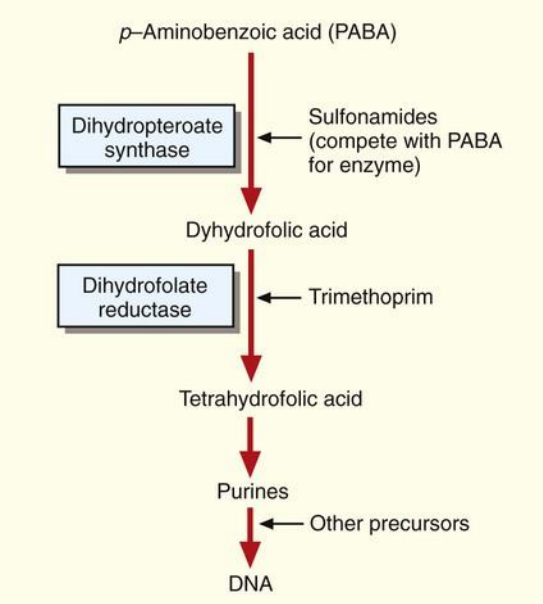

Figure 3:Mechanism of action of antibiotic.

ANTIBIOTICS RESISTANCE: *Heavy use of antibiotics specially without prescription lead to bacterial resistance.* Resistance of the bacteria to antibiotics may develop in which the organism adapt genetically to changes in their environment [17-20]. fig. 4.

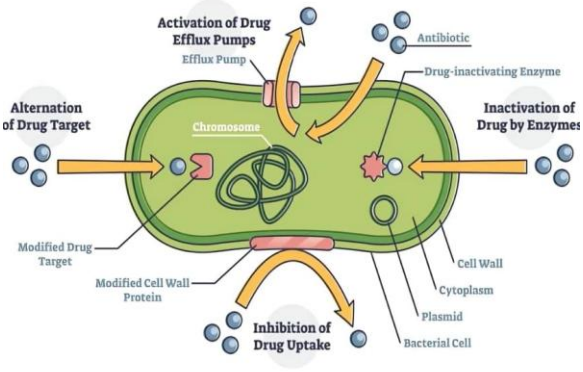

Figure 4:Resistance mechanism of antibiotics.

SIDE EFFECTS OF ANTIBIOTICS.

A- Mild To Moderate Effects: nausea and vomiting**,** headache and mental depression, cyanosis (less alarming than it looks)**.**

B- Serious Effects: hepatitis**,** hypersensitivity reactions (rash**,** fever**,** and may cause anaphylactic reaction)**,** bone marrow depression and Crystal-urea (due to precipitation of acetylated metabolites in urine) which can be prevented by giving plenty of fluids and keeping the urine alkaline**.**

Most antibiotics when administered without prescription and in large doses can causes many side effects. See fig. 5.

Side Effects of Antibiotics

Antiblotic	Most Common Side Effects	Additional Side Effects / Notes
Penicillins (Penicillinn, Amoxicillinn)	Skin rash, diarrahea, nausea, stomach pain, vomiting, fever, allergic reaction	Allergic reactions that may occur even with other B-lac-tam antibiotics. Consult. a doctor it a rash viching, or zwelling occurs.
Cephalosporins (Cefumime, Celirixe, Cefotaximen)	Skin rash, diarrahea, nausea, vomiting, headache	Can cause allergic reactions similar to penicillins. Long-term use may cause kidney and liver toxicity,
Carbapenems (Meropenem, Imipenem)	Diarrhea, loss, kidney toxicity, dizziness, allergic reaction, rash, itching	Risk of "Red Man Syndrome" if injected rapidly. Caution in mien. with prot-state chlargement.
Aminoglycosides (Glycopeptides)	Red man syndrome (flushing, itching, rash), nausea	Can increase heart arrythymia in elderly patients. Should not be used with statins (e-g.,simvastatin).
Glycopeptides (Meromenycin)	Diarrhea, nausea, vomiting, stomach pain, loss of apetie	Avoid during pregnancy. and in shildren <8 years (rise of footh discoloration and inhibition of bone growth)
Macrolides (Erythromycin)	Nausea, vomiting, diarrhea, stomach pain, tooth discolo-	May cause tendon rupture (especially Achilles tendon).
Tetracyclines (Telcoplanin)	Nausea, vomiting, ymiting, headache, stomach pain, dizziness	May interact with aniid-epressants (SSRis). risk of serotoin syndrome.
Quinolones (Nitraimidazole Tinidazole)	Nausea, vomiting, diarrhea, stomach pain, stomin pain, dizzirnis	Avoid alcohol during use and up to 3 days after (disulfiram-like reaction)
Sulfonamides (Sulfonamides	Nausea, vomiting, diarrhea, stomach pain, skin rash	May cause kidney stones. Drink plenty of water,

Figure 5: Side effects of antibiotics.

III- THE AIM OF THIS STUDY: A- to establish an methods of antibiotic dispensing in pharmacies of Tripoli.

B- To appear the percentage of antibiotics dispensing through the over- the- counter drugs (OTC), prescription- only medicines (POM) and both of them in Tripoli pharmacies**.**

MATERIALS AND METHODS*— sampling and Study design* — A pre-verified questionnaire containing many questions was prepared to be used in the study. A total of (540) questionnaires were distributed on randomly selected (30) pharmacies in Tripoli city. Cross -sectional study is idea of my descriptive questionnaire and was conducted for some weeks from May to July 2025**.**

DISTIBUTION AND QUESTIONAIRES DEVELOPMENT—in this study, The interview questionnaire was prepared into two sections The first section include items about the pharmacy

characteristics (Address-pharmacy name -pharmacist name). The second section was include (3) questions about to prescribed methods used with dispense different types of antibiotics in Tripoli pharmacies. Data collection was done through a face to face interview of pharmacists.

Analysis Of Data— for data analysis and collection, Microsoft Excel 2016 was used. Categorical variables were assessed using percentages and frequencies.

RESULTS— We conducted this study, which monitored the methods of dispensing antibiotics, whether with or without a prescription, and we obtained the results of the study, as we explained in table (1). We acknowledge that this study includes only the city of Tripoli, as we included in our study (30) pharmacies randomly within the geographical scope of the city of Tripoli, and our study does not include the entire Libyan state.

After collection of A total of (30) pharmacies answered the questionnaire, was resulting the percentage of pharmacies dispensing antibiotics only by prescription (POM) is (70.2%), and percentage of pharmacies dispensing antibiotics without prescription (OTC) is (4.9%), and both of above is (24.9%). See Figure 6.

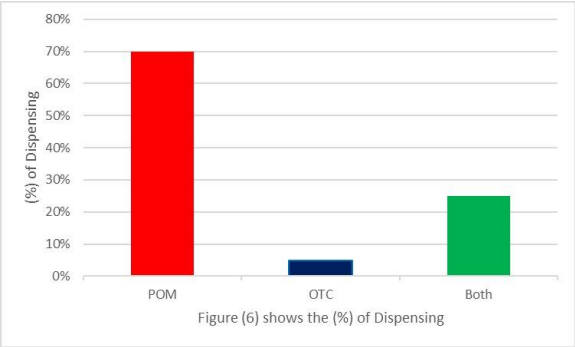

Figure 6: Shows the (%) of antibiotics dispensing

In table 1, By following up on (30) pharmacies in different areas of Tripoli City and the methods used to dispense (18) antibiotics in these pharmacies, include prescription- only medicines (POM) meaning with prescription only or over- the-counter medicines (OTC) meaning without prescription or (both) of above**.**

From previous results, why do Pharmacies require prescriptions to dispense antibiotics? because, - to preventing antibiotic resistance, - Ensuring accurate diagnosis, - Protecting patient health, - public health considerations.

So, Pharmacies require prescriptions for antibiotics to protect both individual and public health. This regulation ensures that antibiotics are used only when necessary, in the correct way, and under professional supervision. Without such measures, the world would face an even greater threat from antibiotic resistance, making common infections potentially life threatening again. By following prescription rules, society can preserve the effectiveness of antibiotics for future generations. Pharmacists in Tripoli pharmacies were the main source of getting knowledge on different methods of antibiotics dispensing.

DISCUSSION— The results of this study, which was conducted in the city of Tripoli, showed the most pharmacies are committed to dispensing antibiotics through a prescription approved by a specialist doctor. this can be linked to the broader global problems, [14]. As the entire world suffers from the problem of citizens desire to buy and take antibiotics without going to a specialist doctor and without a prescription 9-18]. This leads to an increase in bacterial resistance to antibiotics specially with heavy use of antibiotics, and other side effects, and therefore it is necessary to dispensing of antibiotics only by prescription. [10-19]. See table 1.

Antibiotics are very important for treating many diseases and bacterial infections, but dispensing them without a prescription in an excessive and unregulated manner leads to several problems, the most important of which are resistances [2-16].

Table 1: Knowledge the methods of medicines or - drugs dispensing in Tripoli pharmacies

Pharmacies questions	Number of pharmacies	Percentage of dispensing
What are the methods of dispensing of Metronidazole T.	14-----POM 1-----OTC 15------Both	46.6% 3.3% 50%
What are the methods of dispensing of Sulphonamides T.	30-----POM 0------OTC 0-------Both	100% 0% 0%
What are the methods of dispensing of Trimethoprime T.	30------POM 0------OTC 0-------Both	100% 0% 0%
What are the methods of dispensing of Augmentine tablet.	3-------POM 8--------OTC 19------Both	10% 26.6% 63.3%
What are the methods of dispensing of Ciprofloxacine T.	15-------POM 3------OTC 12------Both	50% 10% 40%
What are the methods of dispensing of Tetracycline tablet.	26------POM 1-------OTC 3-------Both	86.6% 3.3% 10%
What are the methods of dispensing of Erythromycine T.	29-------POM 0--------OTC 1--------Both	96.6% 0% 3.3%
What are the methods of dispensing of Azithromycine tablet.	6------POM 4-------OTC 20-------Both	20% 13.3% 66.6%
What are the methods of dispensing of Chloramphinicole T.	27-------POM 0--------OTC 3--------Both	90% 0% 10%
What are the method s of dispensing of Cloxacillin tablet.	27-------POM 0--------OTC 3-------Both	90% 0% 10%
What are the methods of dispensing of Ampicillin tablet.	13------POM 2-------OTC 15------Both	43.3% 6.6% 50%
What are the methods of dispensing of Amoxicillin tablet.	2-------POM 6-------OTC 22-------Both	6.6% 20% 73.3%
What are the methods of dispensing of Cephalosporin T.	30------POM 0------OTC 0------Both	100% 0% 0%
What are the methods of dispensing of Clarithromycine T.	25-------POM 1-------OTC 4-------Both	83.3% 3.3% 13.3%
What are the methods ofdispensing of Clindamycine T.	29--------POM 0-------OTC 1-------Both	96.6% 0% 3.3%
What are the methods of dispensing of Septine tablet.	30------POM 0-------OTC 0--------Both	100% 0% 0%
What are the methods of dispensing Chloramphenicole T.	19------POM 1------OTC 10-------Both	63.3% 3.3% 33.3%
What are the methods of dispensing of Gentamycin topical.	17------POM 1-------OTC 12-------Both	56.6% 3.3% 40%

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IV-- The Main Four Types Of Microbial Resistance To Antibiotics Development:

A) Multi-drug resistance and pan-resistance.

B) Cross-resistance.

C) Acquired resistance.

D) Natural (intrinsic, Structural) resistance. [7-11]

Shown above in Fig. 4.

V- Main Solutions Of Antibiotic Misuse :

A) Public awareness campaigns -educating people about the danger of misuse.

B) Stricter prescription polices - ensuring antibiotics are only available with a valid prescription.

C) Surveillance and research -monitoring resistance patterns and developing new antibiotics.

D) Alternatives to antibiotics-using vaccines, pro-biotic, and improved hygiene to reduce infections.

E) Responsible agricultural use- limiting the use of antibiotics in farming.

CONCLUSION— The misuse of antibiotics is a serious and growing problem that threatens global health. Without immediate action, common infections could once again become deadly, Governments, healthcare professionals, and the public must work together to ensure antibiotics are used responsibly, preserving their effectiveness for future generations. So,

1) This study is very important to appear antibiotics misuse and found method of antibiotics dispensing in Tripoli pharmacies indicate to majority of its pharmacists, with (POM) being the essential and commonest method of despising for antibiotics dispensing.

2) Through these percentages, shown in the results of the study, it is clear that most pharmacies in the Tripoli city depend on dispensing antibiotics with a prescriptions (POM) and not through direct request from the patient, and this percentage is (70.2 %), this leads to decrease many health problems.

3) The results show despising of some antibiotics through the direct request of patient (4.9%), by (OTC) method.

4) Through these percentages, shown in the results of the study, it is clear that most pharmacies in the Tripoli city also depend on dispensing antibiotics with both of them , meaning by direct request from the patient (OTC) , and by a prescriptions (OPM) , this about (24.9%). Shown in above Fig. 6.

5) Because taking the necessary precautions prevents the dispensing of antibiotics and do not dispense them without a prescription, whatever the reasons.

6) The occurrence of side effects and other problems with antibiotics resistance are urgently linked to dispensing the drug (antibiotics) without a prescriptions. (OTC).

REFERENCES—1) Aseel Mahmood Jawad, Nagham Mahmood Aljamali., Jawad, S. M ., Mj, A., and MJ, S. (2020). Development and preparation of Ciprofloxacin. drug derivatives for treatment of microbial contamination in hospitals and environment. Indian journal of forensic medicine and toxicology. [Vol. 14, no. (2), pp. 1115-1122].

2) Azeez, H. M., and Nagham Mahmood Aljamali (2021). Synthesis and characterization of new Trimethoprim formazan derivatives with studying them against breast cancer cells. International journal of biochemistry and bio-molecules, [Vol. 7, no. (1), pp. 2].

3) Blaster, M. J., Melby, M. K., Lock, M., and Nichter, M. (2021). Accounting for variation in and overuse of antibiotics among humans bioassay. [Vol. 43, no. (2), pp. 2000163]. DOI: https://doi.org/10.1002/bies. 202000163.

4) Duchesne E (23 September 2017). Duchesne's antagonism between molds and bacteria. an English colloquinal translation. ISBN 978-5498-1696-3.

5) Hussein Ali Ahmed, Nagham Mahmood Aljamali. Preparation, characterization, Antibacterial study, Toxicity study of new phenylene diamine-formazan derivatives. Indian of forensic medicine and toxicology, April-june 2021, [Vol. 15, No. 2], DOI number: 10.37506/ijfint. vl 5i2-14848.

6)Jawad, A. M., Nagham Mahmood Aljamal., and Aseel, M. J. (2020). Innovation , preparation of Cephalexin drug derivatives and studying of (toxicity and resistance of infection). International journal of psychosocial rehabilitation, [Vol. 24, no. (4), pp. 3754-3767].

7) Jess, T. (2014). Microbiota, antibiotics, and obesity. New England journal of medicine, [Vol. 371, no. (26), pp. 2526-2528]. DOI: Available at: https://www.nejm.org/doi/full/10.1056/NEJMcibr 1409799.

8) Kolar, M., Urbanek, K., and Latal, T.(2001). Antibiotic selective pressure and development of bacterial resistance. International journal of antimicrobial agents, [Vol. 17, no. (5), pp. 357-363]. DOI: http://doi.org/10.1016/So924-8579 (01) 00317-X.

9) Lewis, T., and Cook, J. (2014). Fluroquinolones and tendinopathy: a guide for athletes and sports clinicians and a systemic review of the literature. Journal of athletic training, [Vol. 49, no. (3), pp. 422-427]. DOI:http://doi.org/10.4085/1062-6050-49.2.09.

10) Mohammed, M., Nagham Mahmood Aljamali., Abdarahman, S. A., and shubber, W. A. (2018). Formation of Oxadiazole, derivatives Ligands from condensation and Imination reaction with reference to spectral investigation, thermal and microbial assay. Biochem. cell. Arch, [Vol. 18 , no.(1), pp.847-853] .

11) Marchant, J. (2018). When antibiotics turn toxic. Nature, [Vol. 555, no. (7697), pp. 431-433]. DOI: Available at: http://refp.cohlife. org/when antibiotics turn toxic nature. 2018. pdf.

12) Nagham Mahmood Aljamali., Imad kareem Alwan A., Hasaneen Kudhair abdullbaset., Aseel Mahmood Jawad., (May - June 2020). Review in SARS-corona virus (types, infection, diagnosis, chemical antiseptics for this virus). Journal of science and technology. [Vol. 05, no. (3), pp. 111-224].

13) Nagham Mahmood Aljamali, A M Jawad., Alfatlawi, I. O., Sahar Mahmood Jawad. (2020). Review on hospital bacteria (Causes, Infections, Prevention). Infection, [Vol. 7, no. (11), pp. 4444-4453].

14) Nagham Mahmood Aljamali., and Rahab Mahdi Ubaid Mahmood. (2021). Synthesis, Spectral Investigation and Microbial studying of Pyridine-Heterocyclic compounds. European journal of Molecular and Clinical Medicine, [Vol. 7, no. (11), pp. 16].

15) Nagham Mahmood Aljamali, Asmaa Kefah Mahdi., Synthesis, Identification and Anticancer studying of Heterocyclic Mefenamic drug via Thiosemicarbazide., Annals of R.S.C.B., ISSN:1583-6258, [Vol. 25. no. 3, 2021., Pages. 8521-8537].

16) Nagham Mahmood Aljamali, Hussein Mejbel Azeez., Synthesis and characterization of some new formazan - Cefixitine and study of Against breast cancer., Annals of R.S.C.B., ISSN:1583-6258., [Vol. 25, no. 3, (2021)., Pages. 8562-8578].

17) Nagham Mahmood Aljamali., Synthesis of antifungal chemical compounds from Fluconazole with (Pharma-Chemical) studying, Research journal of pharmaceutical, biological and chemical sciences., 2017, [Vol. 8, no. (3), pp. 564-573].

18) Nagham Mahmood Aljamali., Jawad, S. M. Jawad, Z. M. and Alfatlawi, I. O. (2017). Inhibition activity of (Azo-acetyl acetone) on bacteria of mouth. Research journal of pharmacy and technology. [Vol. 10, no. (6), pp. 1683-1686].

19) Nagham Mahmood Aljamali, Aseel Mahmood jawad, Imad Kareem Alwan Alsabri (2020). Public Health in hospitals. Eliva Press. Ist Ed., ISBN: 9798636352129.

20) Pirotta, M. V., and Garland, S. M. (2006). Genital Candida species detected in samples from women in Melbourne, Australia, before and after treatment with antibiotics. journal of clinical microbiology, [Vol. 44, no. (9), pp. 3213-3217]. DOI: at: http://jcm.asm.org/content/44/9/3213.short.

21)Wang, X., Ryu, D., Houtkooper, R. H. and Auwerx, J. (2015). Antibiotics use and abuse: a threat to Mitochondria and chloroplasts with impact on research, health, and environment. Bioassays, [Vol. 37, no.(10), pp. 10451053]. DOI: http://doi.org/10.1002/bies. 201500071

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