Original Article

Antibiotic prescription in Morocco, national data: Meta-analysis

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Abstract

Antibiotics are the most prescribed medication and the misprescribing of antibiotics is a public health problem worldwide.

Objective: Conduct a meta-analysis to determine the prevalence of antibiotic prescribing, assess the quality of prescribing and identify factors of inappropriate prescribing in Morocco.

Materials and Methods: 92 articles found in databases (35, 42, 55 and 50, in Elsevier, PubMed, Google Scholar and Other engines respectively).

Results: In studies carried out in 2009 and 2011, on the evaluation of the use of antibiotics by dermatologists we noticed that beta-lactams were the most commonly prescribed: 53%. A survey on the use of generic antibiotics or pediatric service used beta-lactam, 63%. The prescription of antibiotics in the department of burns and plastic surgery was 65%. These results are important to explain a resistance of betalactamins to different offences and the constitution of beta-lactamase should be searched. A study conducted in 2018 in Rabat, 90 physicians and surgeon's specialists, 91.7% of them prescribed antibiotics. Through previous studies from 2014 to 2022, a children's under 5 years of age with severe clinical pneumonia, 86.5% received antibiotics. In another study on the evaluation of antibiotic prescriptions in the emergency department, amoxicillin was used in 31.4%. Also in a study on the evaluation of antibiotic prescriptions in pediatric emergency departments, 3rd generation cephalosporins were used in 69% of cases. A study of antibiotic self-medication parents knew that antibiotics are subject to a prescription and 72.1% knew that antibiotics had side effects on children, and in this study amoxicillin was used the most at 46.6%, and it is one of the most widely used antibiotics in Morocco, despite the development of numerous resistances. In studies conducted in 2009, 2016, and 2017 on preventive antibiotic use is still prescribed (22%, 17.7% and 7.14%). Antibiotic prescriptions were not limited only to physicians, but studies indicated that 10.9% of them were prescribed by pharmacists and in 2022 the percentage increased to 42%.

Conclusion: This meta-analysis on studies and research of antibiotic prescribing: national data in the last 13 years in Morocco, the deficiencies found in antibiotic prescribing require the establishment of national recommendations to reduce misprescribing.

Keywords: Prescription - Recipe - Antibiotics – Antibiotic therapy- Morocco.

I. Introduction

Antibiotics have become one of the most common drugs used in hospitals, they are most often prescribed empirically or probabilistically in the absence of microbiological evidence[1], their rational use is one of the essential measures to prevent the appearance of multi-resistant germs, which is linked to the risk of using these drugs and their impact on the development of resistance [2], [3],[4].

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The proper use of antibiotics means knowing how to give the most appropriate antibiotic, which is well tolerated, at the correct dosage and for the optimal duration to treat a bacterial infection. But it is also, and above all, knowing how to limit their use and not prescribing them in unjustified situations: imprecise diagnosis, lack of microbiological documentation, lack of knowledge of recommendations, pressure from the patient or his entourage, fear of a clinical worsening [5].

Bacterial infections remain a major cause of death in the neonatal period because of their high frequency and the fragility and immaturity of the field. Physicians are therefore faced with the problem of the urgent initiation of antibiotic therapy [6]. In the services of infectious pathologies is a frequent reason for consultation and admission, and antibiotics are therefore frequently prescribed, most often for acute respiratory infections[7],[8].

Prescriptions are not without clinical and epidemiological consequences, because even if they are well tolerated, antibiotics can cause undesirable side effects at the individual level, and at the collective level, they contribute to the selection pressure leading to an increase in bacterial resistance to the most commonly used antibiotics [9].

The causes of this resistance are multiple, but the major determinant is the excessive and/or inappropriate use of antibiotics. The worldwide consumption of antibiotics has increased by 65% between 2000 and 2015 [10] and surveys have shown that antibiotics consume more than 25% of the total drug consumption of Moroccan hospitals. In addition, there is also an abuse in the prescription of antibiotic therapy, their sale in self-medication in pharmacies also promotes the abuse of these drugs and the increase in the rate of resistance, these bad habits in prescribing and the increase in antibiotic consumption, result in a change in the resistance profiles of bacterial species and the emergence of multi-resistant bacteria [11].

According to the report of the National Agency for the Safety of Medicines and Health Products, had updated in 2015 his report of expertise on "critical" antibiotics published in 2013, the definition of critical antibiotics is based on the concept of selection pressure and interest in last resort, so were categorized the so-called "critical" antibiotics, antibiotics particularly generating resistance and antibiotics of last resort [12]. [13].

The 2015 list of critical antibiotics, composed two categories: Antibiotics particularly generating bacterial resistance (Association amoxicillin-clavulanic acid, Cephalosporins third and fourth generation , ceftriaxon, Fluoroquinolons and Temocillin) and last resort antibiotics: for Gram-positive cocci (Daptomycin, Glycopeptides and Linezolid, Tedizolid) and for Gram-negative bacteria (Colistin Injection, Penems, Phenicolates and Tigecyclin) and for Gram-positive and Gram-negative bacteria Fosfomycin injection [14].

The aim of our study is to analyze the prevalence of antibiotic prescribing and antibiotic therapy in Morocco, based on research and articles found in the literature and recent recommendations of scientific communities, to assess the quality of prescribing and to identify the factors of inappropriate prescribing during the last 13 years (2009-2022) in Morocco.

II. Materials and methods:

Systematic meta-analysis of previous studies found in the literature on the prescription of antibiotics, based on national data in Morocco.

II.1 Type and period of the study:

Retrospective meta-analysis (October 2020 - October 2022), on the prescription of antibiotics: national data on studies found in the literature conducted in Morocco in the last 13 years.

II.2 Search strategy and study selection criteria:

The databases used were: Elsevier, PubMed, Google Scholar and Other engines. Search words: (Prescription *or Antibiotics*) and (Antibiotic Therapy*or Prescription*). Searches included published studies in all languages. The search options in the Scopus database were "title, abstract, and keywords." We found a total of ninety-two articles in the databases (35, 42, 55, and 50 articles found in Elsevier, PubMed, Google Scholar, and Other engines) [15]. For our purpose of analyzing the national data, 113 of the articles were excluded (see Figure 3 which includes the reasons for elimination). And after processing the information, we finally selected 8 articles

II.3 Exploitation criteria: The collection of articles for our meta-analysis using the keywords prescribing, prescription, antibiotics and antibiotic therapy. We searched for articles and studies in the literature concerning antibiotic prescribing in Morocco: national data from 2009 to 2022, and we did not distinguish on the language of publication.

II.4 Elimination criteria: After the search, articles published in the prescription of antibiotics in Morocco that concerned the animal, studies that are outside the selected period, and studies that were related to our research but in different directions were excluded. We performed a meta-analysis following the GraphPad Prism 9 model [16] With the elimination criteria presented in the figure below, only 8 articles were detailed (Table 1), each of which provides information on the prescription of antibiotics in Morocco.

II.5 Analytical statistics: We used two programs for the statistical analysis, each program with its own advantages and characteristics.

- GraphPad Prism 9: for repetition and elimination criteria, and to graphically represent years and regions of publication.

- Microsoft Excel for numerical entry, collection, comparison

of data, and drawing up tables.

III. Results:

III.1 Studies published in the period of (2009-2022) in Moroccan cities on antibiotic prescription in Morocco:

We have graphically represented the number of studies published in the selected period (2009-2022), the majority of studies took place in 2011, followed by 2009, 2014, 2016, 2017, 2018 and 2022.Figure (1). The number of studies published in the different Moroccan cities in the same period where we found, six studies in Rabat, two studies in Marrakech. Figure (2).

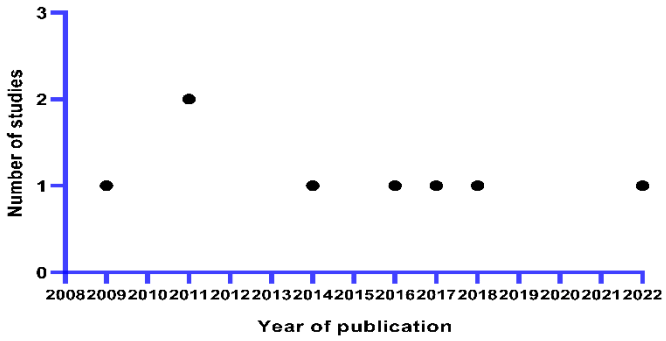


Figure (1): Number of studies published in Morocco during the period (2009-2022) on the prescription of antibiotics.

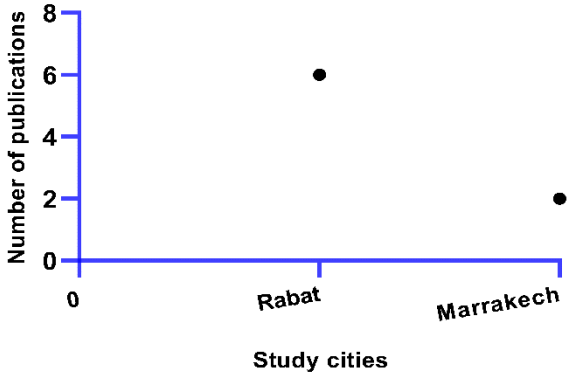
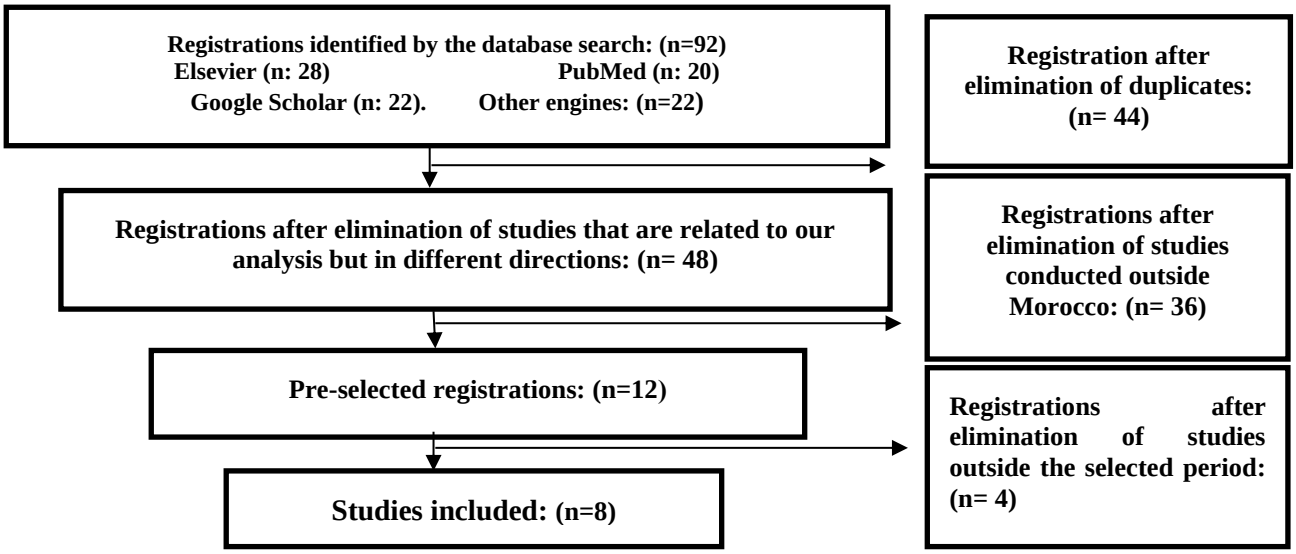


Figure (2): Number of studies published in Moroccan cities on the prescription of antibiotics in the period (2009-2022).

III.2 Characteristics of the studies incriminated in our Meta-analysis:

The diagram and table below summarize the main characteristics of the eight articles (in different cities in Morocco) included in this systematic review. Most of the studies were based on analytical surveys and evaluation studies of antibiotic therapy.



Figure(3): GraphPad Prism 9 flow for the selection of the study: shows the number of articles included in our search in the literature on the prescription of antibiotics in Morocco: national data, and also shows how we processed the articles and the criteria of elimination that we used, which led to select 8 articles for our meta-analysis

III.3 The prescription of antibiotics: national data in Morocco:

In each publication, we analyzed the results and characteristics of 8 articles on antibiotic prescribing in Morocco over the last 13 years. In each study, we analyzed the content, the number of prescriptions and the references on which this research was based. We also noted a comment on the content of each article. The majority of studies were conducted in 2011, with fewer studies conducted in 2009, 2014, 2016, 2017, 2018, and 2022. Of the studies included in our analysis, 6 studies were conducted in Rabat, and 2 studies in Marrakech (Table 1).

Table 1: Summary of incriminated studies in our meta-analysis:

References	Year	Cities	Prescribed antibiotics	Comments	No. of prescriptions	Rf.
Benomar et al.,[17]	2009	Rabat	The antibiotic most commonly prescribed for antibiotic prophylaxis by the dermatologists surveyed was penicillin M, 53% of dermatologists, fusidic acid for 38% and amoxicillin-clavulanic acid for 7%, with less than 2% reporting use of an anti-staphylococcal. The most commonly prescribed oral antibiotic for the treatment of acne is doxycyclin for 28% of dermatologists, tetracyclin for 21% of dermatologists, and an unspecified cyclin for 51% of dermatologists. It is clear that cyclins are the most prescribed antibiotics for acne.	The study evaluates the use of antibiotics by dermatologists in practice through a questionnaire sent to all dermatologists in the public and private sectors in central Morocco.	69	17
Chegour and Bouskraou, [18]	2011	Marrakech	Amoxicillin plus clavulanic acid and other penicillins	Evaluation of the perception and knowledge of generic antibiotics by general practitioners, to know their attitudes and practices in order to determine the levers and obstacles to their development (transversal study).	104	10
Benziane et al.,[19]	2011	Rabat	The most prescribed antibiotics are beta-lactams (65%), glycopeptides (10.5%), aminoglycosides (9%), quinolones (7%) and colistin (4.3%), with (4.2%) for other antibiotic classes	This finding shows the importance of pharmaceutical analysis of antibiotic prescriptions in a department using antibiotics from the hospital supply.	277	17
Jroundi et al., [20]	2014	Rabat	Study on the number of prescriptions for pneumonia	Understanding antibiotic prescribing and use practices in combination with antibiotic susceptibility monitoring of pathogens helps identify appropriate measures for rational antibiotic use.	700	
Elbouti and al., [21]	2016	Rabat	Amoxicillin 31.4% cephalosporins 8.6% and fluroquinolons 7. 6%.	The objectives of this study are to describe prescribing practices, evaluate their relevance and their compliance with the rules of use.	105	10
Hiddou et al [9]	2017	Marrakech	Amoxicillin 17%, Amoxicillin-clavulanic acid 4.5% and third generation cephalosporins 69%.	In the pediatric emergency room, infectious pathology is a frequent reason for admission, and therefore antibiotics are frequently prescribed, most often for acute respiratory infections.	112	17
References	Year	Cities	Prescribed antibiotics	Comments	No. of prescriptions	Rf.
Didouh et al., [22]	2018	Rabat,	Study on the number of prescriptions by specialties and general practitioners.	The prescription of antibiotics by physicians requires the implementation of measures to improve the rational use of antibiotics in hospitals, by highlighting a better supervision of prescribers in the framework of a multidisciplinary collaboration and by developing scientific research.	80	
Amma Mohammed, 2022[8]	2022	Rabat	Amoxicillin	Parents' knowledge was insufficient regarding amoxicillin by antibiotics, and parental information and education on the risks of amoxicillin and the side effects of antibiotics is of	300	56

paramount importance in limiting antibiotic resistance.
of antibiotics is of paramount importance in order to limit antibiotic resistance.

III.4 Comparison of beta-lactam antibiotics and number of prescriptions by physicians

In studies conducted in 2009 and 2011, we observed that beta-lactam antibiotics were the most commonly prescribed. In 2009, a study on the evaluation of the use of antibiotics in chronic wounds, acne and antibiotic prophylaxis post dermatological surgery: survey of dermatologists practicing in the region of Centre-Morocco in Rabat, among 101 prescriptions, 69 prescriptions of beta-lactam antibiotics for the treatment of burns, acne and other skin diseases or 53%. In 2011, a survey on the use of generic antibiotics in the Department of Pediatrics at Arrazi Hospital - Mother and Child Center, CHU Mohammed VI in Marrakech, 114 prescriptions, 104 used beta-lactam antibiotics 63%. Also, in 2011, in pharmaceutical analysis of the prescription of antibiotics in the department of burns and plastic surgery of the Military Hospital of Instruction Mohammed V, in Rabat Morocco, it is between 277 prescriptions 159 contain betalactam 65%.

These results are important to explain a resistance of betalactamins to different offenses. A comparison was made between the antibiotics prescribed and the number of prescriptions selected for the study, excluding the non-prescriptions of physicians in the research, we found that betalactamins are the most prescribed by physicians, and therefore an alternative betalactamase should be sought.

Table 2: A comparison of beta-lactam antibiotics and the number of prescriptions prescribed by physicians

References	Year	Cities	No. of prescriptions	Bêta-lactam antibiotics %
Benomar et *al,* 2009	2009	Rabat	101	53%
Chegour and Bouskraoui, 2011	2011	Marrakech	104	63%
Benziane et *al,* 2011	2011	Rabat	277	65%

III.5 Prescription of antibiotics by physicians and specialists

Through these studies summarized in the table below, it was found that in 2009 of Rabat, prescriptions were made by dermatologists, out of 101 physicians, 69 physicians prescribed antibiotics in chronic wounds and acne, that is to say 68.31%, the doses and frequencies prescribed vary, 57% prescribe antibiotics several times a day, 21% on average once a day, and 11% repeat three or four times a week..

In 2018 for Rabat, out of 90 physicians and surgeons specialists, 91.7% of them prescribed antibiotics, whose prescription was based on international protocols (80.6%), national protocols 63.9%, and information provided by visitors 56.9%.

Table 3: Antibiotic prescriptions by physicians and specialists

References	Year	Cities	Number of participating physicians	Percentage of physicians prescribing antibiotics	The status
Benomar et *al,* 2009	2009	Rabat	101	68.3%	Wounds and acne and plastic surgery
Didouh et al, 2018	2018	Rabat	90	91.7%	Physicians and surgical specialists

III.6 Prescriptions for the most commonly used antibiotics

Through previous studies conducted from 2014 to 2022, in 2014 in a study on the prescription of antibiotics before and during hospitalization in children under 5 years of age admitted to the University Pediatric Hospital of Rabat in Morocco for severe clinical pneumonia, out of 192 prescriptions for respiratory diseases and pneumonia in children, 86.5% were prescribed by antibiotics obtained from a physician. In 2016 in a study on the evaluation of antibiotic prescriptions in the emergency department of the Military Hospital of Instruction Mohammed V, during the study period, 105 medical prescriptions for respiratory and urinary diseases were recorded, 26.7% of patients were admitted to the emergency department, 77 patients in outpatient, 85.7% received antibiotics, and amoxicillin was used in 31.4%.

In 2017, a study on the evaluation of the prescription of antibiotics in pediatric emergencies of the CHU Mohammed VI of Marrakech, 112 prescriptions for children aged 1 to 15 years, 82.14% of prescriptions were antibiotics, and 3rd generation cephalosporins were used in 69% of cases.

In 2022, a study on self-medication with antibiotics in

pediatrics in Rabat, a one-year survey showed that 530 children received medication, 49.6% of their parents knew that antibiotics are subject to a prescription and 72.1% knew that antibiotics had side effects on children.

Among the 300 prescriptions include antibiotics, amoxicillin was the most used 46.6%, it is one of the most used antibiotics in Morocco, despite the development of many resistances. This means that a high level of parental education and knowledge of the potential risks and side effects of antibiotics plays a role in reducing antibiotic resistance.

Table 4: Medical prescriptions for the most commonly used antibiotics

References	Year	Cities	No. of prescriptions	Prescriptions antibiotics %	Pathological cases	Most used antibiotic
Jroundi et al ,2014	2014	Rabat	192	86.5%	Pneumonia	Not specified
Elbouti Jroundi et al, 2016	2016	Rabat	105	85.7%	Urology Department	Pénicillin
A. Hiddou Jroundi et al, 2017	2017	Marrakech	112	82.14%	Respiratory infections in children	C3G
Amma Mohammed, 2022	2022	Rabat	530	56.6%	Fever in children	Amoxicillin

III.7 Unexplained antibiotic prescriptions

We found three studies that showed that the use of antibiotics as a preventive measure is still prescribed by dermatologists during dermatological surgery, where no study could prove the contribution of antibiotics to the prevention of the risk of wound infection. In 2009, among 69 physicians, 22% prescribed unexplained prescriptions, In 2016, among 90 physicians, 17.7% prescribed unexplained prescriptions and In 2017, among 112 physicians 7.17% prescribed unexplained prescriptions for children.

Table 5: Unexplained antibiotic prescriptions

References	Year	Cities	Number of physiciens	Unexplained antibiotic prescriptions %
Benomar et *al,* 2009	2009	Rabat	69	22%
Elbouti et al, 2016	2016	Rabat	90	17.7%
Hiddou et al ,2017	2017	Marrakech	112	7.14%

III.8 Prescription of antibiotics by pharmacists

Antibiotic prescribing was not limited to physicians alone, but studies indicated that in 2014, out of 192 antibiotic prescriptions, 10.9% of them were prescribed by pharmacists.

In 2022, the percentage increased, a study had shown that out of 300 prescriptions of antibiotics of which 42% was prescribed by pharmacists, which requires measures to control pharmacists in the prescription of antibiotics.

Table 6: Antibiotic Prescription by Pharmacists

References	Year	Cities	No. of prescriptions	Antibiotics prescribed by pharmacists
Jroundi et al, 2014	2014	Rabat	192	10.9%
Amma Mohammed, 2022	2022	Rabat	300	42%

IV. Discussion:

In our analysis of national data on the prescription of antibiotics, we selected 8 articles carried out over the last 13 years in two Moroccan cities. Antibiotic therapy has a direct impact on the morbidity and mortality of patients, as well as on the emergence and development of bacterial resistance[23] ;[24]. Studies have shown that antibiotic prescription is problematic because of its side effects, bacterial resistance to antibiotics. One proposed strategy to reduce antibiotic prescribing is to include a recommendation to delay antibiotic use in prescriptions.[25]. The role of antibiotic prescription and consumption has been fully clarified in Morocco [26] and in France [27].

In studies conducted in 2009 and 2011, we observed that beta-lactam antibiotics were the most commonly prescribed. In

2009, a study on the evaluation of the use of antibiotics in chronic wounds, acne and antibiotic prophylaxis post dermatological surgery: survey of dermatologists practicing in the region of Centre-Morocco in Rabat, beta-lactam was prescribed to 53%, in 2011, a Survey on the use of generic antibiotics or Service of Pediatrics A. Arrazi Hospital. Mother-Child Center, CHU Mohammed VI in Marrakech, beta-lactam was prescribed to 63%. Also, in 2011, a pharmaceutical analysis of the prescription of antibiotics in the department of burns and plastic surgery of the Hospital Military Instruction Mohammed V, in Rabat, beta-lactam was prescribed to 65%. These results are important to explain a resistance of betalactam to different infections. The prescription of antibiotics in Colombia 50%.[28] and in Benin, in the department of internal medicine, indicates that beta-lactams, nitroimidazoles and fluoroquinolons were the most prescribed families of antibiotics with 44%, 26.6% and 17.7% respectively.[29], in Mali 94%[30].

A comparison was made between the antibiotics prescribed and the number of prescriptions selected for the study, excluding the non-prescriptions of physicians in the research, we found that beta-lactam is the most prescribed by physicians, and therefore an alternative of beta-lactamase should be sought. However, during prolonged use (more than two months). Prolonged antibiotic prescription modifies the mucosal commensal flora with the appearance of resistance in the UK.[31] in USA [32] in Europe [33], in 2018 in Rabat, antibiotic prescription was based on international protocols (80.6%), and national protocols (63.9%). the majority of physicians interviewed (97%) considered the lack of information as the first obstacle to generic prescription in Morocco [34] .

The percentage of physicians prescribing antibiotics in chronic wounds was 100%, and only 61% used professional bacteriological sampling, where the most used antibiotic was penicillin M, with a rate in Canada is 53% [11], and 53% in France.[35]. Through previous studies conducted from 2014 to 2022, in 2014 in a study on antibiotic prescribing before and during hospitalization in children under 5 years of age, the percentage of antibiotic prescriptions was 86.5%. In 2016 in a study on the evaluation of antibiotic prescriptions, amoxicillin was used in 31.4%. In 2017 in a study the evaluation of the prescription of antibiotics in pediatric emergencies of the CHU Mohammed VI of Marrakech, 82.14% of prescriptions were antibiotics, and 3rd generation cephalosporins were used in 69% of cases.

In 2022 in a study on Self-medication by antibiotics in pediatrics, conducted at Mohammed V University in Rabat, a survey during one year showed that 49.6% of their parents knew that antibiotics are subject to a prescription and 72.1% knew that antibiotics had side effects on children. Amoxicillin was the most used 46.6%, and it is one of the most used antibiotics in Morocco, despite the development of many resistances. This means that a high level of parental education and knowledge of the potential risks and side effects of antibiotics have a role in reducing antibiotic resistance. The most used antibiotic was amoxicillin-clavulanic acid 47%, followed by amoxicillin 24% and macrolides 10.5%..[36]. In France, in 2017, a study shows that the main molecules prescribed were the combination of amoxicillin and clavulanic acid 33%, ceftriaxone 17% and fluoroquinolons 13%[37].

The frequency of antibiotic prescription varies from country to country. Indeed, higher frequencies are reported in countries with better equipment, such as the United States and France, for hospitalized newborns, respectively 72%[7] and 57.5% [38], than in emerging countries, such as India 70.7% [39] , Taiwan, 94.8% [40]. and Brazzacity in Congo 54% [4]. Three studies have shown that the use of antibiotics as a preventive measure is always prescribed by dermatologists during dermatological surgery. In 2009, 69 physicians, 22% of them prescribed unexplained prescriptions, in 2016, 90 physicians, 17.7% prescribed unexplained prescriptions and in 2017, 112 physicians 7.17% of them prescribed unexplained prescriptions to children. Regarding the rate of appropriateness This figure is high compared with a study conducted in the emergency department of the University Hospital Ibn Sina in Rabat which showed that only 45.5% of antibiotic prescriptions were appropriate[41], in other studies in the literature the relevance rate is between 30 and 80% depending on the study [42], in USA, 39% met the criteria for inappropriateness. Of 78 prescriptions with consensus on appropriate indicators, 13.8% had inappropriate dose, duration or expenditure [27]. High rates of inappropriate antibiotic prescriptions in Europe [33] in Sub-Saharan Africa [39]. According to the World Health Organization (WHO), overuse of antibiotics due to inappropriate prescriptions is a public health problem [3]. Studies have shown that the prescription of antibiotics by pharmacists was in 2014, 10.9%, in 2022, 42% in Morocco. the proportion of antibiotics prescribed in general by pharmacists in Canada is 26 % [43] and in UK 24 % [44], pharmacists prescribing antibiotics for pharyngitis in Canada and the UK is 62% to 70%[45],.[46]. It is important to develop recommendations to promote optimal use of antibiotics, and to review prescriptions twice a week by a specialist physician. After the implementation of these recommendations in France, the number of prescriptions decreased by 8.2%. Where recipes were inconsistent with the instructions before implementation by 62.9% and after implementation, they decreased to 46.7%. [27]. Understanding antibiotic prescribing and use practices combined with monitoring the susceptibility of pathogens to antibiotics helps identify appropriate measures for optimal antibiotic use. There may be limitations to the published data on antibiotic prescriptions by physicians and pharmacists in Morocco in this systematic review due to the inability to identify and detail antibiotic prescriptions, mainly due to the fact that most of the studies are not precise and there is also a lack of information and diagnostic reports, especially in some Moroccan cities, but this may have been exerted by publication bias and the studies also contain incomplete data on antibiotic prescriptions in general.

V. Conclusions:

This meta-analysis on studies and research on antibiotic prescribing: national data in the last 13 years in Morocco. A good understanding of antibiotic prescribing and use practices combined with monitoring of pathogen susceptibility to antibiotics allows the identification of appropriate measures for optimal antibiotic use. In our analysis we found that for the group of beta-lactam is the most prescribed of other antibiotics by doctors, and this is a serious indicator that we must be careful about the presence of microbes resistant to these antibiotics, so it is necessary to look for alternative antibiotics and seek an effective way to choose the appropriate antibiotics for each microbe to see the resistance of the microbe to antibiotics and prescribe appropriate antibiotics according to the antibiogram that has advantages in the medical field, for the treatment, by antibiotics and reduce the risk of resistance to pathogens and it is necessary to comply with the systematic monitoring measures and proper management of the use of antibiotics as well as to comply with the rules and health protocols.

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