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Evaluation of the Therapeutic Adherence of Oral Antibiotics Prescribed for Oral Infections in Patients of the Ahmed Zabana Clinic of the University Hospital of Blida (Algeria)

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Abstract

Background: *Antibiotic resistance is a growing threat to global public health, undermining the effectiveness of treatments against common bacterial infections. This study aims to evaluate the level of adherence to oral antibiotics in patients consulting for oral infections at the Ahmed Zabana Dental Clinic of the University Hospital of Blida (Algeria).*

Method: *A cross-sectional descriptive study was conducted between December 2023 and April 2024 among adult patients consulting for various oral infections at Ahmed Zabana Dental Clinic. Adherence to antibiotic prescriptions was assessed using the Morisky Medication Adherence Scale-8, adapted to short-term oral antibiotic treatments and translated into French and Arabic. The data collected was entered into an Excel 2016 spreadsheet and then analyzed using SPSS version 26 software.*

Results: *A total of 484 patients were included in the study, 59% of whom were female. The mean antibiotic adherence score was 4.87 [95% CI: 4.63–5.11]. The distribution of patients by adherence level was as follows: low adherence (53.09%), medium adherence (21.28%) and full adherence (25.61%).*

Conclusion: *The results of this study are comparable to those observed in other countries, but further efforts are still needed to improve adherence to antibiotic treatments in the Blida population, in order to limit the emergence of antibiotic resistance.*

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Introduction

The discovery and use of antibiotics marked one of the major revolutions of the twentieth century in the fight against infectious diseases [1]. However, their excessive and inappropriate use is a key contributor to the development of bacterial resistance [2].

The oral cavity is one of the ecosystems most densely colonized by microorganisms, with more than 700 bacterial species recorded [3]. This oral microbiota plays a key role in the prevention of cavities, periodontal disease, and other oral infections. Nevertheless, the excessive use of antibiotics in dentistry disrupts this delicate balance, promoting the emergence of resistant strains [4,5].

Antimicrobial resistance (AMR) develops when bacteria, viruses, fungi and parasites become unresponsive to treatment, complicating the management of infections, increasing the risk of complications, pathogen spread and mortality [6]. Several factors explain this problem, including inadequate prescriptions (overuse or inappropriate dosage) and non-compliance with treatments by patients [7]. The latter, characterized by non-compliance with therapeutic dosages or durations, leads to an increased risk of clinical failure, infectious recurrence and resistance selection. Its prevalence is estimated at 22.3% on average, with variations from 9% to 44% depending on the geographical context [8]. If this trend continues, resistant infections could become the leading cause of death globally by 2050 [9].

In this study, we examine one of the major determinants of AMR: non-adherence to antibiotic treatments. Our objective is to evaluate the level of therapeutic adherence to oral antibiotic therapies in patients consulting for an oral infection at the Ahmed Zabana Dental Clinic of the Blida University Hospital, using the Morisky-Green-Levine score.

Methods

Study Type and Eligibility Criteria

This descriptive cross-sectional observational study was conducted at the Ahmed Zabana Dental Clinic of the Blida University Hospital between December 2023 and April 2024. The included participants were adult patients aged 18 to 80 years, regardless of gender, consulting for an oral infection and who had received a prescription for oral antibiotics. Inclusion criteria required preserved cognitive ability (assessed by ability to understand and answer the questionnaire) as well as informed consent obtained prior to participation. Patients with cognitive impairment or unwillingness to participate were excluded from the study.

Data Collection Method

A two-part structured questionnaire was used to collect data. The first part, devoted to demographic information, collected the surname, first name, age, sex, level of education, general medical history and chronic pathologies of the participants. The second part assessed medication adherence using the Morisky Medical Adherence Scale-8 (MMAS-8), which is suitable for short-term antibiotic treatments [10]. This internationally validated tool has been translated into French and Arabic to ensure optimal comprehension (Tables I and II in the appendix).

The questionnaire was administered in paper version by four dental interns, previously trained in this task. Eligible patients were verbally informed of the study objectives and invited to participate after providing oral consent. The interviews took place face-to-face, in a calm and confidential environment, with an average duration of 10 minutes per session. Participants were encouraged to respond honestly and thoroughly, and personal data was anonymized to maintain confidentiality.

Table I : Treatment Adherence Assessment Score by Morisky-Green-Levine translated into French

1	Have you ever forgotten to take antibiotics?	Yes	No
2	Some people may not take their medication, but it's not because they forget it. Have there been days when you haven't taken your antibiotics?	Yes	No
3	Have you ever decreased your doses or stopped taking your antibiotics?	Yes	No
4	When you travel or leave home, have you ever forgotten to take your antibiotics with you?	Yes	No
5	Did you take antibiotics on the last day of treatment?	Yes	No

6	When you felt better, did you ever stop taking antibiotics?	Yes	No
7	For some people, taking medication is a real headache. Has having to take antibiotics in fixed doses and at the right time ever bothered you?	Yes	No
8	How many times have you had trouble remembering to take antibiotics?	never,	often, always
		rarely,	
		sometimes,	

Table II: Morisky Green Levine's score translated into Arabic:

1. Have you ever forgotten to take antibiotics? | Have you ever forgotten to take your medications?
2. Sometimes it happens that some people don't take their medications, but that's not because they've forgotten about them. Were there days when you didn't take antibiotics? | Sometimes it happens that some people don't take their medications, but that's not because they've forgotten about them. Were there days when you didn't take medication?
3. Have you ever reduced your dose or stopped taking antibiotics? | Have you ever reduced your dose or stopped taking medications?
4. When you travel or leave your home, have you ever forgotten to take antibiotics with you? | When you travel or leave your home, have you ever forgotten to take your medication with you?
5. Did you take antibiotics on the last day of treatment? | Did you take medication on the last day of treatment?
6. When I felt better, did you sometimes stop taking antibiotics? | When I felt better, did you sometimes stop taking medications?
7. For some people, taking medications is a real hassle. Was it annoying to have to take antibiotics in steady and timely doses? | For some people, taking medications is a real hassle. Was it bothersome to have to take medications in steady and timely doses?
8. How many times have you had trouble remembering taking antibiotics? | How many times? have you had trouble remembering to take medications

Interpretation of the Questionnaire

Items 1 to 7 of the questionnaire were based on binary (yes/no) responses, while item 8 used a five-modality Likert scale (never, rarely, sometimes, often, always). The calculation of the score followed a specific protocol: for items 1 to 7, a no answer was worth 1 point, and a yes answer 0 points, with the exception of item 5 where this system was reversed (1 point for yes, 0 for no). For item 8, the never-and-rarely responses were scored 1 point, while sometimes, often, and always were scored 0. The total score, ranging from 0 to 8, made it possible to classify medication adherence into three categories: optimal (score = 8), moderate (score 6-7) or low (score < 6).

Data Analysis

The data was entered and organized in an Excel 2016 spreadsheet and then analyzed with SPSS version 26 software. Sociodemographic variables and MMAS-8 scores were the subject of descriptive analyses (frequencies, means). Statistical tests (chi-square, ANOVA) were used to assess the associations between antibiotic adherence to antibiotic therapy and independent variables.

Ethical Considerations

The study was conducted in accordance with the ethical principles of health research set out in the Declaration of Helsinki. The study protocol has been approved by the research ethics committee of the Blida University Hospital. Informed consent was obtained from all participants before starting data collection. The confidentiality of the participants' data has been guaranteed.

Results

General Characteristics of the Study Population

The sample consisted of 484 participants, 41% of whom were men, with a mean age of 39.85 years. Regarding the reasons for consultation, the use of care was mainly motivated by functional imperatives (43.8%), followed by prosthetic needs (21.69%), aesthetic needs (17.35%), guidance by colleagues (9.91%), orthodontic corrections (5.16%) and complete oral rehabilitation (2.06%). On the medical level, nearly six out of ten patients (59.29%) reported no history of pathology. Among the reported histories, the most common were diabetes (9.92%), high blood pressure (9.50%) and heart disease (5.55%). Other conditions included cases of neoplasia (3.92%), renal insufficiency (2.06%), neuropsychiatric disorders (1.03%) as well as diversified pathologies (haemopathies, endocrinopathies, autoimmune diseases, etc.), collectively representing 9.29% of the sample. Finally, the educational profile revealed a predominance of patients with higher education (41.11%), compared to 25% at secondary levels, 17.14% at intermediate levels, 6.4% at primary level and 9.91% of patients who were not in school.

Characteristics According to Adherence

The mean adherence score was 4.87 (95% CI [4.63-5.11]). More than half of the participants (53.09%) had low adherence to antibiotic treatment, while the rest were divided between average (21.28%) and optimal adherence (25.61%) (Fig. 1).

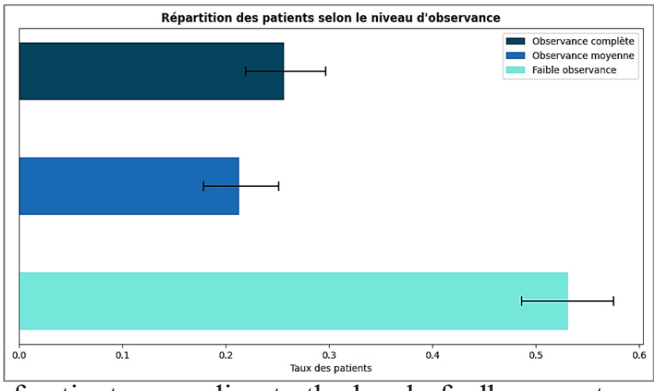

Figure 1: Distribution of patients according to the level of adherence to antimicrobial treatment.

A significant difference was found by age: the oldest patients adhered significantly better to their antimicrobial treatment than the youngest (p = 0.000051) (Fig. 2).

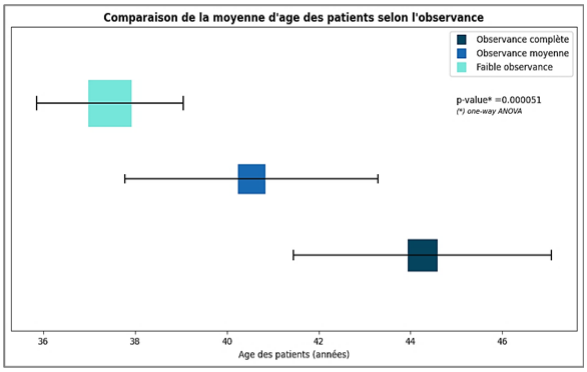

Figure 2: Comparison of the average age of participants according to adherence

In addition, a disparity related to the level of education was observed: participants with a higher education degree had lower compliance than patients with less education (p = 0.0069).

Finally, the analysis of the medical history revealed that patients without chronic pathology had a low adherence to the majority. Conversely, those with chronic diseases (diabetes, heart disease, high blood pressure, etc.) adhered better to their treatment (p = 0.0001) (Table III).

Table III: Antibiotic Adherence by Gender, Education Level and General Pathologies

Gender	**Workforce**	**Relative Frequency (%)**	**Level of compliance P**	
Male	54	11.15	Comprehensive	
	46	9.5	Medium	
	97	20.04	Low	
Female	70	14.46	Comprehensive	
	57	11.8	Medium	
	160	33.05	Low	0,453
Level of education				
Without	15	3.1	Comprehensive	
	8	1.7	Medium	
	25	5.18	Low	
Medium	10	2.07	Comprehensive	
	9	1.9	Medium	
	10	2.07	Low	
Medium	28	5.8	Comprehensive	
	24	4.96	Medium	
	30	6.2	Low	
Secondary	27	5.6	Comprehensive	
	30	6.2	Medium	
	69	14.1	Low	
Academic	44	9.1	Comprehensive	
	33	6.82	Medium	
	122	25.2	Low	0,0069
General pathologies				
Neuropsychiatry	3	0.61	Comprehensive	
	0	0	Medium	
	2	0.41	Low	
Renal pathology	4	0.82	Comprehensive	
	1	0.21	Medium	
	5	1.03	Low	
Neoplasia	4	0.82	Comprehensive	
	6	1.24	Medium	
	9	1.86	Low	
Cardiopathie	13	2.69	Comprehensive	
	5	1.03	Medium	
	9	1.86	Low	
Other	7	1.45	Comprehensive	
	16	3.31	Medium	
	22	4.55	Low	
Diabetic	16	3.31	Comprehensive	
	9	1.86	Medium	
	20	4.13	Low	

HTA	22	4.55	Comprehensive	
	13	2.69	Medium	
	11	2.28	Low	
RAS	57	11.77	Comprehensive	
	55	11.36	Medium	
	175	36.16	Low	0.0001

Discussion

The discovery of antibiotics marked a historic turning point in the control of infectious diseases, saving millions of lives in the twentieth century [1]. However, this progress is now being compromised by the growing emergence of bacterial resistance, a phenomenon amplified by the excessive and inappropriate use of antibiotics in human and animal health [11]. This dynamic threatens therapeutic effectiveness, extends hospital stays, and increases the economic burden on health systems [8].

Antimicrobial resistance (AMR) is the result of a combination of factors, two of which deserve special attention: inappropriate prescribing (overuse of broad-spectrum antibiotics, treatment of non-bacterial diseases) and patient behaviour (non-adherence to dosages, self-medication) [12]. Our study, conducted at the Ahmed Zabana Dental Clinic (Blida University Hospital), evaluates adherence to oral antibiotic therapies in adults consulting for oral infections. The results reveal a mean compliance score of 4.87 (95% CI [4.63-5.11]), with a predominance of low compliance (53.09%), compared to 21.28% mean compliance and 25.61% optimal compliance. These figures highlight a critical issue: nearly one in two patients compromises the effectiveness of their treatment, potentially promoting the emergence of resistance.

Compared to international data, our results partially converge with those of Mendittoet al.in Italy (average score of 4.95), but diverge from those of Zabihiet al.Iran (6.45) [13,14]. This variability could reflect methodological or contextual differences, such as the sociocultural profiles of populations. For example, the Chinese study of Tonget al.(2018) reports non-adherence in 86.97% of patients, confirming the global scale of the phenomenon [15].

A notable divergence concerns the impact of the level of education: contrary to the work of Ambrosioet al.and Mendittoet al., which associate a high level of education with better compliance, our study reveals the opposite trend. This contradiction could be explained by socio-cultural disparities (access to information, mistrust of medical protocols) or by a different perception of antibiotics among the Algerian population [12,13].

The analysis of the medical history shows that patients with chronic pathologies (diabetes, heart disease, hypertension) adhere better to their treatment than those without a history. This observation, consistent with the data in the literature, suggests that previous experience with the disease reinforces therapeutic compliance [16].

Among the studies reviewed, the one by Zabihi et al. in Iran (2021) stands out for the highest level of adherence. Conversely, the study by Munzo et al. in Spain (2014) displays the lowest level of adherence. These variations in compliance levels, based on Morisky scores reported in the literature, are illustrated in Figure 3 [17].

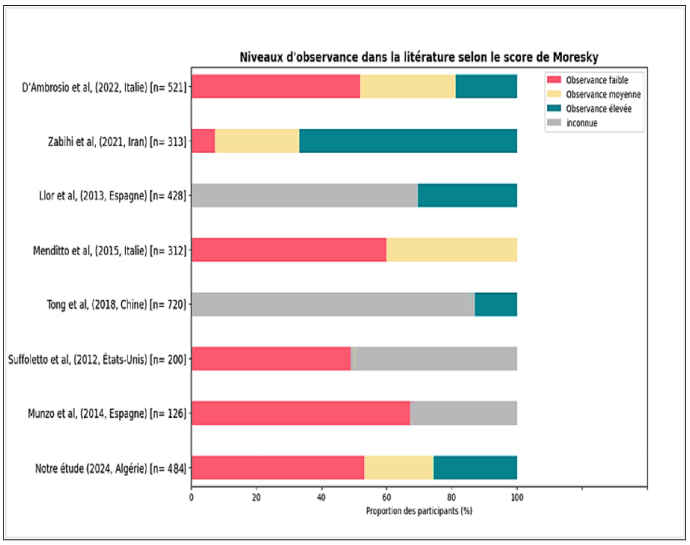

Figure 3: The Level of Compliance in the Literature According to Morisky

While our study makes a valuable contribution to understanding antibiotic adherence in dentistry, it is important to recognize its limitations in order to interpret the results with caution. The voluntary nature of participation may have introduced a selection bias, influencing the representativeness of the sample. In addition, the assessment of compliance by self-report via questionnaires, although practical and economical, has inherent biases. Patients may overestimate their compliance or minimize deviations due to social desirability or inadvertent forgetfulness. More objective assessment methods, such as tablet counting or electronic monitoring, may provide a more accurate measure of actual compliance.

Despite these limitations, our study offers a valuable perspective on antibiotic adherence in dentistry. By recognizing methodological constraints, we can interpret the results responsibly and identify areas for improvement for future research. Further studies with larger samples, appropriate stratification, and objective assessment methods are needed to deepen our understanding of this phenomenon and develop targeted interventions against antibiotic resistance.

Conclusion

Antibiotic resistance represents a critical health challenge, requiring an urgent collective response. Our study reveals that poor adherence to treatment concerns more than half of patients, increasing the risk of resistance. Combating this phenomenon involves mobilizing all stakeholders around targeted awareness, responsible antibiotic stewardship and innovative adherence technologies. These measures, integrated into sustainable health policies, are essential to maintain the effectiveness of antibiotics. By acting today, we are honouring an ethical imperative by bequeathing to future generations a medicine where every antibiotic remains a vital weapon against infection.

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