Minoxidil between Self-Medication and Therapeutic Indications

Bendouida Achwak Fatna[1], Dali Youcef Nacera[2], Fandi Badr Eddine[1], Fliou Nor Eddine[1]

[1.] Department of Pharmacy-Faculty of Medicine Taleb Mourad-University Djillali Liabes-Sidi Bel Abbes, Algeria.

[2.] Department of Epidemiology and Preventive Medicine - CHU Dr. HASSANI Abdelkader-Sidi Bel Abbes, Algeria.

Email: achwak_bendouida@yahoo.com

Received:26/08/2023; Accepted: 06/12/2023;

Abstract

Introduction:

Given the increasing popularity of minoxidil and the emergence of unconventional uses of the drug, which may pose risks to users, the objective of this study was to assess the prevalence of these alternative uses and evaluate the associated risks for users in the Sidi Bel Abbes province.

Materials and methods: Our study was designed as a descriptive cross-sectional study conducted in 62 pharmacies. The selection of pharmacies was done through route sampling. A total of 239 questionnaires were collected during a single visit as part of the data collection process.

Results: Our study findings reveal that the non-prescription use of minoxidil constitutes 51.71% of the dispensing, with the primary reason being beard growth (32.91% of reported reasons). On the other hand, prescription-only use accounts for 48.29%, including 28.21% for the treatment of androgenic alopecia. The prevalence of adverse effects was observed to be 40.17%.

Conclusion:

The use of minoxidil outside of prescription is a fairly widespread phenomenon, it results in uses unrelated to its main indication which can compromise the safety of users and their health, it is therefore necessary to make patients aware of the dangers linked to these uses and to train pharmacy staff on this product.

Keywords: Minoxidil; Beard growth; Auto-medication; Alopecia.

Tob Regul Sci.™ 2023;9(2):2635 - 2646

DOI: doi.org/10.18001/TRS.9.2.172

Introduction

In the 1950s, Upjohn, a pharmaceutical company later acquired by Pfizer, conducted research on N, N-Diallyl melamine (DAM) for the treatment of stomach ulcers. However, the drug did not

exhibit anti-ulcerative properties. Surprisingly, it was found to have a delayed and prolonged blood pressure-lowering effect. In 1968, an application for a clinical trial of a new drug (IND) was submitted to explore the potential of minoxidil, an analog of DAM, as an antihypertensive medication.

The administration of oral minoxidil to a group of refractory hypertensive patients resulted in a significant reduction in hypertension. Remarkably, oral minoxidil showed substantial blood pressure-lowering effects within 7 to 10 days. In 1979, the FDA approved minoxidil for the treatment of hypertension, marketed under the trade name "Loniten®." However, clinicians were restricted to using oral minoxidil solely for refractory hypertensive patients with target organ lesions, and the treatment duration was limited to two weeks. Prolonged use of oral minoxidil for more than two weeks led to the development of hypertrichosis. On the other hand, an emulsion-based minoxidil patch demonstrated hair regrowth. Consequently, the FDA approved a 2% prescription solution of minoxidil in 1988, marketed as "Rogaine®," specifically for the treatment of alopecia in men [1].

Problematic

Minoxidil was initially developed and primarily used as a hypotensive (blood pressure-lowering) agent. However, it was during its application for this indication that the unexpected effect of promoting hair growth was discovered [2]. The widespread availability of minoxidil has led to the emergence of various off-label uses through self-medication. However, there is a lack of comprehensive studies investigating the prevalence and impact of self-medication, particularly in the field of dermatology. Dermatology is a medical specialty that often relies on topical treatments, which are more susceptible to non-prescription and self-medication practices [3].
What are these uses and how they can impact the safety of the user?

Objectives

- Main Objective
  • Evaluate non-conventional use of minoxidil.
- Secondary objectives
  • Estimate the extent of the adverse effects of minoxidil.
  • Appreciate the satisfaction of staff with minoxidil.
  • Judge the use ratio of minoxidil with and without prescription.

2. Materials and methods

This is a cross-cutting descriptive study conducted through a questionnaire with the officinal team in the municipality of Sidi Bel Abbes.
The survey took place from 2 January to 7 April 2023.

3. Results and analysis

Our study population consists of all staff.

After observing the workshops, it is evident that there is a diverse distribution of professions, with a significant majority (approximately 57%) being sellers (other) and pharmacists comprising only around 33% of the listed staff. Additionally, a smaller proportion of the workforce consists of preparers, accounting for approximately 10% (Fig 1).

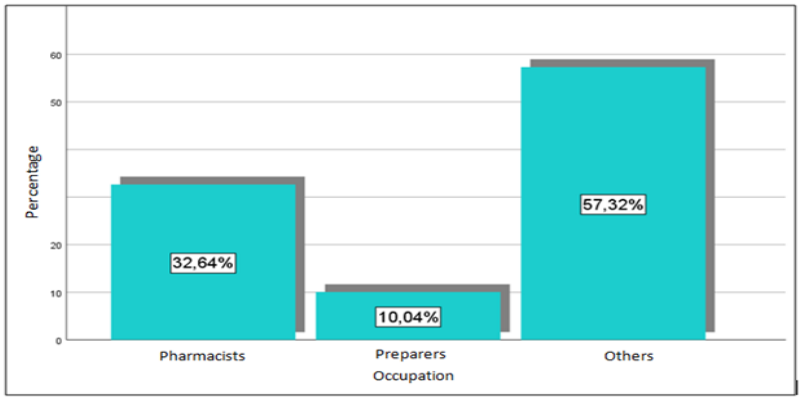

Fig. 1: Distribution of the pharmacy team according to profession.

The findings indicate that a substantial majority of the staff (92%) have completed some form of training. However, a minority of the workforce, approximately 8%, has not undergone any training (Fig. 2).

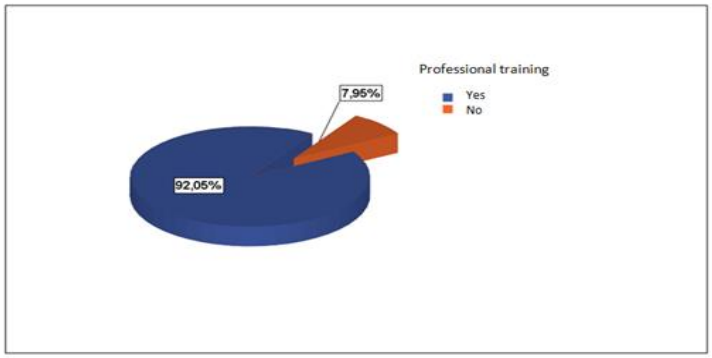

Fig.2: Distribution of staff according to their training.

It is noted that the majority of officer staff have less than 10 years of experience (76%).Half of them have fewer than 5 years' experience, with a small proportion having more than 10 years of practice (14%), and even fewer have more than 20 years of active experience (10%) (Fig.3).

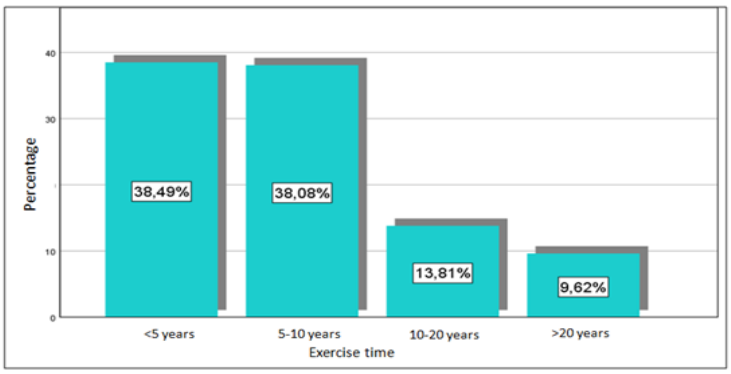

Fig.3: Distribution of staff according to their exercise time.

It is noted that minoxidil is distributed in almost all officers with a percentage of 98%, but a very small proportion does not (2%) (Fig.4).

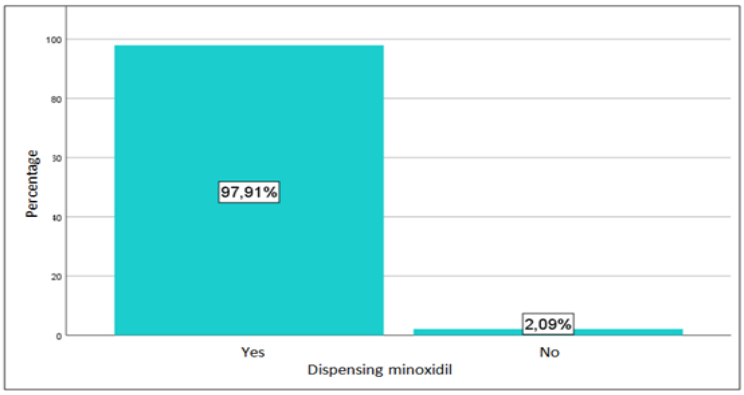

Fig.4: Dispensing minoxidil.

Certain parity was observed in the delivery of minoxidil with and without a prescription (48% with and 52% without prescription) (Fig.5).

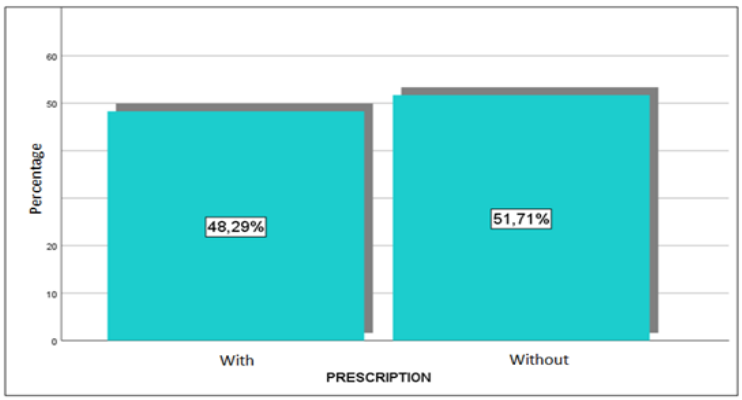

Fig.5: Minoxidil prescription.

Observing the different dispensation patterns of minoxidil, a certain trend emerges, with a large portion being dispensed for the treatment of androgenic alopecia (45%), closely followed by its

use to accentuate beard growth (35%) and for seasonal hair loss (15%). A low proportion of release was observed for postmenopausal baldness (2%) and alopecia areata (3%) (Fig. 6).

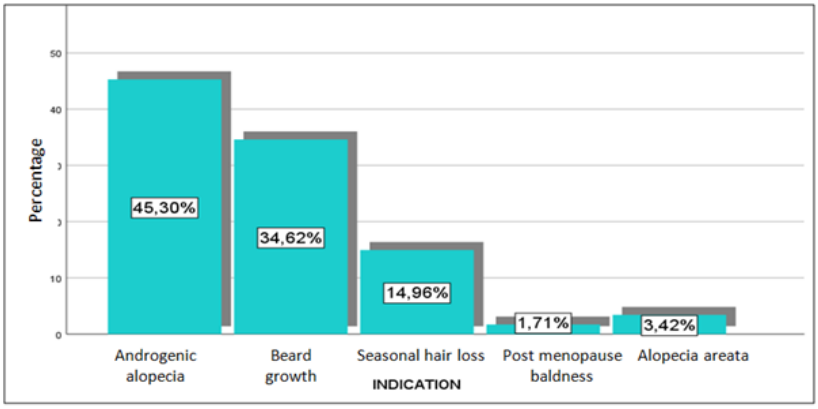

Fig.6: Reasons for dispensing minoxidil.

A predominance of 5% concentration solution release (68%) and less than 2% concentration (32%) is detected (Fig. 7).

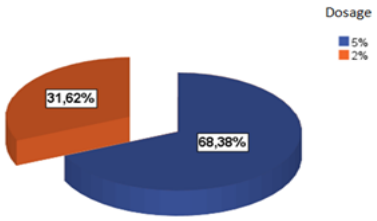

Fig.7: Dispensing according to dosage.

Most surveyed pharmacies (67%) only deliver a minimal amount of minoxidil, with less than 5 boxes per month. To a lesser extent, 22% of pharmacies have a delivery between 5 and 10 boxes, while a minority of them (11%) has a supply of more than 10 boxes (Fig. 8).

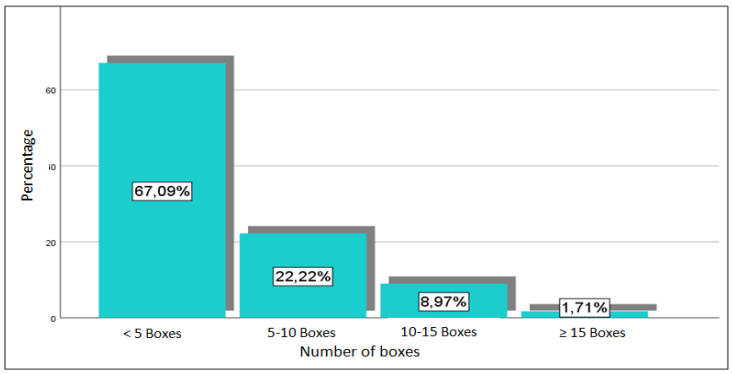

Fig.8: Minoxidil monthly sale.

In most offices (70%) the consumption of minoxidil concerns more men than women, while it is given more to women in 16% of offices (Fig.9).

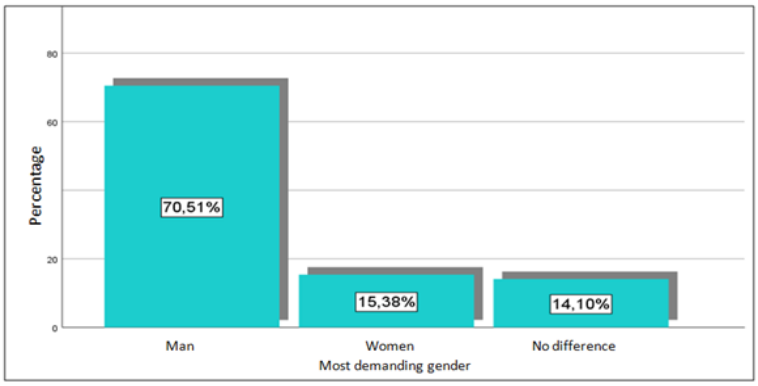

Fig.9: Consumption of minoxidil according to gender.

The use of minoxidil in pharmacies involves the age group between 20 and 40 years (90%), while a small proportion of 9% is distributed among people under the age of 20 and those between 40 and 60 years, with an incidence of 3% and 6% respectively. There is an absence of consumers older than 60 years (Fig. 10).

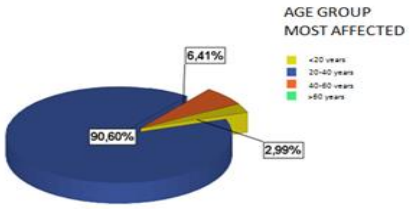

Fig.10: Consumption by age group.

A large proportion of pharmacies (63%) recommend the use of minoxidil, while a non-negligible portion (37%) do not recommend it (Fig. 11).

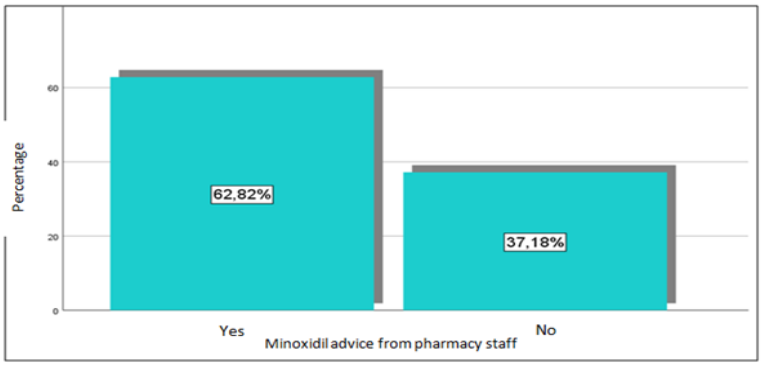

Fig.11: Minoxidil advice from pharmacy staff.

In pharmacies, the staff advises minoxidil for its effectiveness in 69% of cases, while 17% do not recommend it due to its multiple side effects, and 14% justify their non-recommendation by the fact that it requires a prescription (Fig. 12).

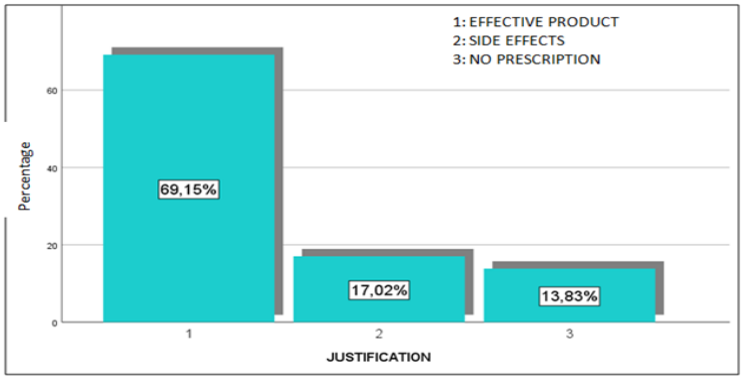

Fig.12: Justification for advice or not for minoxidil.

Minoxidil did not cause side effects in 60% of pharmacies, but in the remaining 40% of cases, it resulted in the occurrence of bothersome side effects (Fig. 13).

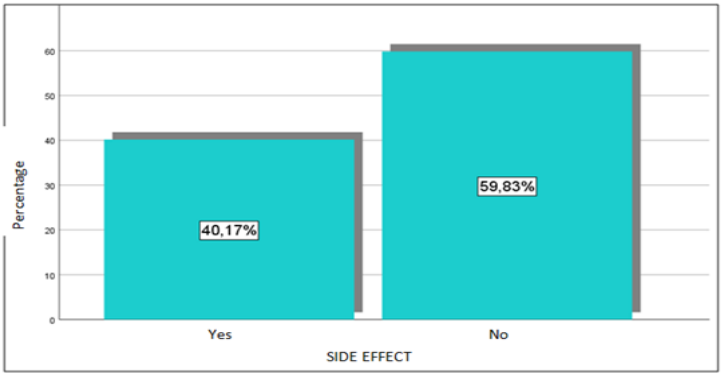

Fig.13: Return or not for adverse effects.

Minoxidil is primarily indicated for the treatment of androgenic alopecia, with a prescription rate of 28%. However, its use for beard growth is more commonly done without a prescription, accounting for approximately 33% of applications (Fig. 14).

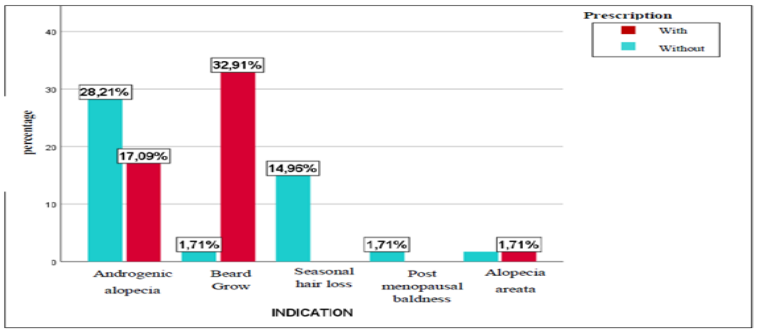

Fig.14: Prescription of minoxidil according to reasons for use.

The most common side effects of minoxidil are irritation and hypertrichosis, affecting 27 and 26 patients, respectively. This is followed by redness (18) and palpitations (17), with a lower incidence of itching, relapses, and hypotension (16) (Table I)."

Tableau I : Most common side effects

		Numbre
SIDE EFFECTS	Hypotension	3
	Palpitation	17
	Itch	7
	Redness	18
	Relapse	6
	Irritation	27
	Hypertrichosis	26

4. Discussion

"Minoxidil was initially used as an antihypertensive agent. However, due to its anti-hair loss properties, it has found numerous other uses, particularly in the treatment of androgenic alopecia. In this study, we focused on exploring the boundaries of its uses between self-medication and therapeutic indications. A descriptive pharmaco-epidemiological study was conducted in the wilaya of Sidi Bel Abbes, covering 62 workshops. A total of 239 questionnaires were collected from the staff of these pharmacies, including pharmacists, preparers, and sellers. The study was carried out from January 2 to April 7; 2023.The main objective of this study was to evaluate the non-conventional use of minoxidil."

Discussion of results

• Characterization of the population studied (Personnel officinal)

In our study, we observed a predominance of vendors, accounting for 57.32% of the officinal staff. Among them, 92.05% have completed training, although the specific nature of this training was not specified. Pharmacists, on the other hand, constitute only 32.64% of the surveyed staff, and it was noted that the pharmacist is often absent. Preparers represent a smaller proportion, comprising only 10.04% of the surveyed staff.

Regarding the experience of the staff, it was found that 76.57% of them have less than 10 years of experience. Among them, half have been in practice for less than 5 years, while a quarter of the staff has worked for over 10 years.

The availability of minoxidil is quite high, as 97.91% of the surveyed staff dispenses it as a 2% concentration solution. Among these, the most commonly dispensed concentration is 5%, accounting for 68.38% of the dispensations. This is primarily for men, who constitute the majority of consumers at 70.51%. This can be correlated to the fact that men are more affected by alopecia, as demonstrated in the study conducted by Dr. Mansoul (2021)[4]. However, it should be noted that the dispensation of minoxidil remains infrequent, with less than 5 boxes delivered per month in the majority of pharmacies (67.09%).

Minoxidil is primarily used by individuals aged between 20 and 40, accounting for 90.60% of users. There are a negligible proportion of users under the age of 20 and between the ages of 40 and 60. Furthermore, the use of minoxidil among the elderly is absent.

The patterns of minoxidil use are varied, but one trend stands out. The main indication for its use is androgenic alopecia, accounting for 45.30% of cases. Surprisingly, a significant proportion (34.62%) of minoxidil use is for stimulating beard growth. This practice is assumed to be due to its demonstrated effectiveness in enhancing facial hairiness, as shown in the study conducted by Ingprasert [5]. Seasonal hair loss represents 14.96% of minoxidil use, while postmenopausal baldness and general baldness account for only a minor portion of its uses.

Self-medication is quite common in Algeria, as demonstrated by the study conducted by Ziari (2006) [6]. This phenomenon also extends to the use of minoxidil, as our study revealed. In fact, more than half of the cases (51.71%) involve the release of minoxidil without a prescription, slightly surpassing the cases where it is obtained with a prescription.

In our study, it was found that the officinal staff tends to advise the use of minoxidil, with a rate of 62.82%. The staff largely justifies this recommendation based on its effectiveness. On the other hand, those who do not advise the use of minoxidil argue their stance by highlighting the presence of side effects or the absence of a medical prescription. These two arguments were found to be present at a rate of 17.02% and 13.83%, respectively.

In our study, it was observed that adverse effects were reported by 40.17% of the staff interviewed. The most frequently mentioned adverse effect was irritation, which can be attributed to the excipient used in the minoxidil solution, specifically propylene glycol. This finding aligns with the

research conducted by Friedman (2002)[7].Hypertrichosis, the excessive growth of hair, was another commonly highlighted adverse effect, mentioned in 26 of the collected responses. This effect is particularly disconcerting in women and has been confirmed by the Peluso study (1997)[8].Additionally, redness and palpitations were reported to a lesser extent. These effects can be associated with the vasodilatory properties of minoxidil, which, despite its limited systemic absorption, can cause tachycardia, as reflected in the Aprahamian study (2011)[9].It is worth noting that some of the adverse effects mentioned in our study were related to the treatment of hair, which is consistent with previous analogous studies.

In order to give credibility and veracity to our study, we used the Chi-square test since all of our variables are of a qualitative nature. For those variables with an effectiveness of less than 5, we employed the exact Fisher test.

1st crossing

We used the Fisher test since there are staff <5

Null hypothesis (H0): reasons for use and prescription are independent.

The alternative hypothesis (Ha): there is a link between them.

• P-value < 0.0001

• Alpha=0.05

Since the calculated p-value is less than the significance level of alpha=0.05, we reject the null hypothesis (H0), indicating that there is a significant association between the reasons for use and the prescription.

2nd crossing

We also used the Fisher test.

The null hypothesis (H0): the reasons for use and the presence of side effects are independent.

The alternative hypothesis (Ha): there is a relationship between them.

• P-value < 0.0001

• Alpha=0.05

Since the p-value is lower than the predetermined alpha level of significance, we reject the null hypothesis (H0), indicating that there is a statistically significant relationship between the patterns and the presence of side effects.

3rd crossing

As the number of personnel is greater than 5, we used the Khi-Two test.

The zero hypothesis (H0): there is no link between the profession and the fact of advising minoxidil

The alternative hypothesis (Ha): both are correlated

The X2 observed 4.19 with ddl=2 and the p-value= 0.123

Reference X2 5.99 with alpha=0.05

If the p-value obtained from the Chi-square test is 0.123 and higher than the predetermined alpha level of significance, it suggests that there is insufficient evidence to reject the null hypothesis (H0).

5. Conclusion

In our study conducted in 62 offices in the Sidi Bel Abbes province, we focused on the availability and non-prescription use of minoxidil, as well as its off-label uses beyond its primary indication. Our findings revealed that non-prescription use of minoxidil is a common practice, accounting for approximately 52% of its distribution. Interestingly, a significant portion of this non-prescription use is for stimulating beard growth, comprising around 34% of the demand. These findings could help explain the occurrence of more substantial side effects when minoxidil is used for this purpose, as observed in our study.

It can be inferred that there is a certain level of complacency towards the use of minoxidil, particularly in cases where it is obtained without a prescription and used for purposes beyond its intended medical use. This complacency may lead to the omission of important information regarding the nature and medicinal origin of minoxidil. Of particular concern is the powerful hypotensive effect of minoxidil, which can interact with other hypotensive medications. This highlights the potential dangers that may arise from the unregulated and uncontrolled use of minoxidil, without proper medical supervision and consideration of potential drug interactions.

6. Recommendations and prospects

• Although the effectiveness and safety of all medicines are duly established, it is better to inquire before buying a prescription-free medicine.

• Raising awareness of patients about irresponsible self-medication that confronts the patient with the risks of misuse, overdose, and drug interactions.

• Minoxidil should not be used without medical advice in case of heart disease, even if it occurred in the past.

• In subjects with scalp lesions, there is a possibility of increased absorption of the active substance into the bloodstream. Therefore, it is recommended to apply it on a healthy scalp.

• Inform office staff, including vendors, about the risks and drug interactions associated with minoxidil.

• Limit the use of minoxidil to its primary indication (Androgenic Alopecia).

• Cancellate the dispensation of minoxidil only on medical prescription.

References Bibliographiques

[1] Gupta AK, Talukder M, Venkataraman M, Bamimore MA. Minoxidil: a comprehensive review. Journal of Dermatological Treatment. 19 may 2022; 33(4):1896-906.
[2] Martini MC. Introduction to Cosmetology. Cosmetic Valley Editions; 2021. 352 p.
[3] Lees S. Self-medication in dermatology.
[4] Mansoul T. Androgenetic alopecia in the commune of Constantine [Internet]. Constantine University 3 Salah Boubnider, Faculty of Medicine; 2021. Available on: http://pubmed.mesrs.dz/handle/123456789/81
[5] Ingprasert S, Tanglertsampan C, Tangphianphan N, Reanmanee C. Efficacy and safety of minoxidil 3% lotion for beard enhancement: A randomized, double-masked, placebo-controlled study. J Dermatol. August 2016; 43(8):968-9.
[6] Djazairess: Newspaper of a doctor: Self-medication, a dangerous practices [Internet]. Available on: https://www.djazairess.com/fr/horizons/7156
[7] Friedman ES, Friedman PM, Cohen DE, Washenik K. Allergic contact dermatitis to topical minoxidil solution: Etiology and treatment. Journal of the American Academy of Dermatology. February 2002; 46(2):309-12.
[8] Peluso AM, Misciali C, Vincenzi C, Tosti A. Diffuse hypertrichosis during treatment with 5% topical minoxidil. Br J Dermatol. January 1997; 136(1):118-20.
[9] Aprahamian A, Escoda S, Patteau G, Merckx A, Chéron G. Intoxication by minoxidil, the active ingredient in a hair lotion. About a case. Pediatric Archives. December 2011;18(12):1297-9.
[10] Olsen EA, Weiner MS. Topical minoxidil in male pattern baldness: Effects of discontinuation of treatment. Journal of the American Academy of Dermatology. July 1987; 17(1):97-101.