

## Original Research Article

# Polypharmacy-related polypathology in the elderly: A case study at Ibn Sina Hospital, Morocco

Mostafa Bouaoudate<sup>1\*</sup>, Jaouad El harti<sup>1</sup>, Redouane Abouqal<sup>2</sup>, Khalid Abidi<sup>3</sup>, Amine Ali Zeggwagh<sup>3</sup>

<sup>1</sup>Laboratory of Medicinal Chemistry and Hospital Pharmacy, <sup>2</sup>Acute Medical Unit, <sup>3</sup>Medical Reanimation Service, University Hospital Ibn Sina, Rabat, Morocco, Faculty of Medicine and Pharmacy, University Mohamed V of Rabat, Rabat, Morocco

\*For correspondence: **Email:** bouaoudate2@gmail.com; **Tel:** +212-6-6722 1406

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### Abstract

**Purpose:** To determine the polypathological and therapeutic profiles of a population of elderly subjects at the Ibn Sina Hospital, Rabat, Morocco.

**Methods:** This was a prospective cross-sectional observational study on a population made up of 356 patients aged  $\geq 65$  years. Data were collected from different departments during the study period, regarding age, sex, educational level, socio-cultural and economic status, self-care ability, polypathologies, polymedication, effectiveness of treatments, adverse effects, and knowledge of the concept of generic medication. The results, which are presented in percentages and simple averages, were processed with Excel 2016 software.

**Results:** Patients aged 66 - 75 years comprised 60.4 % of the studied population. The most common pathologies were diabetes, asthma, and cardiovascular disease. A total of 237 patients (66.6 %) took < 6 drugs, while 119 patients (33.4 %) were on polypharmacy, i.e., > 6 drugs. The elderly were more vulnerable to polypathology and polypharmacy due to age-related reduction in physiological functions and their impact on pharmacological parameters. Polypathology led to polypharmacy which increased the risk of side effects and problems with adherence to medications.

**Conclusion:** This study provides information on the pathological profiles of a population of elderly subjects in a Moroccan hospital, and details of the therapeutic strategies used in managing these patients.

**Keywords:** Polypharmacy, Paleopathology, Elderly subjects, Ibn Sina hospital, Public health

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## INTRODUCTION

The marked increase in the population of elderly people in Western countries in recent years is a challenge which political authorities are constantly faced with. A demographic analysis of the Moroccan population shows that although it

is ageing, it still has sizeable number of youths. However, aging means defects in functions of vital organs, with decreased capacity for physiological adaptation. In addition, there are multiple chronic diseases which are liable to decompensation during acute intercurrent pathologies. These chronic pathologies interfere

with each other and with the socio-economic and psychological problems of the elderly, resulting in loss of ability for self-care, that is, a situation where the elderly person needs assistance to carry out their daily activities [1].

Polymedication is defined by the World Health Organization (WHO) as 'the administration of many drugs at the same time, or the administration of excessive number of drugs'. Poly-medication is normal and often legitimate in the elderly. It is said to be appropriate when it is justified by a complex medical situation (polypathology), and when the prescribed treatments are consistent with the recommendations. Conversely, polymedication is problematic when one or more drugs are prescribed inappropriately, or when their expected benefits are not obtained [2-4].

Polypathology and polymedication are public health problems linked to increases in geriatric populations. In fact, advancing age is accompanied by accumulation of risk factors for pathologies [5-10]. The objective of this study was to determine the pathological profiles of a population of elderly subjects in Morocco, and to describe the general therapeutic strategies used in the management of these pathologies.

## METHODS

This study took place at the Ibn Sina University Hospital in Rabat. It was conducted over a 6-month period (from September 2019 to February 2020) in order to recruit a large number of people aged  $\geq 65$  years, and to simplify the study and make it cost-effective.

### Inclusion criteria

Patients aged  $\geq 65$  years, who were fully conscious, were included in the study. Several information were collected from these patients in different departments during the study period. These data were collected through sheets filled in by the patients (illiterate patients were assisted by one of their family members). During this period, data were collected from 356 patients.

### Ethical approval

This study was approved by the Ethical Committee of the Faculty of Medicine and Pharmacy in Rabat, Morocco (CERB no. IORG0006594). The Ethical Committee for Biomedical Research in Rabat is registered with the Office of Research and Human Protection, Department of Health and Social Services of United States, with registration number

IORG0006594CERB [11]. The patients were informed about the purpose of the study and the processes involved, and they gave their informed consent.

The patients (respondents) provided information with respect to socio-cultural and economic status, age, sex, educational level, stability of income, and whether living alone or with nuclear family members. Information was also collected on ability of the patients to carry out daily activities independently. This was aimed at determining if the patients were able to take care of themselves on their own, e.g., taking prescribed medications, or whether they were usually assisted. Data was collected with respect to polypathology. Each patient was required to provide information on chronic pathologies, number of pathologies, knowledge of pathologies, and adherence to prescribed treatments.

Moreover, information on polymedication was obtained to determine if the patients were taking more than one drug, the drugs most commonly used, their effectiveness (from the point of view of the patients), the main adverse effects, and patients' knowledge of the concept of generic medication. This was a prospective cross-sectional observational study. The results were processed with Excel 2016 software, and are reported in percentages and simple averages.

## RESULTS

A total of 356 patient files were examined. Information on patients aged  $\geq 65$  years were collected from different departments during the study period. The patients were divided into three age groups. The study population comprised 59.1 % males and 40.9 % females. Majority (60.4 %) of the respondents were aged 66 - 75 years, with 55.1 % married, 50.3 % living in personal homes, and 48.6 % without formal education. These data are shown in Table 1. In relation to income, 34.3 % of patients indicated that they had stable and sufficient income, while the rest of the patients said that they were being taken care of by their children or relatives. Moreover, 40.7 % of the study population were capable of self-care with respect to taking medications, travelling and performing the tasks of daily life, while 43.5 % of the population were semi-independent, and 15.7 % of the subjects were entirely dependent on other people. Emphasis was placed on information regarding chronic pathologies, number of pathologies followed, patient's knowledge of the pathologies, and adherence to the prescribed treatment (Table 2).

**Table 1:** Distribution of patients according to age and marital status

Parameter	Status	Number of patients	%
Age (years)	65-75	215	60.4
	76-85	121	34
	>85	20	5.6
Sex	Male	202	56.7
	Female	154	43.3
Marital status	Married	196	55
	Widower	145	40.7
	Single	15	4.2
Living with own children	Yes	177	49.7
	No	179	50.3
Educational level	No formal education	173	48.6
	Koranic	72	20.2
	Primary	56	15.7
	Secondary	47	13.2
	University	8	2.2

**Table 2:** Distribution of patients according to data on their pathologies

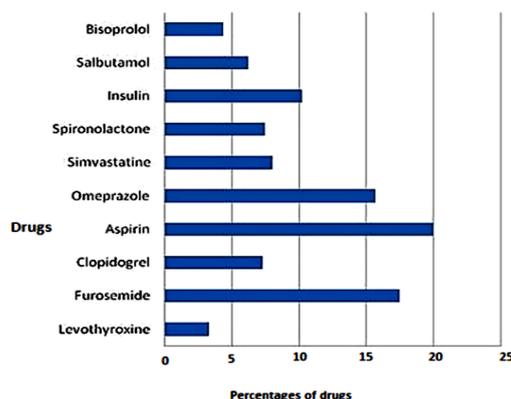
Parameter	No. of patients	%
Type		
Diabetes	143	40.2
Asthma	40	11.2
Cardiovascular disease	242	68
Pathologies per patient		
1	78	21.9
2	110	30.9
3	107	30
4	48	13.5
5	10	2.8
>5	3	0.8
Knowledge of pathology	294	82.6
Compliance with treatment	287	80.6

It can be seen that 30.9 and 30.1% of the patients presented two and three pathologies, respectively. In this study population, cardiovascular diseases, in particular arterial hypertension, digestive diseases and endocrine diseases (especially diabetes) were identified. It was found that 80.6 % of the subjects took their medications faithfully at the scheduled times. On the other hand, based on a previous report [12], the present study showed that 237 patients took less than 6 drugs, i.e., 66.6 %, while 119 patients (33.4 %) took more than 6 drugs. The distribution of drugs taken by the study population is shown in Figure 1. Out of a total of 549 prescriptions, the three most-used products were aspirin, furosemide and omeprazole.

Data on perceived effectiveness of drugs showed that 263 patients (73.9 %) expressed satisfaction with the effectiveness of drugs given. However, 191 patients (53.6 %) indicated that they were given too many drugs. Indeed, 139 patients (39.1 %) wanted reduction in the number of drugs prescribed for their pathologies. The ten top side

effects experienced by patients are shown in Figure 2. The most common adverse effects reported by the respondents were dizziness and digestive problems.

Only 69 patients (19.4 %) bothered to read the literature on the drugs. Moreover, only 98 respondents (27.5 %) provided correct answers to the question on the difference between an original drug and a generic drug, while 72.3 % did not know about the concept of generic drugs. In addition, 35.7 % of those who knew about generic drugs considered them to be ineffective.

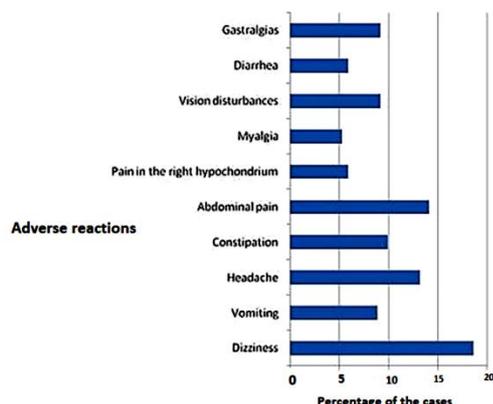
**Figure 1:** Percentage distributions of the most used drugs

## DISCUSSION

The survey data showed that majority of the hospitalized patients (60.4 %) were within the 'young elderly' group in the age range of 65 - 75 years.

The preponderance of patients within the age range of 65 -75 years may be partly explained by the fact that the average life expectancy of the

Moroccan population is 76 years (79 years for women, and 73 years for men), based on statistics carried out in 2011 [13].



**Figure 2:** Percentage distribution of the most reported adverse reactions

The proportion of men (59.1 %) is higher than that of women (40.9 %). The 2004 census showed that in the Moroccan population, there was parity between the percentage of males (49.6 %) and that of the females (50.4 %) with respect to people aged  $\geq 60$  years [13]. Half of the patients (50.3 %) lived in personal houses, while 49.7 % lived with their descendants. In another study carried out in France on people aged  $\geq 75$  years, the proportion of subjects living at home was 81.8 % [14].

Married people (men and women) formed 55.1 % of the study population, while 40.7 % of the population were widowed, and 4.2 % were single. This distribution is more favorable than that cited in another French study where 61 % of the population were widowed, 26 % were married, 7 % were single, while 6 % were divorced [15]. In the present study, 49.7 % of the respondents (men and women) lived with their children. This inter-generational solidarity was further confirmed by the high proportion of elderly people who received material assistance from their descendants.

Illiteracy is a problem in developing countries. It partly influences the independence of the patients, their understanding of pathologies, as well as adherence to treatments. In this survey, 48.6 % of the respondents did not have formal education, unlike the younger Moroccan population, which shows significant growth in the fight against illiteracy.

Drug consumption in people aged  $\geq 65$  years, especially in those aged  $> 80$  years, was marked by a unique specificity to the aging process [16].

An increase in polypharmacy decreased adherence. Thus, 53 % of patients reported that they had too much medication, and 39 % wanted reduction in the amount of medication. Elderly patients are vulnerable to polyopathy and polypharmacy due to reduced adaptation of physiological functions. Moreover, polyopathy and polypharmacy may negatively impact pharmacological responses in the elderly population. In this study population, there was an age-related polyopathy with respect to cardiovascular diseases, especially arterial hypertension, which often requires the use of diuretics. Another condition where diuretics are used is edema, the most widely used molecule being furosemide which is a readily available drug. Besides, the use of aspirin as an antiplatelet agent has increased. However, due to its gastric side effects, most patients prefer to combine aspirin with omeprazole after medical advice; this often leads to improved therapeutic effect.

About 73.9 % of the patients considered their drugs to be effective. Indeed, the qualities of drugs produced in Morocco are classified according to the WHO standards in the European zone, and they are subject to rigorous regulations [17]. In a developing country where purchasing power is relatively low, it is necessary to switch to generic medicines. After explaining the concept of generics, most patients agreed with the vital role of generic drugs in access to healthcare. Dizziness and digestive problems were the most reported side effects in this population. These adverse outcomes were linked to drugs for diabetes and high blood pressure which are known to have side effects on digestion. At the end of this study on a small population faced with reduced income and illiteracy, it was seen that some elderly people had difficulties accessing health care. However, the advent of generics, the culture of solidarity, and the efforts of the State are in favor of a constant struggle to remedy these drawbacks.

## CONCLUSION

In the years to come, there will be an increase in the elderly population requiring special care. Polyopathy in the elderly results in polypharmacy, leading to an increase in side effects and a decrease in drug adherence. Therefore, the Moroccan health structure will have to deal with patients' profiles marked by fragility and vulnerability, which require special attention.

## DECLARATIONS

### Acknowledgements

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### Funding

None provided.

### Ethical approval

This study was approved by the Ethical Committee of the Faculty of Medicine and Pharmacy in Rabat, Morocco (CERB no. IORG0006594).

### Availability of data and materials

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

### Conflict of Interest

No conflict of interest associated with this work.

### Contribution of Authors

We declare that this work was done by the authors named in this article, and all liabilities pertaining to claims relating to the content of this article will be borne by the authors. Mostafa Bouaoudate and Jaouad El harti designed the study, collected data, analyzed the data, and wrote the manuscript. Redouane Abouqal and Khalid Abidi supervised data analysis, while Amine Ali Zeggwagh reviewed the manuscript.

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## REFERENCES

1. Elouardi Y. Pathology of the elderly subject in the reception service for emergencies of the CHU

Mohammed VI of Marrakech. Doctoral thesis in medicine, 2013; 48.

2. Monegat M, Sermet C, Perronnin M, Rococo E. Polypharmacy: definitions, measures and issues. Literature review and measurement tests. *Health Economics Issues* 2014; 1-8.
3. WHO Centre for Health Development (Kobe, Japan). A glossary of terms for community health care and services for older persons. Kobe, Japan: WHO Centre for Health Development. 2004 (cited 2021 Dec). Available from: <https://apps.who.int/iris/handle/10665/68896>
4. Duerden MG, Avery T, Payne RA. Polypharmacy and medicines optimisation: Making it safe and sound. *The Kings Fund* 2013; 68.
5. Apeti S, Mossi KE, Ouédraogo PW, Tolo N, Balaka A, Coume M. Epidemiological and therapeutic profile of polyopathy according to elderly patients in Togo at geriatric consultation in Lomé. *RAFMI* 2019; 6: 17-27.
6. Hubbard RE, Sinead O'Mahony M, Woodhouse KW. Medication prescribing in frail older people. *Eur J Clin Pharmacol* 2013; 69: 319-326
7. Lordos EF, Herrmann FR, Robine J-M, Balahoczky M, Giannelli SV, Gold G, Michel J-P. Comparative value of medical diagnosis versus physical functioning in predicting the 6-year survival of 1951 hospitalized old patients. *Rejuvenation Res* 2008; 11: 829-836.
8. Franchi C, Tettamanti M, Pasina L, Djignefa CD, Fortino I, Bortolotti A, Merlino L, Nobili A. Changes in drug prescribing to Italian community-dwelling elderly people: the EPIFARM-Elderly Project 2000-2010. *Eur J Clin Pharmacol* 2014; 70: 437-443.
9. Louria DB. Extraordinary longevity: individual and societal issues. *J Am Geriatr Soc* 2005; 53(9 Suppl): S317-9.
10. Christensen K, Doblhammer G, Rau R, Vaupel JW. Ageing populations: the challenges ahead. *Lancet* 2009; 374: 1196-1208.
11. Office for Human Research Protections Database; (cited 2021 Dec). Available from <http://ohrp.cit.nih.gov/search/search.aspx>
12. Hisbergues A. Polypharmacy in the elderly: study of characteristics and determinants. (Dissertation). *Life Sciences (q-bio): Henri Poincaré University - Nancy* 1; 2008; hal-01733437.
13. Morocco High Commission for Planning. Structure (%) by major age groups of the total, urban and rural population: 1960-2050. 2020 (cited 2021 Dec). Available from: [http://www.ondh.ma/sites/default/files/2020-03/\\_rapport\\_personnes\\_agees\\_1.pdf](http://www.ondh.ma/sites/default/files/2020-03/_rapport_personnes_agees_1.pdf)
14. Mokrani Z, Morin K, Illi N, Peyras F, Cognet F. Epidemiological analysis of patients aged over 75 admitted to the emergency room of the Salon-de-Provence hospital center without a mobile geriatric team. *J Eur des Urgences et de Reanim* 2009; (03): 264.
15. Biant C. What is an Acute Geriatrics Unit? Example of the UGA of the Charles Foix hospital in Ivry-sur-Seine. Doctoral thesis in medicine, Paris 5; 2008; 16: 110.

16. Stuckelberger A. *Polymedication and self-medication in the elderly: Results of the national research program Old Age*, In: *Self-medication, banal practice, complex patterns*. Editor *Medicine and Hygiene* 2001; 47-68.
17. Koro Ajob M. *Access to medicines: case study: Morocco and cancer drugs*. *Pharmaceutical sciences* 2019. Dumas 02076505.