

MONITORING THE CONSUMPTION OF DRUGS BEFORE, DURING AND AFTER THE COVID-19 PANDEMIC

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Abstract. Introduction. In addition to the traditional role of pharmacists in the preparation, distribution and dispensing of medicines, today pharmacists represent an important link in the health system with their active participation in health promotion and prevention of many diseases. There are a number of educational activities of pharmacists aimed at familiarizing the population with the importance of a healthy lifestyle and risk factors for the development of diseases. Self-medication is defined as the application of drugs for the treatment of symptoms and diseases that the patient himself recognizes. Self-medication is the primary resource of any healthcare system. However, only with adequate, professional advice from pharmacists, who can identify, prevent and solve problems related to self-medication, an optimal and safe outcome of therapy can be achieved, as well as improving the quality of life of patients.

The aim and tasks of the research work. Monitoring the consumption of the following OTC preparations: zinc, selenium, vitamins C and D, Paracetamol, Naphazoline, Xylometazoline and Ibuprofen (of 200, 400, 600 mg) immediately before the COVID-19 pandemic, during the COVID-19 pandemic and immediately after. **Methodology of the research work.** A cross-sectional study was applied before the declaration of the COVID-19 pandemic and after the COVID-19 pandemic. The data source was the electronic prescription database (POINTER 2023) of the "Zdravlje 1" pharmacy in Despotovac. The study lasted 4 years (from 01.01.2019 to 31.12.2022). The data were calculated in the SPSS statistics 20 program package and are presented graphically. **Results and discussion.** By far the highest consumption is for Ibuprofen 400 mg, followed by Ibuprofen 600 mg, while the lowest consumption for the four-year period from 2019-2022 was for Ibuprofen 200 mg. Observed for each year individually, it was noted that the use of Ibuprofen 200 mg during the outbreak of COVID-19 (2020) showed a drastic increase, five times higher values on an annual basis compared to the time period before and after the occurrence of COVID-19. **Conclusion.** Taking into account the four-year period of supplementation with zinc, selenium, vitamin D and C also shows an increase in the consumption and use of these supplements for the time period of 2020 and 2021, so that in 2022 there will be a reduction in the use and sale of these OTC preparations.

Keywords: self-medication, pharmacist, education

1. INTRODUCTION

Apart from the traditional role of pharmacists in the preparation, distribution and dispensing of medicines, today pharmacists represent an important link in the healthcare system with their active participation in health promotion and prevention of many diseases. The mission of the pharmaceutical profession is also reflected in giving advice to the public on the most rational use of drugs and preparations (such as supplements, nutritional supplements, bioactive components of medicinal herbs, homeopathic medicines) available in pharmacies [1]. The role of pharmacists as advisors to the general population on responsible self-medication and the application of appropriate health care at the level of primary and secondary health care institutions is also of great importance. There are a number of educational activities of pharmacists aimed at familiarizing the population with the importance of a healthy lifestyle and risk factors for the development of diseases.

Self-medication is defined as the application of drugs for the treatment of symptoms and diseases that the patient himself recognizes [2]. Self-medication is very common in today's society, both in urban and rural areas. Self-medication means the use of drugs and supplements that are used for self-diagnosed disorders or symptoms of certain diseases such as colds (high temperature, fever, and cough), chronic stress (headache, anxiety, nervousness, and weakness), and gastrointestinal complaints (nausea, vomiting, abdominal pain and diarrhea) in the acute phase or in convalescence as part of a chronic disease [3].

The sale of some medicines is seasonal (allergies in the spring, colds in the autumn months and gastrointestinal complaints in the summer months) and, together with appropriate influence marketing, affects the choice of consumers.

The potential benefits of self-medication can apply to the individual and the entire social community. At the individual level, they include taking an active role in their own health care [4], relying on themselves to

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prevent or alleviate minor symptoms or conditions, being able to educate themselves about certain health issues, and economics (reducing costs).

At the community level, the benefits of self-medication include reducing the cost of community-funded health programs, reducing absenteeism from work due to milder symptoms, reducing pressure on medical services where there are insufficient health personnel, and increasing the availability of health care to populations living in rural or remote areas [5].

The use of self-medication in our country is quite widespread in every age group, and especially in the elderly and people of mature age. Also, many studies provide us with important statistical data on the use of self-medication in childhood, especially in children of preschool age. By far the highest prevalence of self-medication was observed among undergraduate students in India as well as among young doctors in hospital settings in Norway [6]. There are numerous reasons why the population most often resort to self-medication. Some of them are crucial, such as saving time, reducing stress in healthcare institutions [7] and among the highest ranked is the easy availability of different categories of drugs, i.e. dispensing of medicines without a prescription. The situation is very different when it comes to narcotics, antidepressants and sedatives [8, 9].

2. THE AIM AND TASKS OF THE RESEARCH WORK

Monitoring the consumption of the following OTC preparations: zinc, selenium, vitamins C and D, Paracetamol, Diclofenac and Ibuprofen (from 200, 400, 600 mg) immediately before the COVID-19 pandemic, during the COVID-19 pandemic and immediately after.

3. METHODOLOGY OF THE RESEARCH WORK

A cross-sectional study was applied before the declaration of the COVID-19 pandemic and after the COVID-19 pandemic. The study lasted 4 years. The data source was the electronic prescription database (POINTER 2023) of the "Zdravlje 1" pharmacy in Despotovac. The pharmacy and the place were chosen by the method of random selection in the period from 01.01.2019 to 31.12.2022). The data were calculated in the SPSS statistics 20 program package and are presented graphically.

4. RESULTS AND DISCUSSION

The products most often used in self-medication are non-opioid analgesics and antipyretics and their combinations, drugs for local and oral therapy of the nasal mucosa, secretolytics and mucolytics, antitussives, antiemetics, antidiarrheals, antihistamines for local use, combinations of vitamins and minerals, and herbal teas.

These products have low toxicity, a wide therapeutic range, safety in overdose, minimal interactions, indications well known to the user and serve for self-

medication, and are called OTC preparations (Over the Counter) and are dispensed in pharmacies without a prescription. In 1951, a distinction was made between prescription drugs and self-medication. This Amendment regulates that drugs, which are not habit-forming and can be used without the supervision of medical personnel, should meet the conditions to be declared self-medication preparations (OTC products). Self-medication is the primary resource of any healthcare system. However, only with adequate, professional advice from pharmacists, who can identify, prevent and solve problems related to self-medication [10], an optimal and safe outcome of therapy can be achieved, as well as improving the quality of life of patients.

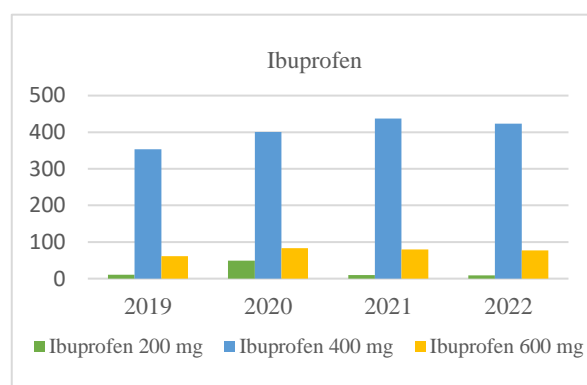


Figure 1. Comparative analysis of the use of drugs (Ibuprofen 200, 400 and 600 mg) in self-medication for the period 2019-2022 in Despotovac

The obtained data (SPSS statistics 20) and calculated average values (AVERAGE) and standard deviation (ST DEV) of the consumption of OTC preparations for the four-year period from 2019-2022 were statistically processed with parametric tests. From Figure 1, it can be seen that by far the highest consumption is Ibuprofen of 400 mg (403.5 ± 36.78), followed by Ibuprofen of 600 mg (75.25 ± 9.81), while the lowest consumption for the mentioned four-year period was for Ibuprofen 200 mg (19.75 ± 19.52). Observed for each year individually, it was noted that the use of Ibuprofen 200 mg during the outbreak of COVID-19 (2020) showed a drastic increase, five times higher values on an annual basis compared to the time period before and after the occurrence of COVID-19. Ibuprofen 600 mg showed an increase in consumption in 2020 and 2021, while after that in 2022 there was a reduction in the consumption of the mentioned preparation, and such a value with fewer deviations was recorded even before the appearance of COVID-19 in 2019. All this indicates to us that the use of this OTC preparation in our region has increased many times in the year of the appearance of COVID-19. This can be explained by the more severe clinical picture accompanied by accompanying symptoms that characterize the flu (COVID-19), which is highly contagious and even reaches pandemic proportions.

Alternative medicine offers great opportunities for self-treatment and the use of plant-based preparations. Accompanying printed material, textbooks and the

availability of Internet and websites from brochures were the main source of information about indications, contraindications and possible side effects of certain preparations used in self-medication. The outcome of self-medication and the use of drugs and preparations are the joint responsibility of pharmacists and doctors, as well as patients. Free access to various medicines and abundant sources of information, advertising through the media, the Internet and deregulation of the pharmaceutical market pose a serious risk to the health of patients. In order to prevent and reduce adverse reactions as well as medical complications, timely consultation with a pharmacist on the correct, rational use of medicines is necessary.

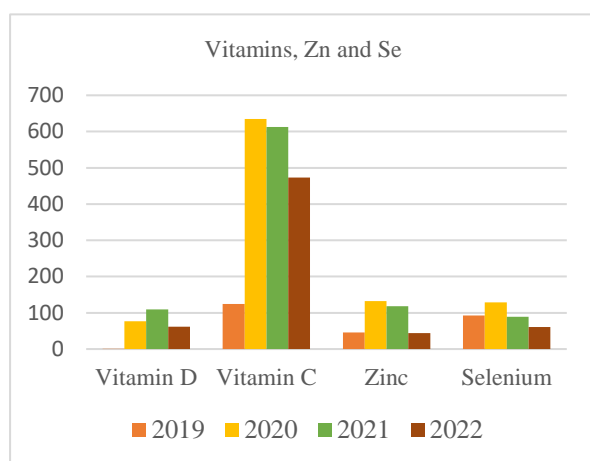


Figure 2. Comparative analysis of the use of drugs (Zn, Se and vitamins: D and C) in self-medication for the period 2019-2022 in Despotovac

From Figure 2 can be concluded that the occurrence of COVID-19 in the territory of the Pomoravlje district led to a large use of vitamin D in 2020 and 2021. A lot was said and discussed about the role of vitamin D on the human body during the COVID-19 pandemic, and a lot of attention was focused on the positive effects and benefits of vitamin D as a supplement that would reduce the risk of the infection itself. All of this is in favor of the fact that the aforementioned infection first appeared in the winter months, when the concentration of 25-hydroxy vitamin D is the lowest. Some clinical studies have determined that vitamin D deficiency contributed to the occurrence of acute respiratory distress syndrome, heart failure, and that the mortality rate increased with age and the associated occurrence of many chronic diseases (hypertension, diabetes, chronic heart and lung diseases). That is why many doctors of various specialties have suggested that the dose of vitamin D in the body should be increased during the flu because its mechanism of action enables the reduction of pro-inflammatory cytokines, C-reactive protein and at the same time the increase of anti-inflammatory cytokines, which is very useful in the treatment of COVID-19 [11]. Average consumption for four years from 2019-2022. year was 62.25 ± 45.29 , with the fact that in 2019 there was only 1 in the territory of the municipality of Despotovac, and the highest culmination in the sale of "Zdravlje 1" pharmacy was

observed in 2022 and was 109. Taking into account the four-year period supplementation with zinc (85 ± 46.55) and selenium (93 ± 27.90) also shows a drastic increase in the consumption and use of these supplements for the time period of 2020 and 2021, so that in 2022 there will be a reduction in use and sales of these OTC preparations. Vitamin C, considered a powerful antioxidant, played a role in removing free radicals (harmful reactive oxygen species), thereby protecting cells and tissues from oxidative stress and disturbances in normal functioning. Also, it is significant for raising the quality of the immune response in the fight against viral respiratory infection (COVID-19) and for a better outcome and reduced complications of the infection itself. In the years of marked expression and high contagiousness of the pandemic-like infection itself, a fivefold increase in sales and consumption of the said vitamin was observed.

The concept and standards of good pharmaceutical practice provide the basis for quality pharmaceutical care and services provided in pharmacies. All of this is based on the rational use of drugs as means to achieve a satisfactory therapeutic response and high quality of life results. The knowledge, competence and accessibility of pharmacists increase the effectiveness of pharmacotherapy and reduce the overall costs of health care [12,13]. Traditionally, pharmacists are considered the best and most reliable sources of information, so the pharmacist's communication skills are extremely important. Pharmacists contribute to effective and safe self-medication. Trust, satisfaction and good financial ability of consumers are key factors for the stability and sustainable development of pharmaceutical establishments in a highly competitive environment [14].

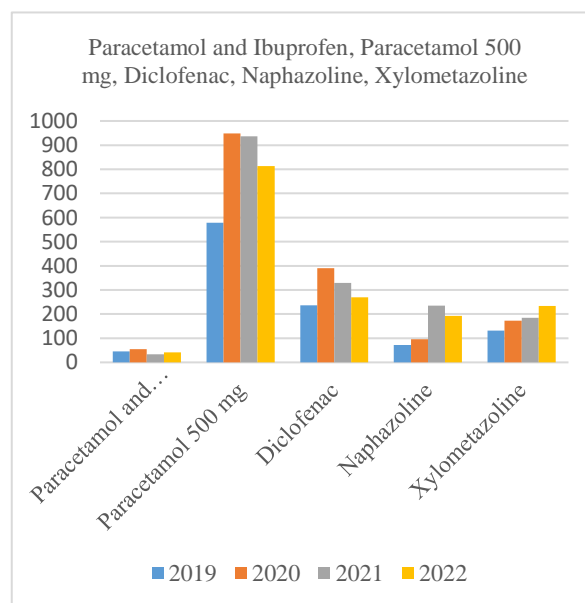


Figure 3. Comparative analysis of the use of drugs in self-medication for the period 2019-2022 in Despotovac

Figure 3 shows an almost two-fold increase in the consumption of Paracetamol 500 mg, which in 2019

amounted to 579, and in 2020 949 in the pharmacy “Zdravje 1” in Despotovac. The increase in consumption of Diclofenac for 2020 and 2021 is also characteristic. as an anti-inflammatory drug, as well as the reduction of the aforementioned in 2022 in the municipality of Despotovac in the pharmacy “Zdravje 1”.

The basic characteristics of the drug (efficacy, quality), the usual dose of OTC preparations and their low toxicity (safety) are the basis when deciding on the choice of a drug in self-medication [15]. In this way, health education of the population and a certain higher level of health culture of the population about the use of OTC preparations would be carried out [16].

It is very important to influence the awareness of the management of all healthcare institutions about the role of pharmacists in giving adequate instructions on how to use drugs in self-medication and monitoring the effectiveness of therapy [17], as well as about possible interactions after the use of two or more drugs in the therapy of chronic patients or the elderly population.

5. CONCLUSION

From this research work, it can be observed that higher consumption of vitamins C and D, Ibuprofen and Diclofenac during and immediately after the covid 19 pandemic. Although the data was taken from one pharmacy in the town of Despotovac, it aims to show us how the consumption of these supplements is maintained at the level of the entire country of Serbia during and after the covid infection. The strong position and opinion of pharmacists on the use of OTC drugs and referral to medical consultation and advice in order to obtain adequate therapeutic treatment and achieve satisfactory results in the occurrence of a disease, as well as to reduce the possible comorbidities of some diseases and the unwanted effects of the OTC preparation itself, are emphasized.

REFERENCES

1. D. Galato, L. M. Galafassi, G. M. Alano, S. C. Trauthman, “Responsible self-medication: Review of the process of pharmaceutical attendance,” *Braz. J. Pharm. Sci.*, vol. 45, no. 4, pp. 625 – 633, Dec. 2009.
DOI: 10.1590/S1984-82502009000400004
2. K. Wilbur, S. E. Salam, E. Mohammadi, “Patient perceptions of pharmacist roles in guiding self-medication of over-the-counter therapy in Qatar,” *Patient Prefer. Adherence*, vol. 4, no. 3, pp. 87 – 93, May 2010.
DOI: 10.2147/ppa.s9530
PMid: 20517469
PMCID: PMC2875718
3. E. A. Chrischilles, J. H. Lemke, R. B. Wallace, G. A. Drube, “Prevalence and characteristics of multiple analgesic drug use in an elderly study group,” *J. Am. Geriatr. Soc.*, vol. 38, no. 9, pp. 979 – 984, Sep. 1990.
DOI: 10.1111/j.1532-5415.1990.tb04419.x
PMid: 2212451
4. A. Blenkinsopp, C. Bradley, “Patients, society, and the increase in self-medication,” *BMJ*, vol. 312, no. 7031, pp. 629 – 632, Mar. 1996.
DOI: 10.1136/bmj.312.7031.629
PMid: 8595343
PMCID: PMC2350384
5. M. J. Sculpher, I. Watt, A. Gafni, “Shared decision making in a publicly funded health care system,” *BMJ*, vol. 319, no. 7212, pp. 725 – 726, Sep. 1999.
DOI: 10.1136/bmj.319.7212.725
PMid: 10487985
PMCID: PMC1116585
6. G. S. Lau, K. K. Lee, C. T. Luk, “Self-medication among university students in Hong Kong,” *Asia Pac. J. Public Health*, vol. 8, no. 3, pp. 153 – 157, Jul. 1995.
DOI: 10.1177/101053959500800301
PMid: 10050180
7. S. I. Sharif, O. H. M. Ibrahim, L. Mousli, R. Waisi, “Evaluation of Self-Medication among Pharmacy Students,” *Am. J. Pharmacol. Toxicol.*, vol. 7, no. 4, pp. 135 – 140, Dec. 2012.
DOI: 10.3844/ajptsp.2012.135.140
8. S. A. Sallam, N. M. Khallafallah, N. K. Ibrahim, A. O. Okasha, “Pharmacoepidemiological study of self-medication in adults attending pharmacies in Alexandria, Egypt,” *East. Mediterr. Health J.*, vol. 15, no. 3, pp. 683 – 691, May 2009.
PMid: 19731784
9. C. L. Lam, M. G. Catarivas, C. Munro, I. J. Lauder, “Self-medication among Hong Kong Chinese,” *Soc. Sci. Med.*, vol. 39, no. 12, pp. 1641 – 1647, Dec. 1994.
DOI: 10.1016/0277-9536(94)90078-7
PMid: 7846561
10. N. Morrow, O. Hargie, H. Donnelly, C. Woodman, ““Why do you ask?” A study of questioning behaviour in community pharmacist-client consultations” *Int. J. Pharm. Pract.*, vol. 2, no. 2, pp. 90 – 94, Jul. 1993.
DOI: 10.1111/j.2042-7174.1993.tb00732.x
11. P. B. Richman, G. Garra, B. Eskin, A. H. Nashed, R. Cody, “Oral Antibiotic Use without Consulting a Physician: A Survey of ED Patients,” *Am. J. Emerg. Med.*, vol. 19, no. 1, pp. 57 – 60, Jan. 2001.
DOI: 10.1053/ajem.2001.20035
PMid: 11146021
12. H. James, S. S. Handu, K. A. J. Al-Khaja, R. P. Sequeira, “Influence of medical training on self-medication by students,” *Int. J. Clin. Pharmacol. Ther.*, vol. 46, no. 1, pp. 23 – 29, Jan. 2008.
DOI: 10.5414/cpp46023
PMid: 18218294
13. F. R. Chang, P. K. Trivedi, “Economics of self-medication: Theory and evidence,” *Health Econ.*, vol. 12, no. 9, pp. 721 - 739, Sep. 2003.
DOI: 10.1002/hec.841
PMid: 12950092
14. J. R. Laporte, “Automedicación: la información de los usuarios aumenta al mismo tiempo que el consumo?,” *Med. Clin. (Barc)*, vol. 109, no. 20, pp. 795 - 796, Dec. 1997.
(J. R. Laporte, “Self-medication: Does information to users increase at the same rate as consumption,” *Med. Clin. (Barc)*, vol. 109, no. 20, pp. 795 - 796, Dec. 1997.)
PMid: 9493159
15. M. E. Ruiz, “Risks of self-medication practices,” *Curr. Drug Saf.*, vol. 5, no. 4, pp. 315 - 323, Oct. 2010.
DOI: 10.2174/157488610792245966
PMid: 20615179
16. M. A. Flaiti, K. A. Badi, W. O. Hakami, S. A. Khan, “Evaluation of self-medication practices in acute diseases among university students in Oman,” *J. Acute Dis.*, vol. 3, no. 3, pp. 249 – 252, 2014.
DOI: 10.1136/bmj.312.7031.629
PMid: 8595343
PMCID: PMC2350384

- DOI: 10.1016/S2221-6189(14)60056-1
17. J. S. Mogil, "Sex differences in pain and pain inhibition: Multiple explanations of a controversial

phenomenon," *Nat. Rev. Neurosci.*, vol. 13, no. 12, pp. 859 – 866, Dec. 2012.
DOI: 10.1038/nrn3360
PMid: 23165262