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DISCOVERY SCIENTIFIC SOCIETY

Knowledge about the use of over-the-counter painkillers in society

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ABSTRACT

Background: Modern society is increasingly reaching for over-the-counter (OTC) painkillers, treating them as a quick and convenient solution in the fight against everyday pain. *Aim*: The purpose of the research was to assess the level of knowledge regarding the use of over-the-counter painkillers among the cohort population. *Material and methods*: This study used a questionnaire method in the preparation of this article. The research tool was a self-designed survey, which permitted the collection of data and served as the basis for the study. Data collection utilized a web-based questionnaire comprising 28 distinct items. *Results*: All respondents in the study group claimed using over-the-counter painkillers in the past year. A quarter of the study group stated using over-the-counter remedies at least once a month. The frequency of use of over-the-counter painkillers varies quite a bit in the group of subjects. Younger subjects are less likely to use over-the-counter painkillers. In the study group, the most commonly used over-the-counter analgesics were ibuprofen (38%) and paracetamol (23%). There were no statistically significant findings in the relationship between the place of purchase of over-the-counter painkillers and the gender and age of the subjects. *Conclusions*: Studies indicate that more and more adult Poles reach for over-the-counter painkillers at least once a year, and knowledge about their use is still insufficient.

Key words: painkillers, pain relievers, over-the-counter drugs, analgesia, pharmacology

1. INTRODUCTION

Nowadays, many people show a significant tendency to reach for analgesics, colloquially named painkillers, that are available over the counter. These medicines are expected to be solution for many somatic ailments - both mild, and more severe. Issues like headaches, muscle soreness, period pain, or symptoms of a common cold often lead individuals to treat themselves on their own. Common active agents, such as paracetamol, ibuprofen, and acetylsalicylic acid (widely known as aspirin), have become so widespread that they are now a staple in most household first-aid kits. As the substances have been determined as over- the- counter, they seem to be quite safe and are widely available to buy. Patients do not seem to pay attention to their clinical indications, mechanisms of action, adverse effects, contraindications

and interactions with other drugs at all. Public opinion polls show that a significant part of the population does not consult a doctor or pharmacist before taking such preparations, based on their own experience, or recommendations of friends (Moore et al., 2011; Moore et al., 2015a).

Acetaminophen, commonly known as a paracetamol, is considered as the most frequently used analgesic. It is characterized by its effect on pain relieving, while being well tolerated by patients, especially with gastrointestinal problems. Many patients tend to forget its maximal daily dose, which can be dangerous and lead to liver failure or even death. Ibuprofen, a quintessential member of the non-steroidal anti-inflammatory drug (NSAID) class, is also widely used, particularly for self-treatment of common inflammations and fever. Nevertheless, its long-term use can lead to stomach problems, hypertension, or kidney damage. Aspirin, while effective in relieving pain and preventing blood clots, carries a risk of bleeding, especially in people with gastrointestinal diseases. It is also a worrying phenomenon to use painkillers in a preventive way – for example, before expected pain. This indiscriminate practice could lead to psychological dependence and diminish the therapeutic efficacy of these medications when clinically indicated, as a consequence of developing increased tolerance. Compounding the risk is the phenomenon of unwitting polypharmacy, wherein consumers, unaware of overlapping active ingredients across different brands, engage in co-ingestion. The lack of pharmacological insight poses a severe hazard of accidental supratherapeutic dosage exposure (Moore et al., 2015b).

Equally pivotal is the pervasive impact of direct-to-consumer advertising (DTCA), which significantly modulates consumer decision-making processes regarding pharmacotherapy. Some marketing strategies like aesthetic packaging or widespread advertisements promising rapid relief have made that these substances are now perceived in public opinion as very effective, safe and that they are great option to self-medicate. Unfortunately, the lack of proper health education in society means that many people do not read information leaflets, do not know contraindications, or ignore recommended doses. From a public health perspective, it is necessary to increase public awareness of the responsible use of painkillers. Educational curricula must transcend the traditional focus on pharmacodynamics and adverse profiles. Instead, they should promote a holistic understanding of pain management, focusing on non-pharmacological modalities like physical therapy, relaxation methods and modification of a lifestyle. Equally crucial is the role of pharmacists, who, as available specialists, can provide advice and warn of the risks associated with the misuse of medicines (Moore et al., 2011; Moore et al., 2015a).

The most frequently utilized OTC analgesics

Of the widely available non-prescription analgesics, paracetamol (acetaminophen) is still a predominant choice. Its primary clinical value lies in its potent antipyretic and analgesic properties, coupled with a favorable gastrointestinal tolerability profile compared to other common OTC agents, such as NSAIDs. Paracetamol, in terms of its pharmacological mechanism of action, does not have anti-inflammatory effects, so it would not work well in the treatment of inflammation, but it is safe for patients with accompanying stomach diseases or active gastric ulcers. However, patients should remember that an overdose could lead to acute liver failure, so it is necessary to follow the recommended doses while taking acetaminophen. Another popular agent is ibuprofen – a non-steroidal anti-inflammatory drug (NSAID), which, in addition to analgesic effects, also has anti-inflammatory and antipyretic properties. These substances have grown in popularity due to its common use for myalgia, arthralgia, dysmenorrhea, and infection-associated pyrexia. Even though they are extremely useful in everyday clinical practice, they have many serious side effects. Their chronic administration may lead to gastritis, peptic ulcer disease, gastrointestinal bleeding and haemodynamic dysregulation (Moore et al., 2015b). In this category stands out acetylsalicylic acid (ASA), commonly known as an aspirin, which diverges from other analgesics its accessory antiplatelet properties, alongside the antipyretic effects. This property underpins its established role in the secondary prevention of cardiovascular events. However, peptic ulcer disease or hemorrhagic disorders preclude its use due to the associated risks of gastric irritation and bleeding (Derry et al., 2017).

Other NSAIDs available in pharmacies include naproxen, diclofenac, and dexketoprofen, which have longer durations of action than ibuprofen. These substances are effective in treating inflammatory pain, e.g., rheumatic diseases or injuries. It is important for patients, especially elderly or chronically ill, to restrict their use only for a short time, take advantage of pharmaceutical consultation or contact with a doctor. Metamizole also should be considered, particularly considering a recent regulatory shift. The 500mg formulation remains available over-the-counter, while the maximal dosage (1g) has to be prescribed by the doctor, according to strict indications, until June 2025. This regulatory shift was caused by reports of contributing to agranulocytosis-and idiosyncratic, potentially lethal, hematological disease (Moore et al., 2015a). It therefore remains one of the more potent analgesics available without prescription, but only in its lower-dose variants, while its therapeutic use at full strength now requires medical oversight. It is also essential that the

combination of drugs that contain several active substances – e.g., paracetamol with caffeine or ibuprofen with pseudoephedrine – increases their effectiveness in treating pain associated with colds or migraines. Although their action can be faster and more comprehensive, patients should be under professional medical care to be aware not to exceed the maximum doses of individual ingredients. As indicated above, the most commonly used over-the-counter painkillers are paracetamol, ibuprofen, aspirin, naproxen, diclofenac, dexketoprofen, and metamizole, administered at lower doses. Clinical stratification of the appropriate agent requires a careful assessment of the type and origin of the pain, patients' clinical status, existence of potential comorbidities, and individual tolerability (Derry et al., 2017). Notwithstanding their over-the-counter availability, the administration of these substances requires caution, as all pharmaceutical preparations – including the seemingly safe one – can carry a risk of side effects. However, it is worth using the knowledge and advice of pharmacists and not treating painkillers as a universal solution for every ailment (Gaskell et al., 2017).

All things considered, the use of over-the-counter painkillers is a common issue that, in many cases, is justified. However, improper use, the absence of professional medical oversight, and ignoring the producers' recommendations may result in severe clinical complications, life- or health-threatening. In an era of increasing accessibility of medicines and information, it is imperative to enhance health literacy and promote responsible practices, enabling the general population to utilize pharmacotherapy in safe and rational manner (Moore et al., 2015b; Gaskell et al., 2017).

Research Objective

The study aimed to learn about the level of knowledge about the use of over-the-counter painkillers in society.

2. REVIEW METHODS

This article employed the questionnaire method. A self-authored, 28-item survey facilitated the data collection process via an online platform.

2.1. Inclusion and exclusion criteria for the study

Inclusion Criteria:

- informed consent of the respondent to participate in the study
- adults

Exclusion Criteria:

- lack of informed consent of the respondent
- persons under 18 years of age

2.2. Participants

The survey tested a group containing 100 people from different regions in Poland. Before participating in the study, the patients were informed about its scope and purpose and the informed consent to join anonymized protocol was obtained. The study cohort included 100 people - 57 females and 43 males.

2.3. Procedure

The study cohort included 100 participants. There were 57 women and 43 men. All collected forms were subjected to statistical analysis. The data were obtained in the period from February to March 2024. The study was directed to adults, living in different regions across Poland. Each of respondents was informed about the aim of the research and agreed to take part in the anonymous survey.

2.4. Statistical analysis

SPSS 17.0 software facilitated the data analysis, with statistical significance defined as $p \leq 0.05$.

2.4.1. Statistical Methods

Statistical analyses of nominal variables were carried out using the Chi-square test, as well as corresponding statistics, the primary purpose of which is to evaluate the strength of the correlation between the variables: Phi (tables two by two) and V by Kramer (tables

greater than two by two). When the variables represented data on ordinal scales, the correlation coefficients tau-b Kendall (for two ordinal variables with the same number of responses) and tau-c Kendall (for two ordinal variables with different numbers of responses) were used. Measures that determine the strength of the compound are normalized and take values from 0 to 1. A higher value of the coefficient indicates a stronger relationship between the tested factors. The obtained correlation results (Kendall's tau-b and Kendall's tau-c), as well as the Phi symmetric measure, can take negative values, which in this case are interpreted as an inverse relationship/correlation. When the crossover table consisted of questions built on a nominal and ordinal scale, then the statistics were read at a weaker level of measurement. When analyzing with the Chi-square test, it is essential to keep in mind certain assumptions. It is assumed that it allows for a sufficiently precise assessment of the test probability when there are fewer than 20% of cells with an expected number of less than 5 and when no cell has an expected number of less than 1.

3. RESULTS

The majority of the studied group were women (57% of respondents), and men were 43%. A slight majority in the surveyed group were rural residents (52%), while the city residents were 48%. People in the age range of 18 to 35 years (61%) constitute the majority of respondents. The smallest group is made up of people between 36 and 50 years of age (17%). The majority of the surveyed group were people with secondary education, 50%. Higher education is 32%, followed by people with vocational education is 16%. Among the respondents, the most significant groups are working people (58%) and learners/students (21%). Pensioners (20%) followed. The most significant part of the surveyed group, 41%, assesses their health status at 4 (good condition), followed by 31% of respondents at 3 (medium), then 20% of respondents rated their health condition at 5 (very good). In 2018, the dominant part of the surveyed group used a doctors advice 1-2 times, i.e., as many as 45% of respondents. The next part of the tested group went to visit more than 4 times 25%. 17% of respondents declared that they reported visiting 3-4 times. 100% of the study group declared that they had used over-the-counter painkillers in the past year (Figure 1).

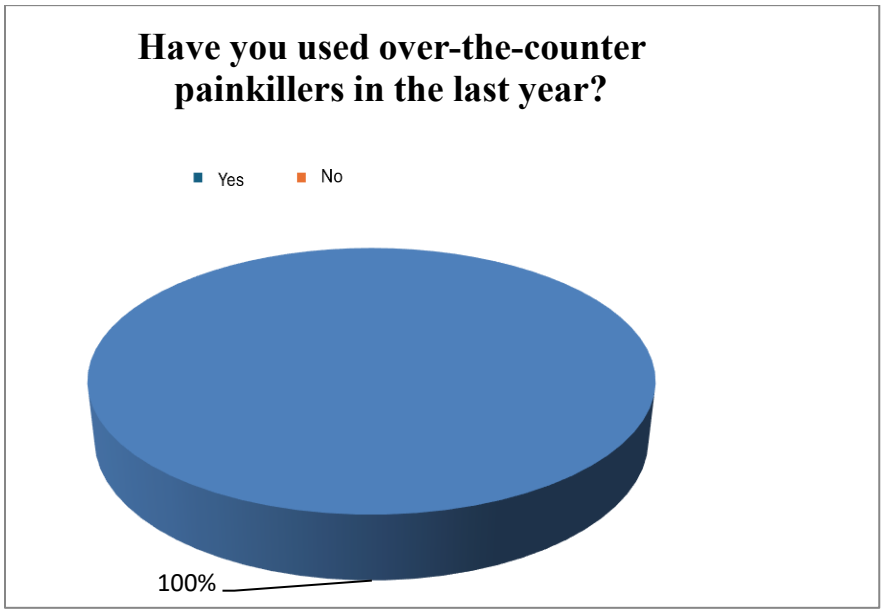

Figure 1. Over-the-counter use of painkillers in the past year among the study group

The most significant number of respondents, as many as 37%, claimed taking over-the-counter painkillers less often than once a month. 30% of respondents use over-the-counter painkillers several times a month. Consequently, 24% of the surveyed group answered that they use over-the-counter remedies at least once a month. The frequency of use of over-the-counter painkillers varies quite a bit in the group of subjects. Younger subjects are less likely to use over-the-counter painkillers (Figure 2).

In the study group, the most common reason for reaching for over-the-counter remedies to relieve pain was headache (45%), followed by 23% of respondents indicating menstrual pain. 7% of them were taking medication for pain in the lumbosacral region. 72% of those surveyed say they try to manage their pain in a different way than using an over-the-counter painkiller. And only 28% take painkillers without trying another method to alleviate the ailment. In the studied group, the respondents declared that when choosing

an over-the-counter painkiller, they most often suggested the effectiveness of as much as 48%. The respondents' choice of drug type was guided by the safety of the drug in 9% and 8% by the price. The results are visible in Figure 3.

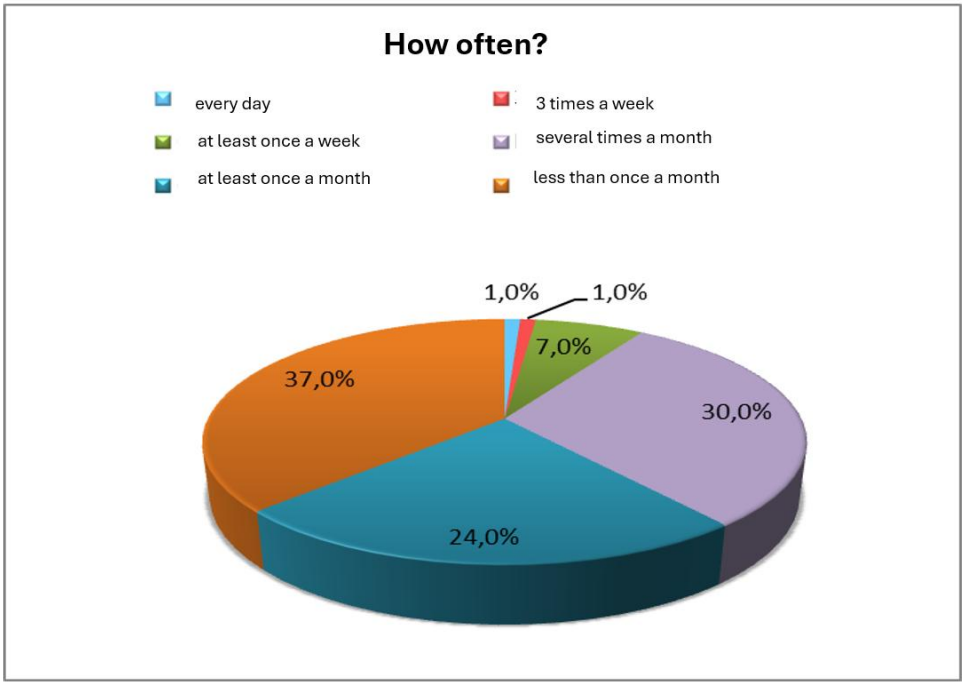

Figure 2. Frequency of over-the-counter use of analgesics in the study group

As a source of knowledge about over-the-counter painkillers, the respondents most often chose the information leaflet (22%), followed by TV advertising (20%) and the pharmacist (20%). In the study group, the most commonly used over-the-counter analgesic was ibuprofen (38%). Then the respondents chose paracetamol 23%. Subsequently, the respondents indicated ketoprofen 20%. The most common place to buy over-the-counter painkillers among the surveyed group was a pharmacy, as many as 82% of respondents gave such an answer. The next place was a 9% supermarket. And 5% of respondents indicated a gas station as the place of purchase. Statistical analysis revealed no significant difference between the place of obtaining over-the-counter painkillers and the gender and age of the subjects. The majority of participants answered 75% in the affirmative when asked about having a home first aid kit with over-the-counter painkillers, and 25% did not have painkillers at home. In the group of respondents, 52% of respondents answered that they always have over-the-counter painkillers with them, while 48% of respondents said that they do not take medication with them when traveling or to work. In the study group, when asked about the frequency of reading the leaflet before using over-the-counter painkillers, 37% of respondents answered sometimes, and 30% of respondents indicated that they read the leaflet very rarely. Then 26% always read the leaflet attached to the medicine packaging. No statistically significant difference was observed between the frequency of reading the leaflets attached to the package before the use of painkillers and gender, or place of residence.

Among the surveyed group, 88% of respondents answered yes to the question whether the content of the leaflet attached to the packaging of over-the-counter painkillers is written in an understandable language. Understanding the content of the leaflets attached to the packaging of painkillers does not depend significantly on education and place of residence. The majority of 79% of respondents answered yes to the question of whether they still want to use the drug after learning about the possible side effects that may occur after taking the drug. Only 21% of respondents resigned from taking the medication after reading information about it. When using over-the-counter painkillers, 89% of respondents did not experience side effects from the drug. And 11% declared that they had experienced side effects after taking painkillers. 58% of respondents feel anxious when there is no positive effect after using the medication.

On the other hand, 42% do not feel nervous. Among the surveyed group, 52% of respondents did not take a higher dose of over-the-counter painkillers than recommended. As many as 48% of respondents indicated that they had used a higher dose of an over-the-counter painkiller. Most respondents, 71%, are aware of the possible effects that may occur after taking over-the-counter painkillers not

in accordance with the recommendation. The survey also asked what the respondents most often drink: over-the-counter painkillers. 62% of respondents choose water, 25% do not pay attention to it.

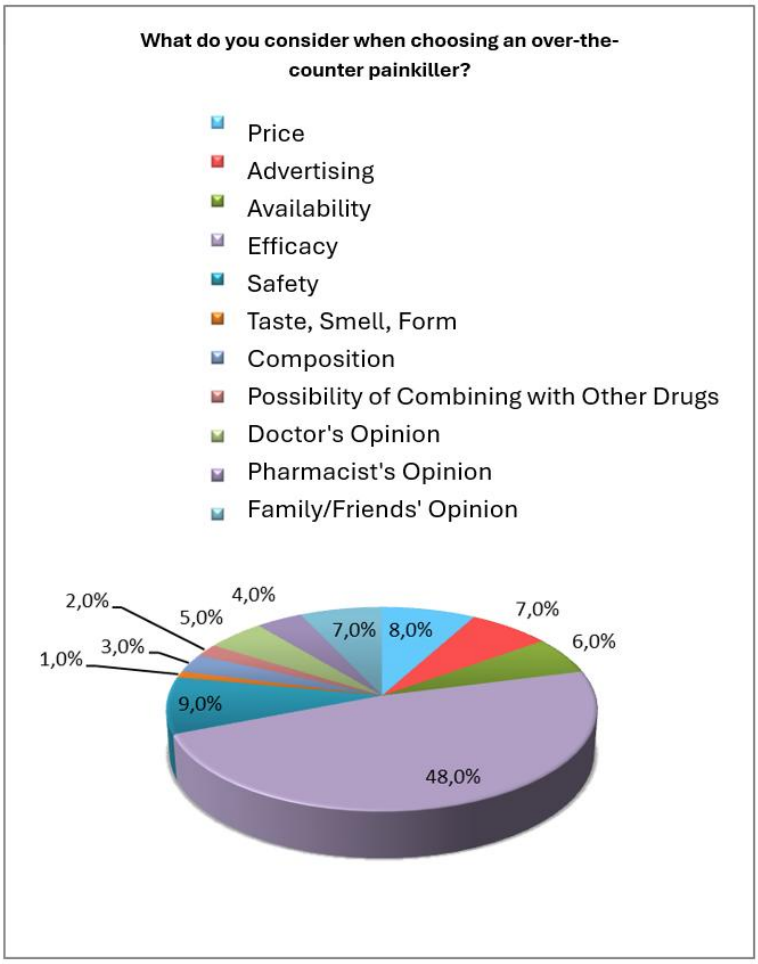

Figure 3. Factors influencing decisions in the case of over-the-counter analgesic purchase among the study group

On the other hand, 6% drink their medication with tea. A fifth of respondents, 20% declared that they had combined an over-the-counter painkiller with alcohol. More than half of respondents, 58%, have knowledge about the active ingredient associated with over-the-counter painkillers. Knowledge of the active substance in the drug used is not statistically significantly dependent on the age or education of the subjects. The majority of those surveyed, 79%, believe that the affordability of over-the-counter painkillers is sufficient. 14% think access is too big, and only 7% think it is too small. During the analysis, no statistically significant correlation was shown between the education and age of the respondents and their opinion on the availability of over-the-counter painkillers.

4. DISCUSSION

Public awareness of the use of over-the-counter (OTC) painkillers is an issue of increasing importance in the context of public health. In the era of easy access to pharmaceuticals, self-medication has become a common practice, and painkillers are ones of the most frequently chosen medicinal products. On the one hand, they allow for quick pain relief and improvement of the comfort of life; on the other hand, their improper use can lead to serious health consequences. A thorough discussion on the level of knowledge of the society in this area requires taking into account both educational and cultural, economic and systemic aspects (Derry et al., 2015).

Research conducted among adult Poles shows that 89% used over-the-counter drugs during the year, of which painkillers and anti-inflammatories were the most frequently chosen. Such a high percentage of users indicates its common use, but not necessarily its reasonable and safe administration – in accordance with indications. Another study showed that a significant percentage of respondents was unaware about the basic rules of using painkillers, such as the maximum daily dose or the risk of interaction with

other preparations. Such a lack of knowledge in the patient population could lead to drug abuse, improper drug combinations, and, in severe cases, to damage to the liver, kidneys, or digestive system (Derry et al., 2013). It is worth noting that the knowledge about painkillers is not uniform across different social groups. Studies show that younger people who are more educated and live in cities are more aware of the risks associated with self-medication than older people, those with lower levels of education, or those who live in rural areas. These differences may result from access to information, the level of health education, and cultural habits (Bailey et al., 2013; Weibel et al., 2020).

In many cases, decisions about taking medication depend on the basis of recommendations from family, friends, or advertisements, rather than consultation with a pharmacist or doctor. The role of the media and pharmaceutical marketing is not without significance. Pharmaceutical companies spend huge amounts of money to the promote OTC drugs, what makes that they are perceived as safe and universal remedies for all ailments among patients. Advertisements often do not include the information about adverse effects, contraindications, or the need of consultation with a doctor. As a result, the society may have a false sense of security, which promotes the reckless use of painkillers (Derry et al., 2013a; Derry et al., 2015a).

Another aspect worth discussing is the place where the drugs are purchased. Although the majority of respondents declare that they buy OTC drugs in pharmacies, the percentage of people buying them in grocery stores, drugstores, or online is growing. In such places, there is a lack of professional pharmaceutical advice, which increases the risk of misuse. In addition, the availability of medicines outside pharmacies may be conducive to treating them as ordinary consumer products rather than as medicinal substances requiring caution (Moore et al., 2015; Stephens et al., 2016). In the context of safe OTC drug usage, health education should emphasize the role of information campaigns in schools or public media. Promoting knowledge about the safe use of painkillers should be part of a broader health prevention strategy. Education should include not only information about dosage, but also about the mechanisms of action of drugs, the risk of addiction, interactions with other substances, and alternative methods of pain management (Derry et al., 2012; Jerez-Roig et al., 2014). However, the psychological aspect cannot be overlooked, because pain is a subjective experience, and its sensation and reactions to it are strongly linked to emotions, stress, and lifestyle.

Analgesics consumption frequently is a sign of psychosomatic strain, weakness, fatigue, or affective distress rather than somatic damage. In these contexts, pharmacotherapy provides only symptomatic masking, leaving the distinct etiology unresolved (Marjoribanks et al., 2015). Ideally, public education must reframe pain management not as a pill-based solution, but as a dual discipline requiring both physiological and psychological interventions (Freytag et al., 2014).

Collectively, the findings expose a critical lack of knowledge in public health literacy concerning non-prescription analgesics, which draws attention to conducting educational campaigns in this area. A troubling paradox emerges while the consumption of these agents is ubiquitous, adherence to safe dosing protocols remains low. This disconnect is largely driven by commercial messaging, which frequently overshadows the necessity of professional pharmacist consultation. Educational, regulatory, and responsible self-medication activities are necessary. It is the only way to reduce the risk of health complications and improve the patient's quality of life (Derry et al., 2014; Dale et al., 2015; Crews et al., 2014).

5. CONCLUSION

Although recent data suggests increasing awareness of safety, the need for sustained public discourse remains serious. Knowledge and understanding of pharmacology is essential, especially when it comes to widely accessible over-the-counter agents, which – despite their perceived safety - can cause serious health consequences if they are used improperly. Many people treat the use of OTC drugs as a form of self-care, which can lead to uncontrolled and unconscious use. Unfortunately, the level of knowledge about painkillers, the rules of their use, possible side effects, and interactions with other drugs can be insufficient.

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Conceptualization - Sabina Krupa-Nurcek, Martyna Winiarska, and Dominika Wiśniewska. Methodology - Michał Klimas, Dominik Jucha, and Arkadiusz Jamro

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Writing - review and editing: Dominika Wiśniewska, Martyna Winiarska
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Data and materials availability
All data associated with this study will be available based on reasonable request to the Corresponding Author.

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