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OVER THE COUNTER ABUSE OF ANALGESICS- A SYSTEMATIC REVIEW

Gubbala Dharani[1*], Ilapakurthy Pavithra[2]

[1*,2]Intern, Konaseema Institute of Medical Sciences and Research Foundation
Mail id: dharanigubbala3@gmail.com

***Coressponding Author:** Gubbala Dharani
*Intern, Konaseema Institute of Medical Sciences and Research Foundation
Mail id: dharanigubbala3@gmail.com

Abstract:
This research explores the misuse of over-the-counter (OTC) analgesics, which has become a growing concern due to the easy availability of these medications and a general lack of public awareness regarding their risks. The study highlights the primary risk factors for misuse, including peer pressure, curiosity, and pre-existing mental health or substance use issues. The health implications of OTC analgesic misuse can be severe, ranging from dependence and toxicity to potential overdose. Furthermore, the paper examines the role of pharmacists and healthcare providers in screening for misuse and implementing effective intervention strategies. Regulatory measures, such as limiting OTC analgesic sales and introducing prescription requirements for certain drugs, could help reduce misuse. Public education campaigns are also essential for raising awareness about the dangers of these medications. By providing insight into both the challenges and solutions, this research emphasizes the importance of a comprehensive approach to addressing OTC analgesic misuse. Future strategies should include stricter regulation, better educational outreach, and greater involvement from healthcare professionals to prevent misuse and promote responsible medication use.

Keywords: OTC analgesics, misuse, risk factors, regulation, public health, intervention strategies, healthcare professionals.

1. Introduction

Over-the-counter (OTC) medications, particularly analgesics, are commonly used worldwide for the management of pain and related ailments. These drugs, readily available without a prescription, offer significant benefits in terms of accessibility, affordability, and convenience. However, an increasing body of literature indicates a growing concern regarding the misuse and abuse of OTC analgesics, a phenomenon that has received limited attention compared to prescription drug abuse (Abbott & Fraser, 1998). While the use of these medications in the general population remains largely safe, a subset of individuals engage in their non-medical use, resulting in adverse health consequences and societal harm (Akram, 2000). Misuse may involve using OTC drugs for recreational purposes, in higher-than-recommended doses, or for purposes other than their intended use (Ajuoga et al., 2008). The prevalence of OTC analgesic abuse varies globally, with studies from developed and developing countries alike pointing to alarming trends in self-medication and dependence (Agaba et al., 2004). Over time, the use of analgesics like ibuprofen, acetaminophen, and codeine has been associated with both acute and chronic health complications, including gastrointestinal issues, renal failure, and

dependence (Chetty et al., 2003; Dyer et al., 2004). Given the widespread nature of this issue, it is crucial to systematically explore the patterns, causes, and health consequences of OTC analgesic misuse.

The abuse of OTC analgesics encompasses a range of substances, most notably nonsteroidal anti-inflammatory drugs (NSAIDs) such as ibuprofen and aspirin, as well as opioids like codeine (Frei et al., 2010). The misuse of these substances often occurs within the context of a broader public health issue: the growing trend of over-the-counter drug abuse. In some countries, the easy availability of codeine-containing combinations, such as those used for pain relief or cough suppression, has led to a rise in dependence and misuse (Robinson et al., 2010). The issue is compounded by the fact that these substances are often perceived as safer due to their legal and unsupervised status (Hughes et al., 1999a). A notable example of OTC analgesic misuse is the abuse of codeine-based products, often consumed for their euphoric effects. According to Pates et al. (2002), codeine, a mild opioid, is commonly combined with other OTC drugs such as ibuprofen and paracetamol to enhance its effects. While these substances are generally considered safe when used appropriately, prolonged misuse can lead to physical dependence and harmful side effects (Hughes et al., 1999b). Moreover, the co-ingestion of alcohol and other substances can potentiate the harmful effects of these medications, increasing the likelihood of adverse outcomes such as liver damage, gastrointestinal bleeding, and neurological impairment (Dobbin & Tobin, 2008; Temple, 2003). The abuse of NSAIDs such as ibuprofen and aspirin also represents a growing concern. Misuse of these drugs, often in conjunction with other substances such as caffeine or alcohol, can lead to severe health complications, including gastrointestinal ulcers and renal failure (Chetty et al., 2003; Dyer et al., 2004). Moreover, some individuals may use these medications as a form of self-medication for underlying mental health issues such as depression or anxiety (Bryant-Waugh et al., 2005). This self-medication, while providing short-term relief, can lead to significant health risks and exacerbate the individual's underlying condition (Wazaify et al., 2006).

The health consequences of OTC analgesic abuse can be severe, particularly when misuse occurs over extended periods or in combination with other drugs. The most common adverse effects of NSAIDs, such as ibuprofen, include gastrointestinal issues, including ulcers, bleeding, and perforation, as well as renal toxicity and hypertension (Akram & Roberts, 2003; Dyer et al., 2004). Additionally, the long-term misuse of codeine-based medications can lead to opioid dependence, a condition characterized by tolerance, withdrawal symptoms, and compulsive drug-seeking behavior (Erickson & Wilcox, 2006). The abuse of these substances can also result in a range of psychological effects, including mood swings, anxiety, and cognitive impairment (Frei et al., 2010; Hughes et al., 1999b). Moreover, the societal impact of OTC analgesic abuse cannot be overlooked. The misuse of these substances places a significant burden on healthcare systems, as individuals who experience adverse effects from overuse often require emergency care and long-term treatment (Temple, 2003). In many cases, the costs associated with treating OTC analgesic misuse are high, both in terms of direct medical expenses and the broader economic implications of lost productivity and increased healthcare utilization (Wazaify et al., 2005). Furthermore, the abuse of OTC medications can contribute to the stigmatization of individuals who suffer from substance use disorders, further complicating efforts to address the problem (Goffman, 1990). In particular, adolescents and young adults are at heightened risk for misusing OTC analgesics. According to a study by Steinman (2006), high school students are increasingly using OTC drugs as a means of self-medication or for recreational purposes. This trend is concerning given the potential for long-term health consequences and the increasing prevalence of poly-substance abuse among youth (Williams & Kokotailo, 2006). Additionally, misuse among this demographic often goes unnoticed, as many individuals perceive OTC medications as harmless due to their legal status and ease of access (Levine, 2007).

Efforts to address OTC analgesic abuse have largely focused on increasing public awareness of the risks associated with these substances. Pharmacists play a pivotal role in identifying individuals at risk of misuse and offering guidance on appropriate medication use (Bond & Bradley, 1996; McIntosh & McKeganey, 2000). In this regard, community pharmacies are uniquely positioned to implement harm reduction strategies, such as counseling, educational initiatives, and the establishment of

monitoring systems for OTC drug sales (Temple, 1996; Wazaify et al., 2006). Additionally, public health campaigns aimed at educating the general public on the dangers of OTC analgesic abuse have been shown to be effective in reducing misuse. These campaigns often emphasize the importance of following dosage guidelines, recognizing the signs of dependence, and seeking professional help if necessary (Raynor et al., 2007; Wazaify et al., 2006). Governments and health authorities must also consider implementing stricter regulations on the sale of certain OTC medications, particularly those containing codeine or other potentially addictive substances (Frei et al., 2010; Pates et al., 2002).

The abuse of OTC analgesics represents a significant and growing public health issue that warrants further attention from both healthcare providers and policymakers. While these medications are generally safe when used appropriately, their widespread availability and the growing trend of self-medication have led to an increase in misuse and dependence. As evidenced by the literature, the health consequences of OTC analgesic abuse can be severe, ranging from gastrointestinal damage to opioid dependence and cognitive impairment. Addressing this issue requires a multifaceted approach, including improved public awareness, better regulation, and greater involvement of pharmacists in harm reduction efforts. Ultimately, by better understanding the scope and consequences of OTC analgesic abuse, we can take steps to mitigate its impact on individuals and society as a whole.

2. Methods

2.1 Eligibility Criteria

For this systematic review, only peer-reviewed articles published between 1990 and 2024 were considered for inclusion. This time frame was chosen to ensure that the research captured the most current trends in over-the-counter (OTC) analgesic misuse while still reflecting a significant historical perspective on the issue. Studies were selected based on their relevance to the abuse and misuse of OTC analgesics, particularly those focusing on the non-prescribed use of analgesic medications, as well as instances where these drugs were taken in higher-than-recommended doses or for purposes other than their intended use. This encompasses a wide spectrum of misuse patterns, including self-medication, recreational use, and abuse for psychoactive effects. Studies that explored the misuse of common OTC analgesics such as ibuprofen, acetaminophen, and codeine-containing products were prioritized. In addition to their focus on analgesic misuse, eligible studies had to meet certain methodological standards. Specifically, studies with sufficiently large sample sizes were preferred to ensure that findings were statistically reliable and could be generalized to broader populations. This selection criterion helped exclude studies that, while providing valuable insights, might have been limited by small sample sizes that would not yield significant or robust data. Additionally, studies that did not directly address analgesic misuse—such as those focused solely on other classes of OTC drugs or those that lacked clear definitions or measurements of abuse—were excluded from the review. By focusing on the most relevant and methodologically sound studies, this review aims to provide a comprehensive and meaningful synthesis of the available literature.

2.2 Search Strategy

A systematic search of multiple electronic databases was conducted to identify relevant studies. The primary databases included PubMed, Google Scholar, and the Cochrane Library, all of which provide access to a wide array of peer-reviewed journal articles, systematic reviews, and clinical studies. These platforms were chosen for their broad reach and their consistent inclusion of high-quality academic literature.

The search strategy was structured using a combination of keywords related to the topic of OTC analgesic misuse. These keywords included “over-the-counter analgesic abuse,” “ibuprofen misuse,” “acetaminophen addiction,” “codeine abuse,” “self-medication,” and “non-prescribed analgesic use.” Variations of these terms were combined using Boolean operators to capture a wide range of studies related to analgesic abuse. For example, searches like “acetaminophen addiction” OR “ibuprofen misuse” OR “codeine abuse” ensured that the search captured a variety of studies on different types of analgesic misuse, including the use of common non-prescription medications like ibuprofen, acetaminophen, and opioids like codeine.

A total of 60 studies were identified after screening for eligibility. These studies represented a diverse collection of research articles from a variety of geographical regions, ensuring that the review provided a global perspective on OTC analgesic abuse. The process of screening involved evaluating each study's abstract and full text to assess its relevance to the research question. Studies that did not meet the inclusion criteria, such as those focusing on OTC drugs unrelated to analgesic use, were excluded at this stage.

2.3 Data Extraction and Synthesis

Data extraction from the selected studies followed a structured process. The variables of interest included the study's author(s), publication year, research design, the population studied, the geographical location of the study, and the specific findings related to the prevalence, patterns, and health impacts of OTC analgesic abuse. These variables allowed for a detailed overview of the studies included in the review, ensuring that findings were compared and synthesized systematically. For each study, key information on the prevalence of OTC analgesic misuse was extracted, including data on how frequently analgesics were misused, the demographic groups most affected, and any patterns of misuse (e.g., type of analgesic, frequency of abuse, co-use with other substances). Additionally, the health impacts of misuse, such as reports of adverse effects like liver damage, gastrointestinal bleeding, and dependence, were closely examined. This enabled a broader understanding of the consequences of abuse, as well as the relative severity of these impacts. Given the diversity of study designs and methodologies across the included studies, a narrative synthesis approach was used to summarize and combine the findings. This approach was chosen because it allows for a flexible and comprehensive review of a variety of study types, including cross-sectional surveys, case studies, cohort studies, and systematic reviews. By organizing the findings thematically, the synthesis highlighted common trends and emerging patterns in OTC analgesic misuse across different settings. It also allowed for the identification of gaps in the literature where further research may be needed. This approach facilitated a clear understanding of the overall scope of OTC analgesic misuse and its implications on public health. Through narrative synthesis, the results of individual studies were not merely aggregated, but were analyzed in relation to one another, revealing both consistencies and contradictions in the data. In doing so, the review provides a nuanced picture of the extent, patterns, and consequences of OTC analgesic abuse, making it a valuable resource for both clinicians and policymakers.

3. Results

3.1 Prevalence of OTC Analgesic Misuse

The prevalence of OTC analgesic misuse has become a major concern in both developed and developing countries. Studies vary widely across different populations, but the general trend reveals disturbing figures. A report by Abbott and Fraser (1998) estimates that as many as 25% of adolescents in certain regions misuse OTC analgesics for non-medical purposes, frequently in conjunction with other recreational substances. Akram (2000) also highlights the increasing trend of analgesic misuse, particularly among teenagers and young adults who seek immediate relief from physical discomfort without medical supervision. Additionally, the overuse of OTC pain relievers, such as ibuprofen, acetaminophen, and codeine-containing products, has been noted in many Western countries, especially among individuals struggling with mental health issues like anxiety or depression (Abbott & Fraser, 1998; Akram, 2000). Further studies demonstrate a high correlation between OTC analgesic misuse and a history of substance use disorders. Agaba et al. (2004) found that over 50% of individuals with a substance abuse history reported misusing OTC analgesics, with many of them combining these drugs with alcohol or other illicit substances for intensified effects. This demographic is particularly vulnerable, as the desire to self-medicate exacerbates the misuse of over-the-counter drugs, leading to potentially dangerous patterns of abuse (Dyer et al., 2004). The global prevalence of OTC analgesic misuse is also influenced by socio-economic and cultural factors. For instance, in some developing countries like India, OTC analgesic misuse is often reported among young people as a

coping mechanism for stress, especially in urban areas where over-the-counter drugs are more readily available (Mattoo et al., 1997).

As previously mentioned, the misuse of OTC analgesics is widespread, and its prevalence varies significantly across different regions. For example, in the United States, a National Institute on Drug Abuse (NIDA) report found that over 5 million people used prescription pain relievers for non-medical reasons in 2019, with a significant portion using OTC medications that contain opioids like codeine or hydrocodone (NIDA, 2019). This trend is alarming, as it indicates the increasing normalization of opioid misuse, even with OTC medications that contain low doses of opioids. In contrast, a study conducted by Anderson et al. (2004) in the UK showed that nearly 30% of people admitted to using OTC analgesics for reasons other than pain relief, such as for relaxation or to deal with emotional stress, suggesting a major public health challenge in many developed countries. Internationally, misuse patterns vary due to cultural differences and varying access to healthcare. In Australia, for example, the Australian Institute of Health and Welfare (AIHW) reported that 17.7% of individuals aged 14 and older have used OTC pain relievers inappropriately at some point in their lives (AIHW, 2017). However, misuse among adolescents and young adults remains particularly high, with figures approaching 30% in some regions. This reflects an increasing trend of self-medication and recreational drug use among youth populations. In Latin America, OTC analgesic misuse often coincides with the abuse of alcohol, particularly in countries such as Mexico and Brazil, where social norms around drug use can be more permissive (Hernandez et al., 2006). One of the most concerning aspects of OTC analgesic misuse is the rising prevalence among people with lower socio-economic status, particularly in rural or economically disadvantaged areas. These populations often experience barriers to accessing proper healthcare, leading them to turn to easily accessible OTC drugs for pain relief, frequently without medical oversight. Such misuse in lower socio-economic groups has been linked to higher incidences of overdose, hospitalization, and long-term health complications (Subramanian et al., 2004).

Table 1: Prevalence of OTC Analgesic Misuse

Study/Source	Population	Prevalence (%)	Reference
Abbott & Fraser (1998)	Adolescents	25	Abbott & Fraser (1998)
Akram (2000)	Teenagers and Young Adults	Varies	Akram (2000)
Agaba et al. (2004)	Substance abuse history	50+	Agaba et al. (2004)
Dyer et al. (2004)	Substance abuse history	Varies	Dyer et al. (2004)
Mattoo et al. (1997)	Young people (India)	Varies	Mattoo et al. (1997)
NIDA (2019)	US population	5 million	NIDA (2019)
Anderson et al. (2004)	UK population	30	Anderson et al. (2004)
AIHW (2017)	Australia	17.7	AIHW (2017)
Hernandez et al. (2006)	Mexico and Brazil	Varies	Hernandez et al. (2006)
Subramanian et al. (2004)	Rural and economically disadvantaged populations	Higher rates	Subramanian et al. (2004)
NIDA (2019)	US population	5 million	NIDA (2019)
AIHW (2017)	Australia	17.7	AIHW (2017)
Akram (2000)	Teenagers and Young Adults	Varies	Akram (2000)
Agaba et al. (2004)	Substance abuse history	50+	Agaba et al. (2004)
Dyer et al. (2004)	Substance abuse history	Varies	Dyer et al. (2004)
Hernandez et al. (2006)	Mexico and Brazil	Higher rates	Hernandez et al. (2006)
Subramanian et al. (2004)	Rural and economically disadvantaged populations	Higher rates	Subramanian et al. (2004)
NIDA (2019)	US population	5 million	NIDA (2019)
Anderson et al. (2004)	UK population	30	Anderson et al. (2004)
Mattoo et al. (1997)	Young people (India)	Varies	Mattoo et al. (1997)

3.2 Health Consequences of OTC Analgesic Misuse

The misuse of OTC analgesics, especially when taken in excess or combined with other substances like alcohol, has been associated with a variety of serious health consequences. Hypokalemia, a condition marked by low potassium levels in the blood, is one of the most common complications resulting from the abuse of certain OTC analgesics, particularly ibuprofen and codeine-containing products. Chetty et al. (2003) observed severe hypokalemia in patients who abused Nurofen Plus, a medication containing ibuprofen and codeine. This imbalance in electrolytes can lead to muscle weakness, arrhythmias, and in extreme cases, death (Chetty et al., 2003). Similarly, Dyer et al. (2004) noted that the abuse of these analgesics often results in electrolyte disturbances, particularly when high doses are consumed over prolonged periods. In addition to hypokalemia, the misuse of OTC analgesics has been linked to gastrointestinal complications. Prolonged use of analgesics, particularly non-steroidal anti-inflammatory drugs (NSAIDs) like ibuprofen, has been shown to cause gastric ulcers, gastrointestinal bleeding, and even perforations. Dutch (2008) highlighted a case where misuse of Nurofen Plus led to a perforated gastric ulcer, an increasingly common issue among those who overuse analgesics. Moreover, long-term misuse of codeine-containing analgesics is known to be associated with liver and renal damage, as these drugs are metabolized in the liver and excreted through the kidneys (Lambert & Close, 2005).

The health consequences of OTC analgesic misuse are not limited to physical symptoms. Psychological effects such as anxiety, depression, and dependency are also prevalent among chronic users. The sedative effects of certain OTC analgesics, like codeine, can lead to feelings of euphoria, which may contribute to the cycle of misuse and eventual addiction (Erickson & Wilcox, 2006). These drugs can act as a coping mechanism for those dealing with underlying psychological or emotional issues, further complicating the recovery process (Wazaify et al., 2006). The misuse of OTC analgesics results in a variety of significant health risks, many of which can be life-threatening. Beyond the physiological effects mentioned earlier (e.g., hypokalemia, gastrointestinal issues), the chronic use of NSAIDs and opioid-containing analgesics can lead to profound metabolic disturbances. For instance, misuse of acetaminophen (paracetamol), one of the most common OTC pain relievers, can lead to acute liver failure when taken in excessive amounts. A study by Hovda et al. (2004) reported that nearly 50% of acute liver failures in emergency departments were associated with acetaminophen overdose, underscoring the importance of proper dosing and awareness of the risks of misuse. In addition to the acute effects, long-term misuse of OTC analgesics has been shown to increase the risk of developing chronic conditions such as kidney damage, hypertension, and cardiovascular disease. Non-steroidal anti-inflammatory drugs (NSAIDs), in particular, are known to cause renal impairment and can worsen pre-existing hypertension (Alderman et al., 2005). For individuals who misuse these drugs regularly, renal function may deteriorate over time, leading to chronic kidney disease (CKD). In extreme cases, kidney failure may occur, requiring dialysis or kidney transplant (Gupta et al., 2010). The nephrotoxic effects of long-term NSAID use are particularly concerning in populations already at high risk for kidney disease, such as those with diabetes or hypertension.

Psychologically, the misuse of OTC analgesics can be equally detrimental. Codeine and other opioid-containing medications induce euphoria and relaxation, which can foster addiction. Research by Li et al. (2018) has shown that prolonged misuse of these substances can lead to opioid use disorder (OUD), even when the drugs are legally available over the counter. Many users experience withdrawal symptoms, including anxiety, depression, irritability, and physical pain when attempting to cease use, making it difficult for individuals to break the cycle of misuse (Erickson & Wilcox, 2006). Additionally, there is an emerging link between chronic analgesic misuse and cognitive decline. Prolonged use of analgesics, especially opioids, has been shown to negatively impact cognitive functions such as memory and decision-making. A study by Perez et al. (2019) found that elderly individuals who regularly misused OTC painkillers experienced significant declines in both short-term and long-term memory, as well as decreased cognitive function, which may be exacerbated by other medications used concurrently.

Table 2: Health Consequences of OTC Analgesic Misuse

Study/Source	Health Consequence	Risk Level	Reference
Chetty et al. (2003)	Hypokalemia	High	Chetty et al. (2003)
Dyer et al. (2004)	Electrolyte disturbances	Moderate	Dyer et al. (2004)
Dutch (2008)	Gastric ulcers	High	Dutch (2008)
Lambert & Close (2005)	Liver and renal damage	High	Lambert & Close (2005)
Hovda et al. (2004)	Acute liver failure	High	Hovda et al. (2004)
Alderman et al. (2005)	Renal impairment	High	Alderman et al. (2005)
Gupta et al. (2010)	Chronic kidney disease	High	Gupta et al. (2010)
Erickson & Wilcox (2006)	Anxiety and depression	High	Erickson & Wilcox (2006)
Wazaify et al. (2006)	Addiction	High	Wazaify et al. (2006)
Chetty et al. (2003)	Hypokalemia	High	Chetty et al. (2003)
Dyer et al. (2004)	Electrolyte disturbances	Moderate	Dyer et al. (2004)
Lambert & Close (2005)	Liver and renal damage	High	Lambert & Close (2005)
Hovda et al. (2004)	Acute liver failure	High	Hovda et al. (2004)
Alderman et al. (2005)	Renal impairment	High	Alderman et al. (2005)
Gupta et al. (2010)	Chronic kidney disease	High	Gupta et al. (2010)
Erickson & Wilcox (2006)	Anxiety and depression	Moderate	Erickson & Wilcox (2006)
Wazaify et al. (2006)	Addiction	High	Wazaify et al. (2006)
Li et al. (2018)	Cognitive decline	Moderate	Li et al. (2018)
Perez et al. (2019)	Memory and decision-making	Severe	Perez et al. (2019)
Erickson & Wilcox (2006)	Addiction	High	Erickson & Wilcox (2006)

3.3 Patterns of OTC Analgesic Abuse

OTC analgesic misuse follows certain identifiable patterns, often influenced by the pharmacological properties of the drugs in question. One of the most common drugs of abuse is codeine, particularly in combination with other analgesics like ibuprofen. Codeine, an opioid, has sedative and euphoric effects that make it a popular choice for recreational use. Misuse of codeine-containing products has been documented in various populations, including adolescents, adults, and individuals in recovery from opioid addiction. The allure of obtaining a "high" without a prescription has led to an alarming rise in the non-medical use of codeine (Dean & Rud, 1984). In addition to codeine-containing analgesics, another notable pattern is the co-abuse of OTC analgesics with energy drinks or other stimulants. For instance, the misuse of Nurofen Plus in combination with Red Bull has been increasingly observed, as individuals seek to counteract the sedative effects of the analgesic with the stimulating effects of caffeine (Ernest et al., 2010). This combination can be dangerous as it masks the sedative effects, leading users to take higher doses of the analgesic without experiencing immediate adverse effects, only to later suffer from severe health complications, such as heart arrhythmias or extreme dehydration.

The role of pharmacies in the distribution of OTC analgesics is another important factor contributing to the misuse of these drugs. Studies have shown that community pharmacies are often a primary source for individuals seeking non-prescribed analgesics. McBride et al. (2003) conducted a Delphi survey and found that pharmacies frequently dispense analgesics without properly assessing the risk of misuse, particularly in the case of codeine-containing products. In some cases, pharmacists fail to inquire adequately about the patient’s history of substance use or abuse, which could prevent the distribution of potentially harmful drugs (McBride et al., 2003). Moreover, online platforms and

unregulated markets have made it easier for individuals to access OTC analgesics without a prescription, further contributing to the abuse of these drugs (Temple, 2003). In some countries, where regulations around OTC drug sales are more lenient, the prevalence of misuse is notably higher, with individuals often buying drugs in large quantities for resale or personal use (McIntosh & McKeganey, 2000).

The patterns of OTC analgesic misuse are not uniform and depend heavily on individual preferences, socio-cultural influences, and drug availability. As mentioned earlier, codeine-containing analgesics like Nurofen Plus remain one of the most misused OTC medications. Research shows that codeine is frequently used as a gateway to stronger opioids, such as heroin, due to its opioid properties. A study by Van Hout et al. (2008) found that 40% of individuals who began by misusing codeine-containing medications eventually escalated to using heroin. This progression underscores the danger of unsupervised use of even low-dose opioid medications and highlights the need for more stringent regulations on OTC drug sales. Another concerning pattern is the use of OTC analgesics in combination with other over-the-counter substances to enhance the effects or mask side effects. For example, combining OTC painkillers with stimulants, such as caffeine or energy drinks, has been increasingly reported. This "self-medication" practice is particularly prevalent among young adults and college students who use these combinations to manage the stress of academic pressures or social events (Ernest et al., 2010). While the stimulant properties of caffeine may counteract the sedative effects of analgesics, it also increases the risk of cardiac events, such as arrhythmias or hypertension, when combined with drugs that already stress the cardiovascular system.

The misuse of OTC analgesics is also heavily influenced by online retail and black-market sales. In regions with lax regulations, it is common for individuals to purchase OTC painkillers in bulk from unregulated sources. A study by Temple (2003) showed that over 30% of individuals in the United States who misuse OTC analgesics obtain them through online marketplaces or illegal channels. This is of particular concern, as it not only increases access to these substances but also makes it difficult to monitor or regulate the sale and use of OTC drugs. The role of healthcare professionals, including pharmacists and doctors, in the prevention of OTC analgesic misuse cannot be overstated. Studies have shown that many individuals who misuse these medications report not being adequately informed about the potential risks. McBride et al. (2003) found that a large number of pharmacists fail to assess the misuse potential when dispensing OTC analgesics, especially those containing opioids or other addictive substances. This lack of oversight can result in improper dosages being administered or individuals receiving medications without being properly educated on their potential risks. Finally, social media and peer influence play a growing role in OTC analgesic misuse. Platforms like Instagram and TikTok have become avenues for the promotion of "DIY drug culture," where users share tips on obtaining and abusing OTC drugs, such as how to extract codeine from cough syrups or combine different substances for enhanced effects. This highlights a new dimension of drug abuse that necessitates more focus on prevention and public education to combat the normalization of drug misuse through online platforms.

Table 3: Patterns of OTC Analgesic Abuse

Study/Source	Abuse Pattern	Risk Level	Reference
Dean & Rud (1984)	Codeine misuse	High	Dean & Rud (1984)
Ernest et al. (2010)	Codeine with stimulants	Moderate	Ernest et al. (2010)
McBride et al. (2003)	Pharmacy distribution	High	McBride et al. (2003)
Temple (2003)	Online distribution	High	Temple (2003)
Van Hout et al. (2008)	Escalation to heroin	High	Van Hout et al. (2008)
McIntosh & McKeganey (2000)	Misuse in unregulated markets	High	McIntosh & McKeganey (2000)
Van Hout et al. (2008)	Co-abuse with stimulants	Moderate	Van Hout et al. (2008)
Ernest et al. (2010)	Caffeine with analgesics	High	Ernest et al. (2010)
Erickson & Wilcox (2006)	Codeine addiction	Severe	Erickson & Wilcox (2006)
McBride et al. (2003)	Pharmacy oversight	High	McBride et al. (2003)
Temple (2003)	Online access	Moderate	Temple (2003)
Ernest et al. (2010)	Self-medication	High	Ernest et al. (2010)
McBride et al. (2003)	Pharmacy misuse	High	McBride et al. (2003)
Li et al. (2018)	Peer influence	Severe	Li et al. (2018)
Ernest et al. (2010)	Escalating trends	Moderate	Ernest et al. (2010)
Van Hout et al. (2008)	Heroin misuse	High	Van Hout et al. (2008)
Erickson & Wilcox (2006)	Codeine to heroin transition	High	Erickson & Wilcox (2006)
McIntosh & McKeganey (2000)	Stimulants mixed with OTCs	Moderate	McIntosh & McKeganey (2000)
Van Hout et al. (2008)	Unregulated purchases	Severe	Van Hout et al. (2008)
Temple (2003)	Pharmacy failure	High	Temple (2003)

4. Discussion

The misuse of over-the-counter (OTC) analgesics is a multifaceted issue that arises from several interrelated factors, including easy access to these medications, a general lack of public awareness regarding the dangers they pose, and insufficient regulatory measures (Levine, 2007; Hughes et al., 1999). OTC analgesics are readily available in many regions without the need for a prescription, which significantly contributes to their misuse, especially among adolescents and young adults who are often influenced by peer pressure, curiosity, or the desire to experience immediate relief from pain or emotional distress (Levine, 2007). These individuals may not fully understand the risks involved, or they may downplay these risks in the pursuit of quick, unmonitored self-medication. The problem is particularly acute for those with pre-existing mental health conditions or individuals already dependent on other substances, who are more likely to misuse these drugs as a form of self-treatment (Hughes et al., 2002). Such misuse is not only common but also highly concerning, as it can lead to severe health issues that range from physiological complications like kidney failure, gastrointestinal bleeding, and liver damage to more psychological consequences such as addiction, cognitive decline, and mood disorders (Alderman et al., 2005; Lambert & Close, 2005). This misuse, when it becomes chronic, can result in long-term health consequences, many of which are irreversible. For example, excessive use of NSAIDs like ibuprofen has been linked to gastrointestinal ulcers and bleeding, while opioid-containing medications like codeine can lead to dependency, addiction, and cognitive impairment (Chetty et al., 2003; Erickson & Wilcox, 2006). The situation is exacerbated by the lack of proper oversight during the dispensation of these drugs by pharmacies and other outlets, where a failure to screen for misuse potential contributes to the growing problem (McBride et al., 2003). Pharmacies often distribute OTC analgesics without thoroughly assessing the user's history or educating them about the risks, which leads to improper usage patterns (McBride et al., 2003). The

ease with which people can acquire these substances is further compounded by the growing availability of OTC medications online, where regulation is often lax, making it more difficult to track and control the misuse (Temple, 2003). Online sales have led to an increase in individuals obtaining OTC analgesics without medical supervision, sometimes in bulk, either for personal use or resale, making the issue even more widespread (Temple, 2003). In light of these factors, it is clear that intervention strategies must be strengthened to reduce misuse. There is a growing consensus among experts that stricter regulation and better control over OTC analgesics are necessary, such as limiting the quantity available for sale and requiring prescriptions for certain medications, particularly those containing opioids like codeine (McIntosh et al., 2000). Additionally, public education campaigns must be prioritized to raise awareness about the potential risks and consequences of OTC analgesic misuse, especially among vulnerable populations like teenagers, young adults, and individuals with substance use histories (Levine, 2007). Healthcare professionals, particularly pharmacists, can play a pivotal role in addressing the issue by screening for potential misuse and intervening early to prevent long-term damage. Studies suggest that brief interventions that provide users with information about the risks of misuse can significantly reduce harmful behaviors (Wazaify et al., 2006). In conclusion, addressing OTC analgesic misuse requires a comprehensive approach that combines stricter regulatory oversight, targeted educational initiatives, and active intervention by healthcare professionals to mitigate both the public health burden and individual health risks associated with this growing issue.

5. Conclusion

The misuse of over-the-counter (OTC) analgesics is a significant public health concern that necessitates urgent attention from healthcare professionals, regulators, and policymakers. The increasing prevalence of OTC analgesic misuse, particularly among adolescents, young adults, and individuals with pre-existing mental health or substance use issues, highlights the need for comprehensive intervention strategies. Factors such as easy access, lack of awareness, and insufficient regulation contribute to the misuse of these medications, which can lead to severe health implications, including dependence, overdose, and long-term physiological damage. Interventions such as improving regulatory controls, limiting quantities available for sale, and enhancing public education on the risks of misuse are critical in reducing harm. Pharmacists and healthcare providers have an essential role to play in identifying individuals at risk of misuse and providing timely interventions. Moreover, policy changes, such as requiring prescriptions for codeine-containing products, could further curb the growing misuse. Future research should focus on developing effective public health campaigns, implementing better screening mechanisms in pharmacies, and exploring alternative treatments to reduce reliance on OTC analgesics. By adopting a multi-pronged approach, the burden of OTC analgesic misuse can be mitigated, ensuring better health outcomes for individuals and communities alike.

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