

Opioid Analgesics Use Discrepancy among People in China versus the United States: A Mini Review

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Abstract

Opioids analgesics are among the most effective and widely used medications for pain management. However, there are substantial discrepancies in opioid consumption across different countries and regions. While the average annual consumption of opioids is notably high in the United States, usage in China remains disproportionately low, often insufficient to meet basic pain management needs. These consumption disparities are influenced by factors such as economic development, healthcare policies, prescribing practices, regional differences, and cultural attitudes. Despite significant progress, global opioid analgesic consumption remains uneven. Therefore, increased efforts are essential to ensure safe access to opioids, alleviate unnecessary pain and suffering, and mitigate the risks associated with misuse.

Keywords

Opioid analgesics, Consumption discrepancy, China, The United States

Introduction

Opioids are prescription analgesics and illicit drugs that elicit their pharmacologic effects by engaging the endogenous opioid system. Widely administered for the management of acute pain, cancer-related pain, and palliative care, opioids have been recognized by the World Health Organization (WHO) as "an essential category of medication" [1]. Although the importance of opioid analgesics has long been recognized, significant disparities in opioid analgesic consumption persist worldwide. From 2009 to 2019, opioid consumption exhibited significant geographic variation, with notably high levels in some developed countries such as the United States, while remaining comparatively low in certain Asian nations, including China [2,3]. The annual global average consumption of opioid analgesics, measured in defined daily doses per million people per day (DDDs PMPPD), was 3,027. In comparison, the United States recorded an average annual consumption of 43,879 DDDs PMPPD, more than ten times the global average, whereas China's consumption was only 91 DDDs PMPPD [4]. These contrasting opioid usage

patterns in the United States and China underscore distinct challenges faced by developed and developing regions-specifically, the issues of opioid overuse versus underuse.

This review describes the opioid analgesic consumption discrepancy between the USA and the China, and provides evidence to design health policy interventions and strengthen cancer pain management, promoting rational use of analgesics.

Basic Classification of Opioids

Opioids are substances that bind to opioid receptors in both the central nervous system (CNS) and peripheral nervous system [5], and are widely utilized for their analgesic properties. There are various methods for classifying opioid drugs, and each classification carries distinct clinical significance. For instance, opioids can be categorized based on their length of action for the different therapeutic purposes [6]. Opioids can be classified as (1) Naturally occurring opium alkaloids directly derived from the opium poppy, like morphine; (2) Semi-synthetic, examples of semi-synthetic opioids include oxycodone; (3) Synthetic compounds, such as fentanyl and methadone, possess chemical structures distinct from opium alkaloids but still interact with opioid receptors in the CNS, eliciting similar analgesic and euphoric effects; (4) Endogenous compounds, such as endorphins.

To date, opioids have been the most effective medications for treating moderate to severe pain, holding a significant share in the pain management market and recognized by the WHO as standard treatment in the three-step ladder approach for cancer pain management [7]. However, opioids also have a dual nature; if not used as prescribed, they are highly prone to abuse and dependency. Excessive use of opioids can lead to various serious adverse outcomes.

Opioids Commonly Used in China

Opioid use in China has been a subject of increasing

research due to its implications for public health and pain management. The most commonly used prescription opioids in China include fentanyl, morphine, oxycodone, tramadol and pethidine [8-13], while remifentanyl, sufentanyl, alfentanil, fentanyl, and butorphanol are commonly used opioids or perioperative pain managements in authors' institute.

For decades, morphine has significantly contributed to the total opioid consumption in China, serving as a key indicator for cancer pain management [8]. However, a study reported that between 2006 and 2014, fentanyl surpassed morphine as the most widely used opioid [13]. Since 2009, sustained-release opioid formulations -including controlled-release morphine, transdermal fentanyl, and controlled-release oxycodone- have been introduced into Chinese healthcare practices. Pethidine, with its shorter duration of action, is limited in use to patients who are allergic to or unable to tolerate other opioids. Morphine and fentanyl are primarily prescribed to cancer patients, whereas pethidine is mainly administered to non-cancer patients. A separate study on opioid consumption in Nanjing from 2011 to 2016 showed that fentanyl and oxycodone accounted for the majority of opioid prescriptions, with a notable increase in oxycodone use during 2015-2016 [9]. The consumption of compound opioid analgesics (COA) is also on the rise in China, with oxycodone-acetaminophen (OAA) combinations representing the bulk of COA use. However, consumption patterns vary across regions and healthcare institutions [10]. Recent analyses indicate that prescription opioids are frequently used in China, with tramadol being the most common (27.3%) among individuals with opioid use disorder [11]. Tramadol, structurally similar to morphine and codeine, is a weak μ -receptor agonist that induces opioid-like euphoric effects and has long been considered a well-tolerated option for moderate pain management.

Overall, opioid analgesic consumption shows considerable variation across Chinese regions and between different levels of medical institutions.

Opioids Commonly Used in the United States

The opioid crisis in the United States has emerged as a major public health issue, marked by the extensive use and misuse of both prescription and illicit opioids. Understanding the most commonly prescribed opioids is essential for effectively addressing this epidemic. In the United States, hydrocodone, oxycodone, morphine, fentanyl, and methadone are among the most frequently prescribed opioids according to the reports published by the International Narcotics Control Board (INCB) for 2023 and other research [3,14-16].

Despite comprising only 5% of the global population, Americans consume approximately 80% of the world's oxycodone and 90% of the world's hydrocodone [15].

Hydrocodone, an active ingredient in medications such as Vicodin, Lortab, and Zohydro, is one of the most frequently prescribed opioids in the United States [3,14]. It is used for moderate to severe pain management but is also known for its high potential for misuse and addiction. Oxycodone, another widely prescribed opioid, is found in medications like OxyContin and Percocet [16]. Like hydrocodone, oxycodone is used to treat moderate to severe pain and is associated with a significant risk of abuse and dependence. Morphine, a potent opioid for severe pain management often used in clinical settings, also poses a high risk for addiction and misuse. According to a DEA Intelligence Brief, fentanyl currently represents the most prevalent and significant synthetic opioid threat in the United States. This synthetic opioid is far more potent than morphine and is typically prescribed for severe pain, often in cancer patients or during surgical anesthesia. Between 2013 and 2016, fentanyl-related overdose deaths increased by 540%, surpassing those related to more commonly used opioids and heroin [17]. Methadone is utilized both for pain management and as part of medication-assisted treatment (MAT) for opioid use disorder. In MAT, methadone helps reduce withdrawal symptoms and cravings, supporting individuals in recovery from opioid addiction. Methadone's use has grown significantly over the years, reflecting its dual roles in pain management and addiction treatment [16].

The top five opioids are central to pain management practices in the United States and are key contributors to the ongoing opioid epidemic.

Differences in Opioid Use between China and the United States

A significant disparity exists between opioid analgesic consumption in the United States and China, influenced by factors such as economic development, healthcare policies, prescription practices, regional variations, and cultural attitudes toward pain management and opioid use [2,4,10].

Regulatory approaches to opioid medications differ markedly between China and the United States, particularly in terms of legislation and control levels. In China, the complex regulatory procedures for the procurement, storage, and prescription of opioid analgesics may serve as a barrier to use. Additionally, challenges include limited healthcare worker training in pain assessment and opioid management [10]. Furthermore, public perceptions and understanding of opioids, along with limitations in the healthcare system, exacerbate the underuse of these analgesics in China [18]. In contrast, the United States places a strong emphasis on the individual's right to live free from pain, prioritizing patient access to opioids. The U.S. employs a tiered regulatory system for controlled substances,

Table 1: Opioid usage differences between China and the United States.

Nations	China	The United States
DDDs PMPPD	91	3027
The most commonly prescribed opioids misuse	Fentanyl, morphine, oxycodone, tramadol, pethidine	Hydrocodone, oxycodone, morphine, fentanyl, methadone
Legislation control levels	Complex regulatory procedures	A tiered regulatory system
Drug access	Full control	Base on need
Public attitudes	Tolerate pain	Emphasis on individual rights
Target	Meet the needs of clinical analgesia	Prevention of drug abuse and meet the clinical needs

DDDs PMPPD: Defined daily doses per million people per day

balancing clinical necessity and medical value to facilitate accessibility. However, an over-reliance on prescription opioids for non-cancer pain management has been linked to numerous cases of inappropriate opioid use and contributes to the broader challenges of non-medical opioid consumption [19].

Discussion and Conclusion

Despite significant advancements, the global consumption of opioid analgesics remains uneven, reflecting disparities in access and usage across regions. In comparison to developed countries like the United States, pain management in China remains underdeveloped, reflecting limited access to essential pain relief. This disparity underscores the need to enhance pain management practices and policies. Opioids are essential for medical and scientific purposes, and access to these medications should not be overly restricted [20]. To ensure rational use while preventing misuse, it is crucial to improve opioid availability and strengthen access management for pain relief. Additionally, palliative care and pain service should be prioritized as public health issues. For instance, developing personalized pain management guidelines could help tailor treatment to individual patient needs.

From the introduction of the concept of "pain as the fifth vital sign" to the 2007 case where three pharmaceutical company executives pleaded guilty for misleading the public about the addictive risks of OxyContin, the United States experienced the devastating opioid crisis by 2017 [21]. In response, the U.S. government launched the "Initiative to Stop Opioid Abuse". While data has shown significant declines in opioid consumption rates -attributable to strategies such as prescription monitoring programs and pill mill laws- the current level of opioid consumption in the United States remains high [3]. In the United States, the widespread availability of opioids and their high potential for misuse highlight the need for careful prescribing practices and comprehensive public health strategies to mitigate associated risks. Steps should be taken to promote safe, evidence-based pain treatment, meet the clinical needs and reduce excessive prescribing,

which can lead to unused opioids being available for misuse. Accordingly, we provide a comparison of opioid usage differences between China and the United States, as shown in Table 1.

In conclusion, regulatory measures are needed to standardize opioid use, aiming to balance the need for adequate pain management with the prevention of non-medical use. In particular, ensuring sufficient access to opioid analgesics in China is essential to meet clinical demands and improve pain control outcomes.

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Conflicts of Interest

The authors have no conflict of interest.

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