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Assessing the Potential of Artificial Intelligence in Combating Drug Addiction

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A B S T R A C T

The current study aims to identify the main areas and emerging trends in the field of artificial intelligence research in field of combating drug addiction. It relies on an accurate and organized scientific methodology to achieve its objectives, as research literature related to artificial intelligence in the field of combating drug addiction was collected from the Science Citation Index Expanded database within the Web of Science Core Collection. The period from 2015 to 2024 witnessed a significant increase in the number of research articles published on the use of artificial intelligence (AI) in combating addiction, reflecting a growing global interest in this field. 31 research studies from several countries were analyzed, with the results showing that the United States of America leads research production with 4.34% (14 research papers), followed by Italy (5 research papers), indicating the significant challenges these countries face in the field of addiction. Countries such as Poland, Canada, India (two research papers each), Iran, Spain, Indonesia, China and Brazil have also begun to increase their focus on developing innovative solutions using AI. The current study identified key focus areas and emerging trends in the use of AI to diagnose and treat drug addiction. The findings suggest that AI will play an increasingly important role in efforts to combat this problem.

1. Introduction

Drug abuse refers to the excessive or inappropriate utilization of pharmaceuticals. The chemicals most frequently abused are alcohol, benzodiazepines, illicit drugs, opioids, hypnotics, and stimulants. Substance abuse can lead to physical, psychological, and social problems [1]. The WHO estimates that 35 million individuals suffer from substance use disorders, including both hazardous behaviors and dependency. The nonmedical utilization of synthetic opioid analgesics, anxiolytics, hypnotics, and psychostimulants increase disorders [2]. Substance misuse constitutes 1.3% of the global disease load, resulting in the loss of 42 million Disability-Adjusted Life Years (DALYs). Drugs annually cause the deaths of 500,000 individuals (350 males and 150 females) [1].

Drug abuse is considered as a worldwide health concern, especially throughout the Arab region [3]. Following decades of instability in Iraq, drug abuse has evolved into a various national issue, characterized by increasing drug transshipment through the country and its neighbors, alongside raising consumption of substances, particularly amphetamines, which is linked to transnational criminal organizations [4]. In August 2015, the National Household Survey of Drug Abuse in Iraq recorded that 1.1% of 3,200 adults over 18 across all Iraqi governorates used anabolic steroids, while 1% used benzodiazepines. Benzhexol and Allermine ranked second, with 0.05% for each. In terms of injectable psychoactive substances (IPS), only one participant reported using them, and 2% indicated that they knew individuals who used IPS. Among the various substances, cannabis was the most commonly used IPS, reported by 0.2% of participants, followed by amphetamines and opiates, each at 0.1%. In addition, none of the reported users were female, cannabis was the most prevalently utilized IPS at 0.2% [5].

Drug abuse typically leads to addiction, a chronic neurological disorder characterized by compulsive drug consumption despite adverse consequences. Globalization, the internet, and social media must be considered as factors contributing to adverse oc-currences, such as drug usage among conservative young communities [6]. Chronic use of opioids can lead to a condition known as opioid bowel syndrome (NBS), which is characterized by worsening abdominal pain and other gastrointestinal disturbances. This syndrome greatly complicates the management of irritable bowel syndrome (IBS) and negatively impacts a wide range of other health problems [7]. Recent studies have shown the potential of clove extract and its active compound, eugenol, to modulate addictive behaviors, particularly with regard to opioids. Eugenol acts as an NMDA receptor antagonist, making it of interest in the context of addiction. Eugenol can cross the blood-brain barrier, and studies in rats have shown its ability to inhibit morphineinduced conditioned place preference (CPP), suggesting the potential to reduce the acquisition of addictive behaviors [8]. The confused political condition, unstable economic conditions, and societal pressures facilitated the proliferation of addiction among youth. In addition, drug addiction continues to affect nations, in-cluding Iraq, where its societal repercussions are profound. Substance addiction impacts families and communities, resulting in physiological, psychological, criminal, and behavioral issues. Moreover, the geographical location, political instability, and security concerns in Iraq increase drug trading. Drug addiction has raised owing to cultural and economic challenges in recent years; therefore, governments and societies are combating this problem due to its harmful impact on public health, social stability, and community safety [9].

Artificial intelligence (AI) can enhance the evaluation, diagnosis, and therapeutic management of drug addiction, as it could customize treatment by analyzing extensive patient data, identifying abuse or relapse, monitoring patient behavior, and predicting high-risk individuals [10]. This review presents studies utilizing artificial intelligence and deep learning frameworks to predict drug misuse, metabolism, and abuse based on existing features, providing a foundation for future study.

2. Materials and Method

2.1 Data source and research process

A comprehensive search of the Web of Science Core Collection (WoSCC) database was conducted on February 5, 2025, using Science Citation Index Expanded (SCI-E) as the primary data source. The search strategy was specifically designed to identify studies published in the last 10 years (2015–2024) that addressed the role of AI in drug control. Here is the search formula (((ALL=(dosage)) AND ALL=(psycho*)) AND ALL (abuse)) AND ALL=(COCAINE))). To ensure accuracy and comprehensiveness, all studies found were independently reviewed by two researchers. Publications that did not meet inclusion criteria, such as books, early access articles, data papers, and retracted publications, were excluded from the analysis.

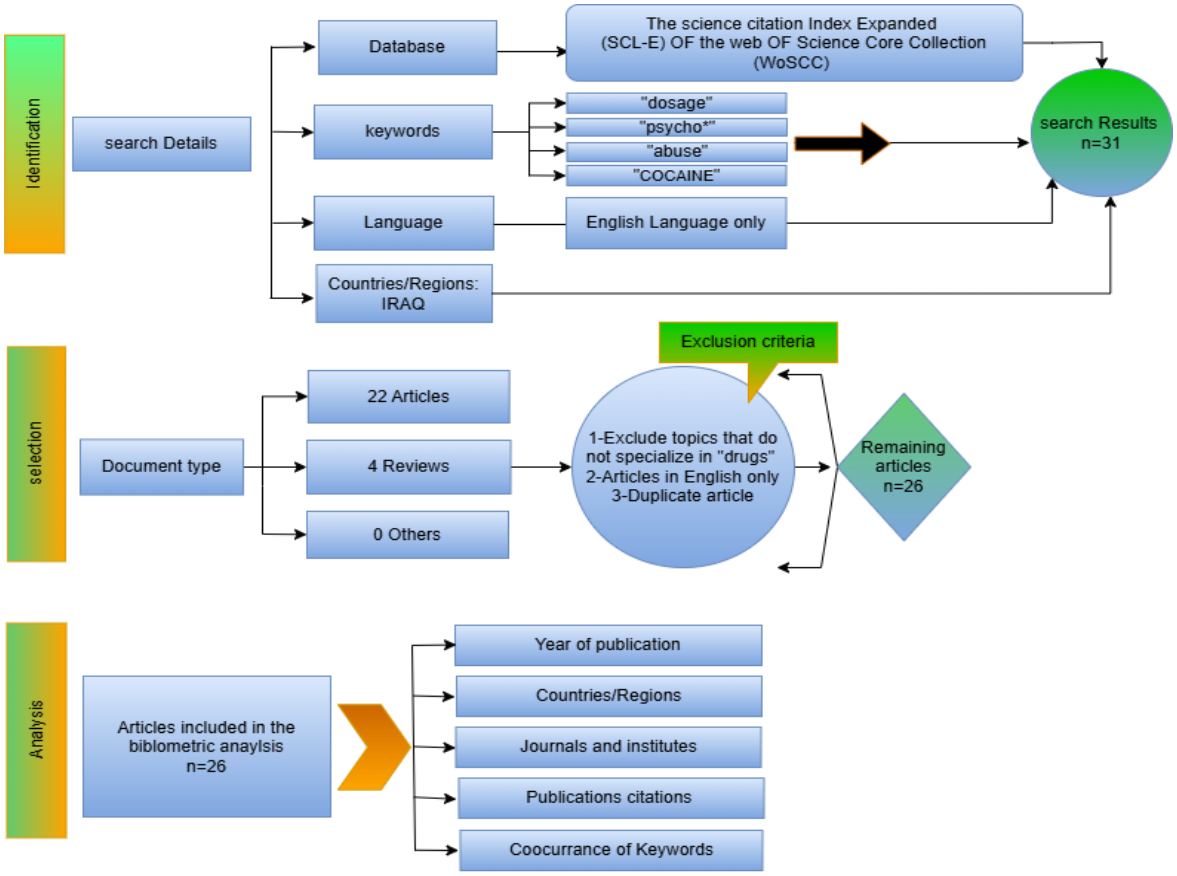

Fig. 1. A schematic diagram of the steps for collecting and selecting documents due to the criteria of the research framework.

The remaining articles then underwent a rigorous screening process, where the titles and abstracts of each study were carefully evaluated. Manual exclusion criteria included: 1) studies that did not address the relationship between AI and drug control, and 2) studies in which AI and drug control were the primary research objectives. The search and analysis process are depicted in Figure1.

2.2 Bibliometric analysis

In this paper, we use three analytical tools to conduct a comprehensive bibliometric examination of the literature covering different aspects of the research topic. First, we rely on the online library analysis platform (https://bibliometric.com/) to visualize the collaborative network relationships between countries and regions. Second, we use VOSviewer 1.6.19.0 (Leiden University, Leiden, the Netherlands), a software specialized in analyzing and visualizing document data through "co-clustering". In this study, we use VOSviewer to analyze the co-occurrence network of keywords across documents, where different colors represent different clusters, circles represent keywords, and the diameter of the circle is proportional to the frequency and importance of the keyword. Finally, we use Publish and perish to analyze the citation data and evaluate the influence of publications in the relevant field. In this analysis, we focus on the top 20 keywords, and determine the year of the keyword's appearance and its influence.

3. Results and Discussion

3.1 Publications per year

Figure (2) shows the chronological development of the number of published research papers, highlighting the noticeable fluctuations in research activity during the period from 2015 to 2024. After a modest start with three research papers in 2015, the number rose to four research papers in 2016. However, the years 2017 and 2018 witnessed a gradual decline in the number of published research papers, reaching two research papers and then one research paper, respectively.

The publication rate stabilized relatively at one research paper in 2019, before 2020 witnessed a noticeable recovery with three research papers, and this upward trend continued in 2021. However, the graph curve declined again in 2022, recording only two research papers. The year 2023 witnessed a qualitative leap in the number of published research papers, reaching four research papers, indicating renewed interest in the research field. In 2024, the number of published research papers stabilized at three.

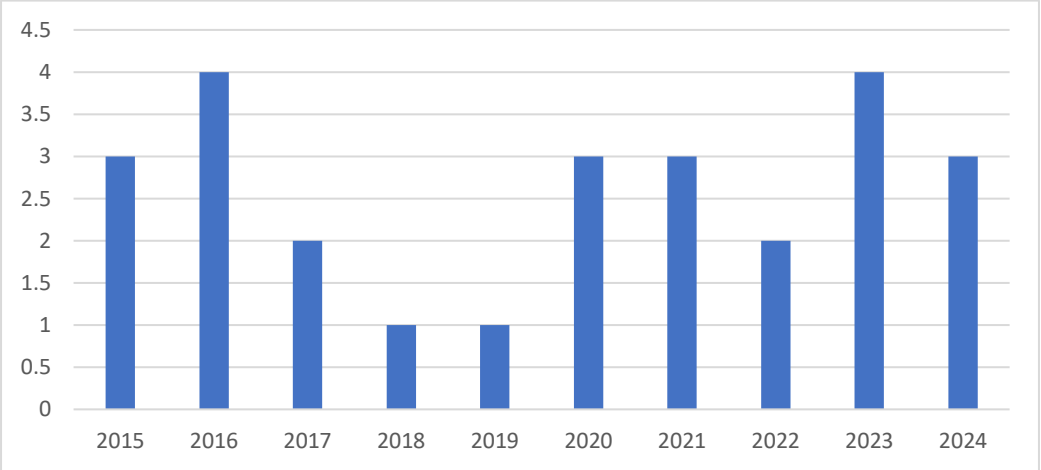

Fig. 2. The published research.

3.2 Countries/regions publications and collaborations

The Figure (3) reveals an analysis of the number of published research papers on drugs from 2015 to 2024 in a group of countries, focusing on the following points: China leads the countries with the highest number of published research papers, indicating its great interest in combating drugs, which may be attributed to several factors including its large population and the social challenges associated with drug use. The United States ranks second, indicating significant concern regarding this issue, frequently linked to the widespread drug usage and its effects on public health and society. India ranks third, suggesting that it faces comparable issues, likely due to its enormous population density and cultural and socioeconomic variety. Furthermore, countries such Spain, Indonesia, Iran, Brazil, Poland, Canada, and Italy provide research, albeit in smaller quantities, which remains crucial for comprehending the unique context in each nation and formulating successful drug control programs.

Pharmaceutical research is disseminated throughout countries and areas with significant contributions, as illustrated in Figure (4). The graph indicates that the United States surpasses China in research output. Spain, Italy, and Poland participate in this industry, albeit at a lesser extent than the United States and China. Brazil and Canada exhibit comparable production levels. Iran possesses the lowest number of published studies. The graph indicates that China, Europe, Brazil, and Canada make substantial contributions to drug research; yet, the United States predominates.

3.3 Publications per journals, publishers and instituions

Table (1) encapsulates the publication record, consisting of 12 scientific journal articles. The data indicates that "Clinical Psychopharmacology" and "Frontiers in Psychiatry" each have two publications, highlighting a significant emphasis on pharmacological regulation and societal risks. "ACS Applied Materials & Interfaces" leads the list with an impact factor of 8.3 and a Q1 ranking. Additional prestigious journals encompass "BBI - Health" and "Drug and Alcohol Dependence," both possessing impact factors exceeding 3.5 and classified within Q1 ranks. In addition, Human Gene Therapy appears as a strong choice with an impact factor of 3.9 and a Q2 ranking. The table shows a diversity of publication venues, noting that there are journals whose impact factors or rankings are not specified, such as European Review for Medical and Pharmacological Sciences and International Journal of Early Childhood Special Education.

Table 1. The journals with the highest number of publications on drug control

Name of the Journal	Publications	Impact factor	Quartile in category	Country
Clin. Psychopharmacol	2	2.4	Q2	USA
Front. Psychiatry	2	3.2	Q2	China
ACS Appl. Mater. Interfaces	1	8.3	Q1	USA
BBI - Health	1	3.7	Q1	USA
Drug Alcohol Depend	1	3.9	Q1	China
Eur. Rev. Med. Pharmacol. Sci	1	N/A	N/A	Italy
Front. Behav. Neurosci	1	2.6	Q3	China
Hum. Gene Ther	1	3.9	Q2	USA
Int. J. Early Child. Spec. Educ	1	N/A	N/A	TR
Int. J. Ment. Health Addict	1	3.2	Q1	USA

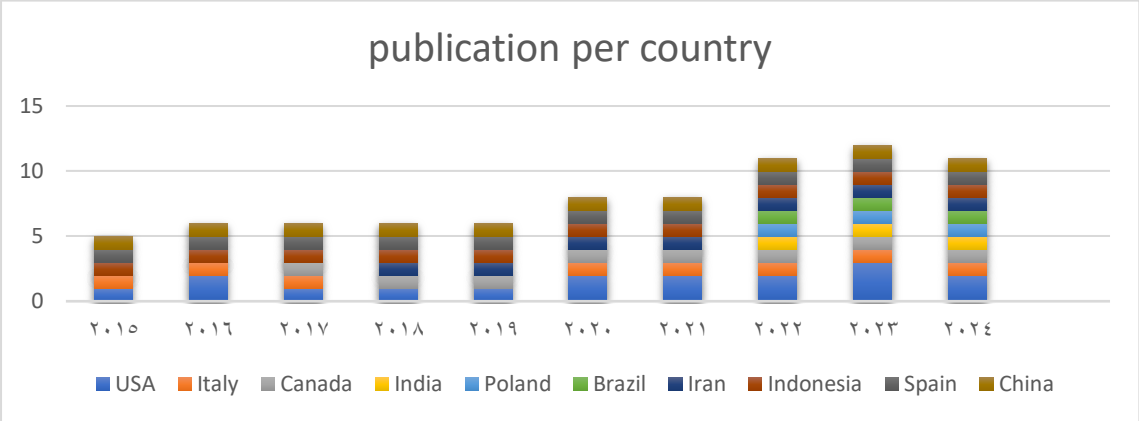

Fig. 3. The distribution of published research related to drugs due to various countries.

This diversity may reflect researchers' choice of specialized journals or journals that follow different indexing standards. The papers in the table are dominated by American research institutions, with notable contributions from Swiss and Italian institutions, indicating international collaboration in scientific research.

3.4 The top 10 institutes based on publication volume

Table (2) shows a bibliometric overview of ten institutions, detailing their publication output and the proportion of firstauthor contributions. Brown University leads with five publications, closely followed by Western Carolina University and the

It is worth noting that the State University of New York at Albany and the Race Triangle Institute, despite their overall number of publications, do not show any first author publications, indicating a possible reliance on collaborative or co-authored publications where first authorship can be attributed to researchers from other institutions. Geographically, institutions are concentrated in the United States, with additional representation from Italy, Canada, Poland, and Spain, reflecting a diverse range of international research collaborations. These data provide an over-view of research activity and authorship patterns across these institutions,

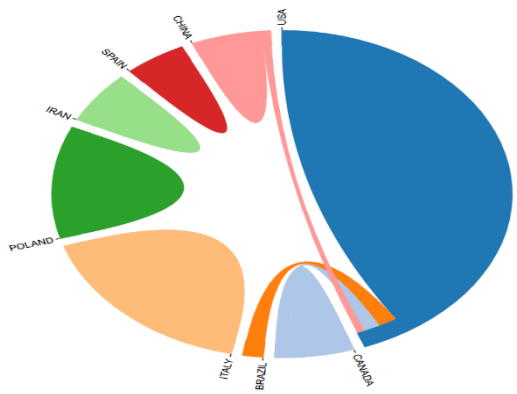

Fig. 4. Analysis of the distribution and spread of published research on drug control and its international impact.

University of Texas at Austin, each with four publications. The State University of New York at Albany, the University of Perugia, the University of Montreal, the University of Modena and Reggio Emilia, along with the Race Triangle Institute, the Jagiellonian University, and the Hospital Clinical de Barcelona, share an equal number of three publications. In terms of first-author contributions, Brown University, Western Carolina University, the University of Texas at Austin, the University of Perugia, the University of Montreal, and the University of Modena and Reggio Emilia record one publication each.

Table 2. Ranking of the Top 10 Institutes Based on Publication Volume.

The name of the institution	Publications	Total number of first-author publications	Country
Brown Unisv	5	1	USA
Western Carolina University	4	1	USA
University of Texas Austin	4	1	USA
SUNY Albany	4	0	USA
Univ Perugia	3	1	Italy
Univ Montreal	3	1	Canada
Univ Modena & Reggio Emilia	3	1	Italy
Res Triangle Inst	3	0	USA
Jagiellonian University	3	0	Poland
Hosp Clin Barcelona	3	0	Espino

Raising questions about factors that influence publication output and first author contributions, such as research funding, departmental focus, or collaborative networks. Further analysis using a larger dataset and more detailed metrics will be needed to draw definitive conclusions.

3.5 Publication citations

Table (3) provides a bibliometric overview of ten addiction-related publications, spanning the years 2015 to 2024. The analysis includes author ranking, year of publication, source journal, publisher, and citation metrics, namely total citations within the Web of Science (WOS) database, citations per year, and citations per author. Notably, “Psychology of Addictive Behaviors” from 2015, published by the Educational Publishing Foundation, leads in total citations (75) and citations per year (7.5), indicating significant impact in the field. However, “The "International Journal of Mental Health and Addiction" from 2024 recorded the highest citations per author (5), although had less total citations, indicating a potentially smaller author cohort or a more concentrated impact. Due to the multidisciplinary nature of addiction research, the listing includes publications and publishers such as Elsevier, Springer, and Frontiers Media SA. The diverse citation metrics among publications highlight the necessity of considering many indicators when evaluating research impact and influence.

The inclusion of articles spanning nearly a decade facilitates the monitoring of research trends and the durability of previous work. This table concisely highlights the performance of addiction research publications.

3.6 A methodological exploration of research data to determine correlates of high citation rates

Table 4 presents research related to substance use, treatment, and detection, with an emphasis on methadone maintenance therapy (MMT) and novel psychoactive substances. Proctor et al. (2015) suggest that demographic, economic, and clinical factors, including cocaine use, influence MMT retention and advocate for improved treatment strategies. Busardo et al. (2015) underscore the necessity for enhanced forensic toxicology techniques to understand the detrimental effects of mephedrone and its implications for public health. Licata et al. (2016) demonstrate that hair analysis can assess therapeutic drug adherence and substance addiction in patients undergoing polypharmacy. Lancia et al. (2020) discovered that patients with MMT frequently misuse pregabalin, often in conjunction with other substances,

Table 3. The most cited articles in the field of deep learning applied to drug and addiction control.

Ref	Year	Source	Publisher	Citations within WOS Only		Age	
[2]	2015	PSYCHOLOGY OF ADDICTIVE BEHAVIORS	EDUCATIONAL PUBLISHING FOUNDATION-AMERICAN PSYCHOLOGICAL ASSOC	Per Papers 75	Per Year 7.5	Per Author 13	10
[3]	2015	EUROPEAN REVIEW FOR MEDICAL AND PHARMACOLOGICAL SCIENCES	VERDUCI PUBLISHER	61	6.1	12	10
[4]	2016	JOURNAL OF PHARMACEUTICAL AND BIOMEDICAL ANALYSIS	ELSEVIER	42	4.67	5	9
[5]	2020	FRONTIERS IN PSYCHIATRY	FRONTIERS MEDIA SA	21	4.2	4	5
[6]	2016	PSYCHOPHARMACOLOGY	SPRINGER	13	1.44	4	9
[7]	2016	JOURNAL OF SUBSTANCE USE	TAYLOR & FRANCIS INC	11	1.22	2	9
[8]	2023	SUBSTANCE ABUSE TREATMENT PREVENTION AND POLICY	BMC	9	4.5	1	2
[9]	2021	JOURNAL OF SUBSTANCE ABUSE TREATMENT	PERGAMON-ELSEVIER SCIENCE LTD	6	1.5	2	4
[10]	2024	INTERNATIONAL JOURNAL OF MENTAL HEALTH AND ADDICTION	SPRINGER	5	5	1	1
[11]	2020	HUMAN GENE THERAPY	MARY ANN LIEBERT, INC	4	0.8	1	5

Table 4. A systematic exploration of research data to identify factors associated with high citation rates.

Authors	Title	Year	conclusion
SL Proctor, AL Copeland …	Predictors of Patient Retention in Methadone...	2015	This study suggests that demographic, economic, and clinical factors, including cocaine use, influence retention in methadone maintenance treatment (MMT). Optimizing treatment regimens based on these factors may improve retention rates and overall patient outcomes, reducing the need for repeated treatment episodes.
FP Busardò, C Kyriakou...	Mephedrone related fatalities...	2015	Mephedrone remains a public health concern despite its classification, as no safe dosage exists and individual responses vary widely. Forensic toxicology laboratories must enhance testing procedures for mephedrone detection in biological matrices to support investigations and improve understanding of its toxic effects.
M Licata, C Rustichelli ,..	Hair testing in clinical setting...	2016	A validated LC-MS/MS method using a modified QuEChERS dSPE cleanup was developed for rapid screening of 50 psychoactive drugs and metabolites in hair. Analysis of patient hair samples demonstrated the method's applicability for therapeutic drug monitoring, revealing both adherence and potential misuse/abuse in polypharmacy patients.
M Lancia, A Gambelunghe,..	Pregabalin Abuse in Combination ...	2020	Hair analysis of patients in methadone maintenance therapy revealed a 14% rate of non-prescribed pregabalin (PGB) use, often in conjunction with other substances like opiates. [1] This finding highlights the potential for PGB abuse in high-risk populations, particularly those with poly-drug use and psychiatric comorbidities, emphasizing the need for ongoing toxicological monitoring.
SL Proctor, AL Copeland.. .	Effects of L-methamphetamine treatment on cocaine...	2016	l-Methamphetamine (l-MA) exhibits cocaine-like discriminative stimulus effects while selectively reducing cocaine self-administration. These findings suggest l-MA and related compounds warrant further investigation as potential treatments for Cocaine Use Disorder.
JMW Hughto, A Tapper...	Outcome predictors for patients receiving ...	2016	This study examined 2,410 patients admitted to 26 methadone maintenance treatment (MMT) programs between 2009 and 2011. The study concluded that positive urinalysis drug screens (UDS) for cocaine, amphetamines, and cannabinoids, along with certain demographic factors like younger age, unemployment, Hispanic ethnicity, male gender, non-married status and non-self-pay status, predicted positive opioid UDS at later intervals, while higher methadone dosage predicted opioid abstinence.

Highlighting the necessity for toxicological monitoring. Proctor and Copeland (2016) examine methamphetamine as a treatment for cocaine use disorder, focusing on its impact on discriminative motivation and self-administration. Hueto et al. (2016) identified predictors of opioid use among patients undergoing methadone treatment, such as positive drug tests and demographic factors, indicating that increased dosages may facilitate opioid abstinence. These studies illustrate the intricate elements influencing substance use and treatment results, highlighting the need for comprehensive interventions that consider individual circumstances, changing drug trends, and effective monitoring systems.

3.7 Co-occurrence of keywords

Figure 5 represents shows a keyword plot focusing on the intersection of “addiction,” “drug abuse,” and “cocaine,” identified across a time spectrum from 2019 to 2021. The network graph shows the strength of association between these terms, with node size corresponding to the relative frequency or importance of each keyword within the dataset. “Addiction” and “cocaine” appear as the most prominent nodes, indicating strong occurrence or contextual importance within the time frame studied. The placement of “cocaine” at the center, with direct links to both “addiction” and “drug abuse,” emphasizes its critical role as a focal point within this topic area.

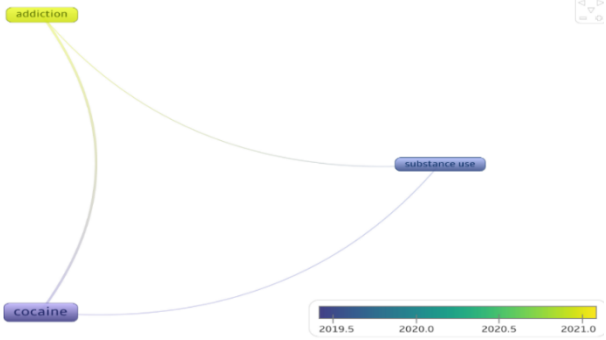

Fig. 5. Visualizes the co-occurrence of keywords, highlighting clusters of related terms.

The connecting lines or edges between these keywords represent the relationships between them; the thickness and potential color gradient indicate the strength or evolution of these associations over time. The color plot shifts from a cooler hue in 2019 to a warmer tone by 2021, implying a potential increase in the frequency or intensity of these keyword relationships as time progresses. However, without further contextual information regarding the dataset and the specific methodology used to create the graph, interpretations regarding the precise nature and statistical significance of these relationships remain speculative. The isolated position of "substance use" in the right portion of the graph, while still associated with "cocaine," may indicate a somewhat distinct, if related, thematic cluster. This could mean, for example, that "substance use" appears in contexts that include broader discussions beyond the specific focus on "cocaine" and "addiction." The temporal gradient along the edges associated with "substance use" also suggests a dynamic evolution in its association with other keywords. The shift in color may reflect changes in public discourse, research focus, or perhaps even data collection methodologies related to substance use over the given period. However, this interpretation requires caution, as the precise meaning of the color gradient requires further clarification. Overall, while the visualizations provide a valuable overview of keyword relationships within a given domain and time frame, more indepth analysis requires access to the underlying data and methodological details. Future research could expand this initial analysis by incorporating additional relevant keywords, exploring the direction of these relationships, and using statistical measures to validate observed trends.

Table (5) Keywords provides a preliminary analysis of search term frequencies and their associated link strength, providing insight into potential SEO strategies or content relevance within a given dataset. "Frequency" likely refers to the number of times a particular keyword appears within a given text or dataset,

Table 5. The co-occurrence of keywords, highlighting related term clusters.

Keyword	Occurrences	Total link strength
addiction	8	7
cocaine	17	7
substance use	5	4

while "Total Link Strength" refers to a metric that measures the relevance or importance of a page or document for that keyword, incorporating factors such as backlinks, internal linking, and anchor text optimization. The data reveals that "cocaine" appears as the most frequent keyword (17 occurrences) with a link strength equal to "addiction," indicating a strong focus on this specific substance within the analyzed content. This prominence may indicate a targeted effort to rank for cocaine related searches, or it may reflect a research focus or general interest in this particular drug. The term "addiction" appears 8 times with a similar link strength, indicating a strong connection between the content and the broader concept of addictive behaviors or disorders.

It is worth noting that while the term "cocaine" appears more than twice as often as "addiction," the association strength is identical, perhaps suggesting that pages where the term "addiction" appears have a higher concentration of relevant links or stronger contextual cues associating them with the term. Finally, the term "substance abuse" appears 5 times with a lower association strength of 4. While this lower strength is a conceptually broader term that includes "cocaine" and "addiction," it suggests that the content analyzed may not be optimized for this broader category. It may also mean that the content focuses on specific substances rather than general substance abuse issues. The discrepancy in association strength between specific terms and the broader category highlights the complexities of search engine optimization and information retrieval, where frequency alone does not necessarily determine perceived relevance or importance.

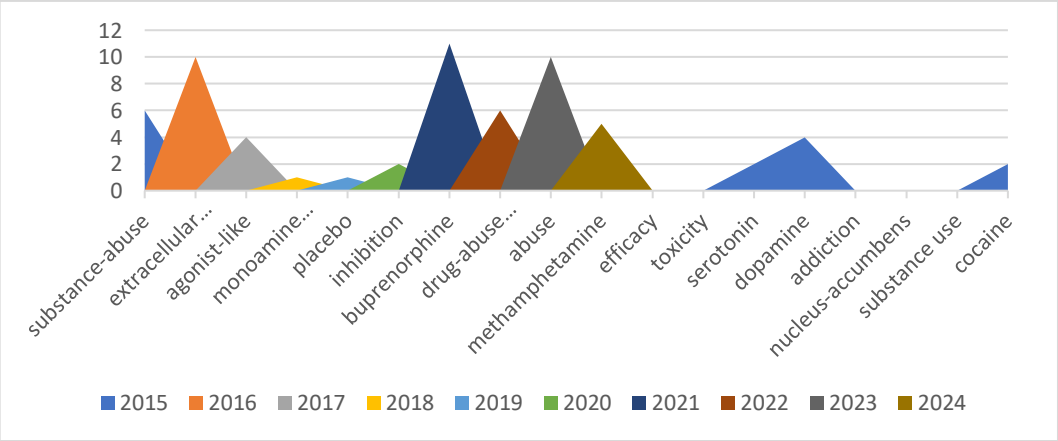

Fig. 6. The main keywords expanded.

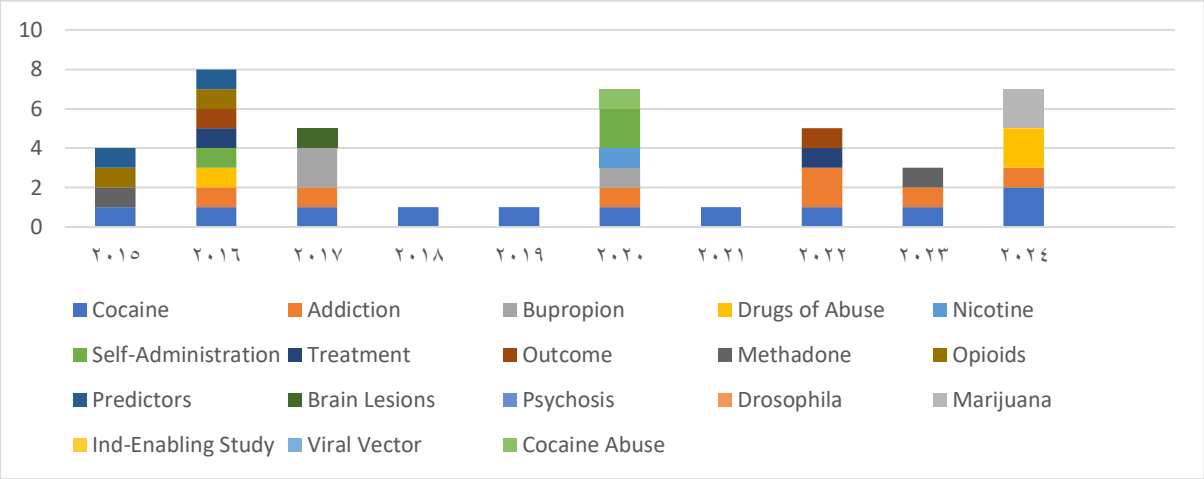

Fig. 7. Research trends related to cocaine addiction.

Further analysis, including contextual analysis and a deeper understanding of the association profile, will be needed to draw more precise conclusions about the effects of these keyword metrics.

Figure (6) represents data on research trends related to addictive substances over a decade (2015–2024), focusing on different aspects of drug use and treatment. The data, which appear to represent numbers of research publications or clinical trials, reveal fluctuating interest in "substance use" with a peak in 2015 and a subsequent decline. "Dopamine-like" research, which probably refers to studies of dopamine receptors or related pathways, shows little activity with a slight increase in 2016. Interestingly, "monoaminoreceptor" research, which might refer to investigations of drugs such as amphetamines, shows sporadic activity.

The appearance of "buprenorphine" and "methamphetamine" entries from 2021 onwards may indicate a shift towards the study of specific drugs of abuse and their specific treatments, including the use of buprenorphine for opioid addiction. A similar observation can be made for "drug abuse treatment" entries, which appear later in the timeline. The inclusion of the categories "nucleus accumbens" and "serotonin" suggests the need for investigations into the neurobiological underpinnings of addiction. Furthermore, the inclusion of "placebo," "inhibition," "efficacy," "toxicity," and "addiction symptoms" (presumably "studies") suggests the research methodologies and outcome measures used in this area. However, in the absence of clear definitions of the categories and the nature of the items counted (e.g., publications, trials, grants), drawing firm conclusions about research trends is limited. Future analyses would benefit from a more detailed classification of "substance misuse" and clarification of the measures used.

Figure (7) provides a bibliometric overview of research trends related to "cocaine addiction" over a decade, spanning 2015 to 2024. The data suggest a fluctuating interest in the topic, with an initial peak in 2015 followed by a period of relative inactivity until 2019. Subsequent years show a resurgence in research output, particularly in 2022 and 2024, which show the highest number of publications. While "cocaine" remains a constant focal term, research appears to explore diverse but related areas, including "addiction" in general, pharmacological interventions such as bupropion and methadone, and broader concepts such as "self management," "treatment outcome," and "predictors" of addiction. The presence of terms such as "encephalopathy," "psychosis," "fruit fly," "marijuana," and "viral vector" suggests investigations into the neurological and genetic underpinnings of cocaine addiction, as well as potential dependencies and methodological approaches. Interestingly, the table also indicates a shift toward exploring "nicotine" and "opioids" in conjunction with cocaine addiction, which may highlight research focused on polysubstance abuse. Further analysis, including citation counts and journal impact factors, would provide a more nuanced understanding of the evolving research landscape in this area.

4. Limitations

Although bibliometric analysis provides an objective, systematic, and quantitative view of valuable insights in the targeted literature, our current study faces some limitations. First, our analysis is limited to the SCI-E database within the Web of Science Core Collection (WoSCC), a prestigious global citation database. However, the limited data available on our topic in this database limited the comprehensiveness of our bibliometric exploration, affecting the completeness of the results. Second, we relied on articles published in English only, and performed manual screening to exclude irrelevant content, which may exclude valuable research published in other languages or in different non-traditional formats. This manual approach, while accurate, may be subject to bias due to the limited expertise of researchers, which may lead to the exclusion of some relevant studies.

Finally, our analysis focused on extracting and analyzing keywords, with a focus on the terms "dose," "psycho," "abuse," and "cocaine." This particular emphasis may have constrained our capacity to encompass all pertinent literature addressing various facets of the subject. Moreover, in the keyword analysis, prevalent and common phrases such as "cocaine," "drugs," and "addiction" predominated the high-frequency outcomes. These concepts, however instructive, did not necessarily yield precise analytical insights. Consequently, next initiatives aim to broaden the range of data sources, enhance the precision of keyword analysis, and utilize the diverse knowledge of the research team to refine and augment our studies.

5. Conclusion

This research constitutes a qualitative and significant contribution to the domain of drug addiction mitigation, as it underscores the considerable potential of deep learning-based models in this area. It offers an extensive study of research focal points and prospective trajectories for artificial intelligence in the diagnosis of drug addiction, facilitating a deeper comprehension of advancements in this domain and the incorporation of deep learning into future clinical practice. The limited use of artificial intelligence (AI) in analyzing addiction data was noticed. We encourage researchers to focus their research efforts on applying AI tools to this vital field to develop more effective solutions to combat addiction.

References

[1] Jabera, M. S., Mohammedb, M. A. and Mohammedc, L. T.: Prevalence of drug-related problems or abuse among physicians and pharmacists working at Al-Karkh and Medical City Directorates based on DAST-20 (2024).

[2] World Health Organization. International standards for the treatment of drug use disorders: revised edition incorporating results of field-testing. (2020).

[3] Alharbi, F. F., Alsubaie, E. G. and Al-Surimi, K.: Substance abuse in Arab world: does it matter and where are we? Handbook of Healthcare in the Arab World. Springer, (2021).

[4] Hakim, H. I., Abdul-Hassan, L. S. and Alkhudhairy, M. K.: Prevalence and patterns of drug use among people in Al-Najaf Governorate, Iraq. Med. Sci. J. Adv. Res. 5(3) (2024).

[5] Al-Hemiary, N. J., Al-Diwan, J. K., Hasson, A. L. and Rawson, R. A.: Drug and alcohol use in Iraq: findings of the inaugural Iraqi Community Epidemiological Workgroup. Subst. Use Misuse 49(13), 1759–1763 (2014).

[6] Alkhudhairy, M. K., Al-Tufaili, S. A., Al-Qazzaz, A. A. and Al-Mosauy, M. M.: A survey study on drug abuse among young people in Al-Najaf governorate, Iraq. in AIP Conference Proceedings, AIP Publishing (2024).

[7] Sultan, N. M., Ali, A. A., and Mardan, H. J.: The effect of intestinal parasite on some hematological parameters among patients with irritable bowel syndrome, NTU Journal of Pure Sceinces, 2, 39–42 (2023).

[8] Saadallah, H., AL-Tarjuman, J. K., and Sultan, F. I.: Evaluation of Phytochemical Constituents by GC-MS and Biological Activity of Eugenia caryophyllus extract. NTU Journal of Agriculture and Veterinary Science, 3(4) (2023).

[9] Alnawas, A., Alharbi, H. and Al-Jawad, M. M.: Understanding the Influence Impact of Social Media on Drug Addiction: A Novel Sentiment Analysis Approach Using Multi-Level User Engagement Data (2025).

[10] Hassan S. A., Rashid, M. K., Sammany, M. and Banoon, S. R.: Artificial Intelligence as a Predictive Tool in Drug Addiction: A Comprehensive Review. J. Misan Res., 19, 39–3 (2024).