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Causes, Nature and Toxicology of Fentanyl-Associated Deaths: A Systematic Review of Deaths Reported in Peer-Reviewed Literature

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Abstract

Purpose: Fentanyl poisoning has been widely reported, yet there is a lack of systematic evaluation of the nature and toxicology of associated deaths in the published literature. This article aims to systematically review the nature, causes, routes of administration and toxicology of fentanyl-associated deaths using case studies and case series in peer-reviewed published literature.

Methods: Four electronic databases including Embase, Medline (via Ovid), Scopus and Google Scholar were searched from inception until October 2019 to identify the studies reporting fentanyl related deaths. Two independent reviewers screened and selected the titles and then evaluated the full texts. Only case studies and case series were included. A structured data extraction tool was used to extract data on the number of deaths, routes of administration, concomitant drug use and toxicological data. The Joanna Briggs Institute quality assessment tool was used to evaluate the quality of included studies. Data were synthesized narratively.

Results: Of 1251 articles identified during initial search, 8 case reports and 9 case series met the inclusion criteria. A total of 1969 deaths were reported in the included studies. Deaths were concentrated in the north American region (n = 1946) and the Nordic region (n = 22). Reported causes of death included fentanyl overdose (n = 321, 56.4%), mixed drug toxicity (n = 196, 34.5%), natural (n = 28, 4.9%), other drug toxicity (n = 10, 1.8%), fentanyl and ethanol intoxication (n = 8, 1.4%), incidental (n = 5, <1%) and aspiration (n = 1). Most common routes of use were intravenous (70.5%) and transdermal routes (23.0%). Deaths came swiftly via the intravenous route. Mean level of blood fentanyl amongst all reported deaths was 0.024 mu g/mL.


Conclusion: Literature related to fentanyl-associated deaths predominantly come from North America. Deaths are comparatively lower or not reported in peer-reviewed publications from the rest of the world. Abuse through intravenous administration, mixed drug toxicities and self-treatment of breakthrough pain are mainly responsible for majority of the reported deaths.

Keywords




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