



## Introduction

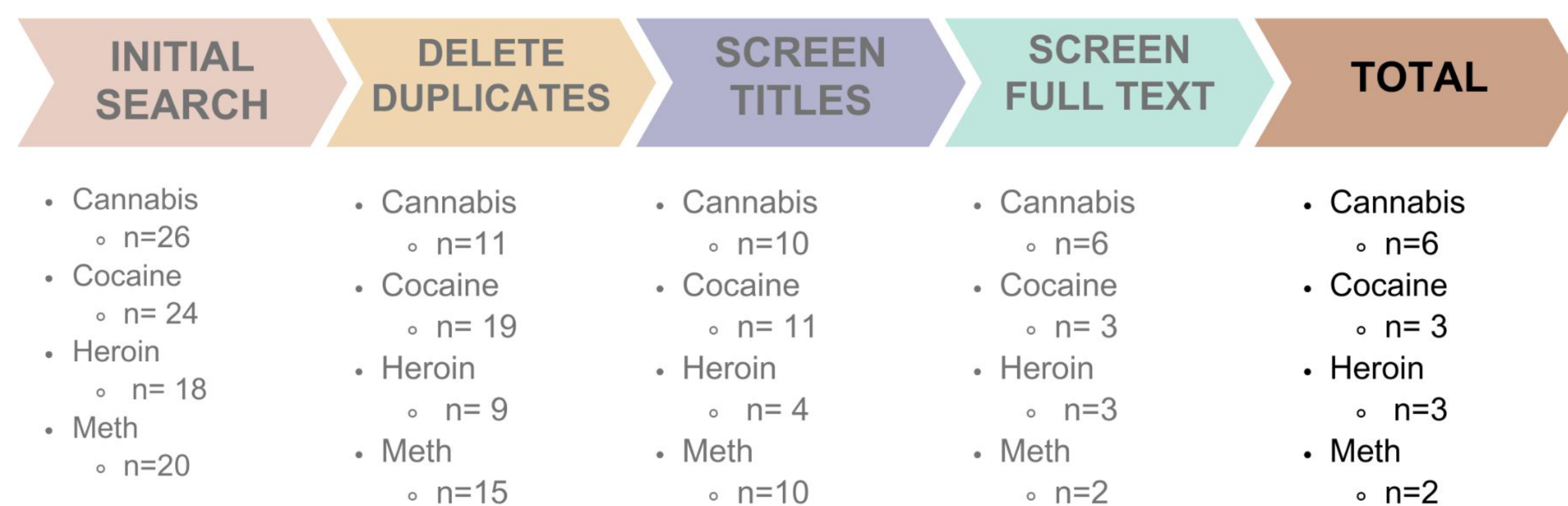
There has been growing concern about the potential impact of illicit drug use on periodontal health. This study seeks to answer the following question: **Do patients who use illicit drugs present with more severe periodontal disease than those who do not abuse illicit substances?**

Our research focuses on four drugs: cannabis, cocaine, methamphetamine, and heroin. We identified "bleeding on probing", "clinical attachment loss", and "pocket depth" as the markers for assessing periodontal health. To gather relevant studies for our analysis, we utilized Pubmed and Embase, which led us to a selection of 11 studies with a total of 4,523 subjects.

## Materials & Methods

- **Study Design:** Systematic review following Preferred Reporting Items for Systematic Review and Meta-Analysis (PRISMA)
- **PECOS Question:**
  - Population (P): Adult patients.
  - Exposure (E): Illicit drug use (cocaine, methamphetamine, heroin, cannabis).
  - Comparison (C): No drug use.
  - Outcome (O): Primary: clinical attachment loss (CAL) probing depth (PD), and bleeding on probing (BOP).
  - Study (S): Randomized controlled trial, case-control, cohort, cross-sectional study.
- **Inclusion Criteria:** Clinical studies (RCTs, cohort, case-control, cross-sectional), ≥20 participants, reporting ≥2 of 3 periodontal parameters, published in English between January 1, 1990, and August 31, 2023.
- **Exclusion Criteria:** Case reports, studies with <20 participants, reporting only one periodontal parameter, published in other languages, inaccessible full text, no response from authors.
- **Search Strategy:** PubMed, EMBASE
- **Data Extraction:** Independent extraction of data by two reviewers using electronic spreadsheet. Data included study design, sample size, mean age, country, and periodontal parameters.

Figure 1. Flow chart outlining the literature search for illicit drugs



## Results

Drug	Study	Sample Sizes (total)	Study Location	Age mean (years)	PD mean±SD (mm)	CAL mean±SD (mm)	BOP mean±SD (%)	Route of Drug Administration	Type of Study
Cannabis	Al Bush et al., 2019	100	Syria	39.2	-	4.43±1.25	60.05±31.86	Smoke	Cross-sectional
	Javed et al., 2020	61	United States	38.3	7.1±0.30	6.2±0.30	30.5±4.80	Smoke	Cross-sectional
	Kayal et al., 2014	57	Saudi Arabia	-	-	-	42.56±31.40	Smoke	Cross-sectional
	Rafat et al., 2020	95	Sweden	29.8	-	-	45.3±38.95	Smoke	Cross-sectional
	Thomson et al., 2008	915	New Zealand	N/A	Categorically measured the number of sites with markers CAL > X mm			Smoke	Cohort
Heroin	Shariff et al., 2017	1,938	United States	44.5	Categorically measured the number of sites with markers PD & CAL > X mm			Smoke	Cross-sectional
	Al Bush et al., 2019	100	Syria	39.2	-	4.7±1.26	66.59±32.19	Intravenous & Inhalation	Cross-sectional
	Kayal et al., 2014	57	Saudi Arabia	-	-	3.35±1.2	34.43±30.60	Intravenous	Cross-sectional
Methamphetamine	Mehmood et al., 2018	72	Pakistan	33.6	8.2±0.50	5.1±0.50	78.6±5.80	Intravenous	Cross-sectional
	Kayal et al., 2014	30	Saudi Arabia	-	-	2.7±0.85	45.12±34.90	N/A	Cross-sectional
Cocaine	Spolsky et al., 2018	571	United States	-	2.33±0.04	2.58±0.07	-	N/A	Cross-sectional
	Antoniazzi et al., 2016	212	Brazil	25.83	2.64±0.54	2.75±0.99	50.55±18.92	Rocks	Cross-sectional
	Casarin et al., 2017	155	Brazil	25	2.71±0.58	2.84±1.14	52.63±20.15	Rocks	Cross-sectional
	Cury et al., 2017	160	Brazil	33.33	2.84±0.76	2.12±1.23	-	N/A	Cross-sectional

Table 1. Periodontal findings according to studied drug

## Discussion

- **Cannabis:** Users had significantly higher amount CAL, BOP, PD compared to non-users. This drug had the most research in regards to periodontal disease, as the route of administration is via smoking. The confounding factor that presented the greatest challenge in interpreting the results from these studies was tobacco consumption, as many users used it in conjunction with cannabis.
- **Heroin:** Users had significantly higher amount of CAL and BOP compared to non-users. A significant confounding factor in interpreting these results is the behavioral tendencies and neglect of oral hygiene often exhibited by heroin users.
- **Methamphetamine:** There were no significant differences in CAL, BOP, and PD. It was interesting to note that the microbiome of users had a higher relative abundance of *Prevotella* bacterium, known to cause periodontal disease. However, due to the behavioral changes of methamphetamine users that result in them having poor oral hygiene practices and a multitude of confounding factors
- **Cocaine:** Users had significantly higher amount of CAL, BOP, and PD than non-users. From 2004 to 2020, global cocaine use rose, reaching over 20 million users by 2020. There are many routes of administration of cocaine, including smoke, intranasal, and injection. Users also can directly apply cocaine to their gums for its numbing properties, warranting investigation into its direct effects on periodontal health.

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