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Terminology Patterns in Acute Human Glyphosate-Based Herbicide Poisoning Research: A PubMed-Based Title Analysis

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***Abstract*—Objective:** To describe how frequently nine operationalized terminology categories appear in PubMed-indexed titles of publications concerning acute human glyphosate-based herbicide poisoning. **Methods:** A PubMed title/abstract search conducted on 14 November 2026 yielded 318 unique records. Titles, available abstracts and bibliographic metadata were used to screen for acute human glyphosate-based herbicide poisoning. Ninety-six primary publications and eight additional exploratory publications were classified using nine nonexclusive title-terminology categories. Frequencies were summarized descriptively. **Results:** Among the 96 primary titles, poisoning/intoxication terminology appeared in 68 (70.8%), formulation/brand terminology in 59 (61.5%), clinical manifestations in 46 (47.9%), ingestion/overdose in 18 (18.8%), severity in 17 (17.7%), management/treatment in 17 (17.7%), prediction/prognosis in 12 (12.5%), mortality/death in 11 (11.5%), and self-harm in 6 (6.2%). Categories were nonexclusive. The exploratory expanded dataset of 104 titles yielded a similar descriptive ordering. **Conclusion:** Poisoning/intoxication and formulation/brand terms were the most common in the primary dataset. These findings describe the wording of publication titles, not clinical outcomes or confirmed changes over time.

***Index Terms*—**glyphosate poisoning; clinical toxicology; publication titles; terminology analysis; bibliometrics; scientific communication

I. INTRODUCTION

Published research on acute glyphosate-based herbicide poisoning has addressed several clinical questions. Examples include a prospective study of self-poisoning [2], a Taiwanese poison-centre investigation [3], a report of pyloric stenosis following poisoning [4], and an Indian study of mortality predictors [5]. Zyoud and colleagues examined the broader bibliometric profile of glyphosate intoxication research [1]. In contrast, the present study focuses on the language of publication titles. This study classified titles into nine operationally defined terminology categories and described their frequencies overall, by publication period, and in an exploratory expanded dataset.

II. METHODS

A. Design and source

This descriptive study examined titles of publications retrieved through a PubMed search conducted on 14 November 2026 without database filters. The archived export contained 318 unique records: 297 with abstracts and 21 without. Available abstracts and bibliographic metadata were used to assess eligibility; the terminology analysis used publication titles only.

B. Search strategy

(glyphosate[tiab] OR roundup[tiab] OR "glyphosate-based"[tiab] OR "glyphosate-surfactant"[tiab]) AND (poison*[tiab] OR intoxicat*[tiab] OR overdose[tiab] OR ingest*[tiab] OR "self-poisoning"[tiab])

C. Eligibility

Publications were included in the primary dataset if their titles, available abstracts, or PubMed metadata indicated a substantial focus on acute human poisoning or clinically significant acute injury associated with glyphosate-based herbicides, regardless of exposure route. Eligible publications included clinical studies, case series, case reports, and clinically focused narrative reviews. Animal and cellular studies, chronic environmental exposure studies, analytical studies without substantive clinical findings, unrelated-pesticide reports, nonclinical editorials, news items, and corrections were excluded. Eight selected publications involving broader or mixed-agent clinical investigations with identifiable glyphosate-related information were retained exclusively for exploratory analysis. These publications did not represent an exhaustive sample of broader pesticide studies. Records lacking abstracts were assessed using available titles and indexed publication types, and eligibility was not assumed when clinical relevance could not be established. All 318 screening decisions were documented in the archived eligibility ledger. Following targeted eligibility reassessment of 14 records, the final allocation remained unchanged: 96 publications in the primary dataset, eight in the exploratory dataset, and 214 exclusions. One publication without an available abstract remained excluded because its eligibility could not be conclusively established using the available bibliographic information.

D. Title coding

The unit of analysis was one publication title. Nine nonexclusive categories were operationalized using explicit wording in the title: (1) poisoning/intoxication—poisoning, poisoned, intoxication or equivalent; (2) ingestion/overdose—ingestion, swallowing, oral poisoning/intoxication or overdose; (3) self-harm—self-poisoning, suicide, attempted suicide or self-harm; (4) clinical manifestations—patient-level signs, symptoms,

syndromes or organ complications, excluding biomarker-only or cellular effects; (5) severity—severe, critical, life-threatening, near-fatal or equivalent descriptors, without automatically treating observed death as severity; (6) management/treatment—named therapy, procedure or intervention, not merely a statement that a patient was treated; (7) formulation/brand—named brand, glyphosate salt, surfactant, formulation or product, excluding generic mentions of glyphosate alone; (8) mortality/death—explicit death, mortality, fatality, fatal outcome or a clearly lethal event, excluding hypothetical fatal potential and near-fatal wording; an explicitly lethal intoxication is coded as a fatal outcome; and (9) prediction/prognosis—explicit prognostic prediction, prognostic factors, risk stratification or prediction of outcomes, excluding nonspecific risk-factor wording without an outcome focus. Each category was coded independently, so titles could receive multiple codes.

E. Quality assurance and statistical analysis

All 318 PubMed records were cross-checked against the eligibility ledger using their unique identifiers and publication titles. The 104 analyzed titles were verified against the corrected nine-category coding matrix. Fourteen records requiring further assessment underwent targeted eligibility reassessment based on available titles, abstracts, and indexed publication types. Of these, two were confirmed for primary inclusion and 12 remained excluded, with no changes to the final dataset allocation. One excluded publication without an available abstract could not be conclusively evaluated without full-text access and remained a methodological limitation. Category frequencies, percentages, and publication-period denominators were recalculated from the corrected coding matrix and reconciled with Tables 1–4. Previously documented coding corrections were incorporated into the final dataset. However, these verification procedures did not constitute independent blinded double coding, and inter-rater reliability was not assessed. The nine terminology categories were nonexclusive; therefore, their percentages were not expected to sum to 100%. Statistical analyses were limited to descriptive frequencies and percentages. No inferential statistical tests, pooled clinical outcome estimates, or patient-level analyses were performed. Record-level eligibility reassessment decisions and supporting rationales were documented in the accompanying audit file.

III. RESULTS

A. Screening and publication selection

The PubMed search yielded 318 unique records, including 297 with abstracts and 21 without. Following eligibility assessment, 96 publications were included in the primary analysis, eight were retained for exploratory analysis, and 214 were excluded. Fourteen records requiring further assessment were reassessed using available titles, abstracts, and indexed publication types. Of these, two met the primary eligibility criteria, while 12 remained excluded. One excluded record lacked an abstract, preventing definitive eligibility assessment without full-text verification. The eligibility reassessment did not alter the final dataset allocation. All 104 analyzed titles were verified against the archived PubMed export and coding matrix.

B. Primary terminology frequencies

TABLE I
TERMINOLOGY FREQUENCIES IN THE PRIMARY ANALYSIS (N = 96; CATEGORIES ARE NOT MUTUALLY EXCLUSIVE)

Terminology category	Titles (n=96)	Percent
Poisoning/intoxication	68	70.8%
Formulation/brand	59	61.5%
Clinical manifestations	46	47.9%
Ingestion/overdose	18	18.8%
Severity	17	17.7%
Management/treatment	17	17.7%
Prediction/prognosis	12	12.5%
Mortality/death	11	11.5%
Self-harm	6	6.2%

C. Terminology frequencies in the additional exploratory dataset

TABLE II
TERMINOLOGY FREQUENCIES IN EIGHT ADDITIONAL EXPLORATORY TITLES (N = 8; CATEGORIES ARE NOT MUTUALLY EXCLUSIVE)

Terminology category	Titles (n=8)	Percent
Poisoning/intoxication	6	75.0%
Formulation/brand	2	25.0%
Clinical manifestations	4	50.0%
Ingestion/overdose	1	12.5%
Severity	1	12.5%
Management/treatment	1	12.5%
Prediction/prognosis	1	12.5%
Mortality/death	0	0.0%
Self-harm	2	25.0%

D. Exploratory descriptive comparisons by publication period

The 96 primary titles span 1991–2026: 13 were published in 1990–1999, 15 in 2000–2009, 43 in 2010–2019 and 25 in 2020–2026. Table 3 describes period-specific terminology proportions. Unequal denominators, exploratory grouping and the incomplete 2026 publication year preclude interpreting descriptive differences as established temporal trends.

TABLE III
EXPLORATORY TERMINOLOGY FREQUENCIES BY PUBLICATION PERIOD; N (%). CATEGORIES ARE NOT MUTUALLY EXCLUSIVE

Terminology category	1990–99 (n=13)	2000–09 (n=15)	2010–19 (n=43)	2020–26 (n=25)
Poisoning/intoxication	11 (84.6%)	11 (73.3%)	30 (69.8%)	16 (64.0%)
Formulation/brand	9 (69.2%)	12 (80.0%)	27 (62.8%)	11 (44.0%)
Clinical manifestations	4 (30.8%)	5 (33.3%)	23 (53.5%)	14 (56.0%)
Ingestion/overdose	2 (15.4%)	3 (20.0%)	8 (18.6%)	5 (20.0%)
Severity	1 (7.7%)	3 (20.0%)	8 (18.6%)	5 (20.0%)
Management/treatment	0 (0.0%)	2 (13.3%)	13 (30.2%)	2 (8.0%)
Prediction/prognosis	0 (0.0%)	2 (13.3%)	6 (14.0%)	4 (16.0%)
Mortality/death	1 (7.7%)	1 (6.7%)	5 (11.6%)	4 (16.0%)
Self-harm	1 (7.7%)	0 (0.0%)	2 (4.7%)	3 (12.0%)

E. Exploratory comparison across archived eligibility datasets

The primary dataset contained 96 glyphosate-focused publications. Adding eight selected broader publications produced an exploratory dataset of 104 titles. This study compared the frequencies of the nine terminology categories in these two datasets without inferential testing. Because the additional records were selected rather than drawn from a comprehensive screening of all broader pesticide studies, this comparison applies only to the archived expanded dataset.

TABLE IV
TITLE TERMINOLOGY IN THE PRIMARY AND EXPANDED ELIGIBILITY DATASETS, N (%); CATEGORIES ARE NONEXCLUSIVE

Terminology category	Primary dataset (n=96)	Expanded dataset (n=104)
Poisoning/intoxication	68 (70.8%)	74 (71.2%)
Formulation/brand	59 (61.5%)	61 (58.7%)
Clinical manifestations	46 (47.9%)	50 (48.1%)
Ingestion/overdose	18 (18.8%)	19 (18.3%)
Severity	17 (17.7%)	18 (17.3%)
Management/treatment	17 (17.7%)	18 (17.3%)
Prediction/prognosis	12 (12.5%)	13 (12.5%)
Mortality/death	11 (11.5%)	11 (10.6%)
Self-harm	6 (6.2%)	8 (7.7%)

Note: The expanded dataset consists of 96 primary publications and eight additional exploratory publications. The eight records and their classification rationale are documented in the archived eligibility ledger.

Poisoning/intoxication remained the most frequent category in both datasets (70.8% and 71.2%, respectively). Formulation/brand wording occurred in 61.5% and 58.7%, and clinical-manifestation wording in 47.9% and 48.1%, respectively. These are descriptive comparisons, not tests of temporal or clinical effects.

IV. DISCUSSION

Poisoning/intoxication was the most frequent terminology category, followed by formulation/brand and clinical manifestations. These findings concern the wording of publication titles; they do not describe the incidence of clinical complications, mortality, or treatment outcomes. Earlier clinical publications illustrate the range of subjects addressed in this literature, including self-poisoning, poison-centre epidemiology, complications, and mortality prediction [2]–[5]. The documented coding revisions also show why clear and consistently applied category definitions matter in a title-based analysis. Publications were counted individually even where underlying patient cohorts may have overlapped, because no patient-level data were combined. The expanded dataset included selected broader or mixed-agent reports and should not be considered clinically equivalent to the primary dataset. By examining terminology rather than overall research output, this study complements the earlier bibliometric work of Zyoud and colleagues [1]. Differences between publication periods are descriptive and do not establish trends.

A. Limitations

This study was based on a single PubMed search and may not represent the entire published literature on acute human glyphosate-based herbicide poisoning. Twenty-one records lacked abstracts, and full texts were not systematically reviewed. Fourteen records requiring further assessment underwent targeted eligibility reassessment using available bibliographic information. However, one excluded publication could not be conclusively assessed without full-text access, potentially resulting in the omission of an eligible report. Other records with limited bibliographic information may also have been misclassified. The primary dataset included heterogeneous publication types, including case reports, clinical studies, and clinically focused reviews. Classification into nine nonexclusive terminology categories involved interpretive judgments, and neither independent blinded double coding nor formal inter-rater reliability assessment was performed. The eight additional broader or mixed-agent publications were selectively included for exploratory comparison and did not constitute a comprehensive sensitivity analysis. Furthermore, publication-period denominators were unequal, and the 2026 publication year was incomplete at the time of the search. Consequently, the findings are limited to the analyzed publication titles and should not be interpreted as evidence of temporal trends, clinical incidence, causality, mortality rates, or treatment effects.

V. CONCLUSION

Poisoning/intoxication and formulation/brand were the most frequent terminology categories among 96 primary titles. This nine-category framework describes language used in PubMed-indexed publication titles; it does not estimate clinical outcomes or establish changes over time. The results apply only to the archived PubMed-retrieved and eligibility-selected titles; they should not be generalized to all glyphosate-poisoning publications.

DECLARATIONS

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Author contributions: Sujit Kumar Sarker: Conceptualization, methodology, literature searching, data acquisition, formal analysis, interpretation, original draft preparation, supervision, and revision. Swapna Pal: Literature screening, data verification, interpretation, and critical revision. Aranya Aditri Saanjh: Literature screening, bibliographic data organization, and critical revision. Avijeet Sarker: Methodological evaluation and critical revision.

Ethics approval: This secondary analysis used publicly available publication metadata and did not collect individual-level participant information or involve human recruitment or intervention. No ethics committee approval was sought; this statement does not constitute an institutional exemption determination.

Use of AI-assisted tools: AI-assisted tools were used to support language editing and data consistency checks. The authors reviewed and verified the final manuscript and take full responsibility for its content and accuracy.

Data availability: The data supporting the findings of this study are retained by the authors and may be obtained from the corresponding author upon reasonable request, subject to the authors' availability.

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