Proceedings Academic Universitas Jambi
Volume 1, Issue 2, November 2025

Identification of antipsychotic side effects in Schizophrenia patients using Naranjo algorithm at Jambi Psychiatric Hospital

Yuliawati[1]*, Attiya Istarini[3], Kamariyah[2], Yuliana[2], Uce Lestari[1], Indah Sri Wulan Sofyan[1], Sofia Elisa Apriyanti[1]

[1] Department of Pharmacy, Faculty of Medicine and Health Science, Universitas Jambi, Jambi, 36122, Indonesia
[2] Nursing Programme, Faculty of Medicine and Health Science, Universitas Jambi, Jambi, 36122, Indonesia
[3] Medical Study Program, Faculty of Medicine and Health Science, Universitas Jambi, Jambi, 36122, Indonesia

*Coressponding Authors: yuliawati@unja.ac.id

Abstract

Background: Schizophrenia is a chronic mental disorder that requires long-term antipsychotic therapy. However, the use of antipsychotics may lead to adverse drug reactions (ADRs) that can affect patients' quality of life. **Objective**: This study aimed to identify the types and likelihood of antipsychotic-related side effects among patients with schizophrenia using the Naranjo Algorithm. **Methods:** A descriptive observational study was conducted in September 2025. Data were collected through structured patient interviews and verified using medical records. The probability of ADRs was assessed using the Naranjo Algorithm, and the data were analyzed descriptively. **Results:** Among 119 patients with schizophrenia, 12 met the inclusion criteria. These 12 patients experienced a total of 23 ADR events. Based on the Naranjo Algorithm, 4 patients (33.33%) were categorized as probable and 8 (66.67%) as possible. The most common adverse effects were severe sedation (6 cases, 29.09%) and weakness (6 cases, 29.09%), followed by acute dystonia, mouth stiffness, and hypotension (each 8.70%). Less frequent events included hyperglycemia, hypertension, leukocytosis, slurred speech, and hypersalivation (each 4.35%). **Conclusion:** Most adverse effects showed a possible to probable causal relationship with antipsychotic use. The Naranjo Algorithm proved useful for identifying ADRs and supporting pharmacovigilance activities in psychiatric settings. Enhanced clinical monitoring and patient education are recommended to minimize serious adverse effects.

Keywords: Antipsychotic; Inpatient; Naranjo Algorithm; Schizophrenia; Adverse Drug Reaction.

Cite This Article

Yuliawati, Istarini, A., Kamariyah, Yuliana, Lestari, U., Sofyan, I. S. W., & Apriyanti, S. E. (2025). Identification of antipsychotic side effects in schizophrenia patients using Naranjo algorithm at Jambi Psychiatric Hospital. *Proceedings Academic Universitas Jambi, 1*(2). 632-640.

Editor

I Made Dwi Mertha Adnyana, M.Ked.Trop.

Article info

Received: October 03, 2025. Revised: October 31, 2025. Accepted: November 09, 2025

INTRODUCTION

Schizophrenia is a chronic and complex mental disorder characterized by disturbances in perception, thought, emotion, and behavior, leading to impaired social and occupational functioning (1). According to the World Health Organization, approximately 24 million people worldwide are affected by schizophrenia, with a relatively consistent incidence rate across different countries, including Indonesia. Based on national health research data, the prevalence of schizophrenia in Indonesia is 7 per 1,000 households, with an increasing demand for mental health services in several provinces, including Jambi. The growing number of patients receiving long-term antipsychotic therapy highlights the need to monitor potential drug-related side effects that may impair quality of life (2).

Antipsychotics remain the cornerstone of schizophrenia treatment and include both typical (first-generation) agents such as haloperidol and chlorpromazine, as well as atypical (second-generation) agents such as risperidone, olanzapine, and quetiapine (3). Although these medications are effective in controlling positive and negative symptoms, their use may lead to serious adverse effects, including extrapyramidal symptoms (muscle rigidity, tremor, dystonia), sedation, hypotension, and neuroleptic malignant syndrome (NMS). Moreover, atypical antipsychotics are frequently associated with metabolic disturbances such as weight gain, hyperglycemia, and dyslipidemia (4). These adverse effects not only affect treatment adherence but also increase the risk of relapse and impose a greater economic burden on the healthcare system (5).

Monitoring and identifying adverse drug reactions (ADRs) constitute a critical component of pharmacovigilance, which ensures the ongoing evaluation of drug safety after widespread clinical use (6). One standardized method for assessing the causal relationship between a drug and an observed adverse effect is the Naranjo Algorithm which employs a structured scoring system based on parameters such as onset timing, response to drug withdrawal or rechallenge, and the presence of alternative explanations. This approach enables clinicians and researchers to categorize ADR likelihood as definite, probable, possible, or doubtful (7). Several studies in Indonesia have documented the occurrence of antipsychotic-related side effects in psychiatric settings. For instance, Madury investigated extrapyramidal symptoms among schizophrenia patients treated with antipsychotics at Soerojo Mental Hospital (8). However, systematic data using standardized assessment tools such as the Naranjo Algorithm remain limited, particularly in mental health facilities in Jambi, which serves as a key referral center for psychiatric care in central Sumatra (9).

Based on this background, the present study aimed to identify the types and likelihood of antipsychotic-related adverse effects among schizophrenia patients using the Naranjo Algorithm. The findings are expected to provide an evidence-based foundation for improving the monitoring of antipsychotic therapy and strengthening pharmacovigilance practices in mental health care facilities.

METHODS

Study design and setting

The study design used was a descriptive observational study with a cross-sectional design, where data were collected during the period of September 2025 through direct interviews with schizophrenia patients (F20) at the Jambi City Mental Hospital. The descriptive approach was chosen to obtain a factual picture of the possible relationship between drug use and side effects based on the results of interviews and assessments using the Naranjo algorithm scale.

Population, samples and sampling

The population in this study was all skizofrenian patients who received drug therapy at the Jambi City Mental Hospital during the period of September 2025. The research sample was taken using the purposive sampling method, namely the selection of samples based on certain criteria that have been determined by the researcher.

Instruments and criteria

The tools used in this study included structured interview forms, Naranjo Algorithm assessment sheets, and computer equipment equipped with Microsoft Excel software for data processing. The research materials consisted of both primary and secondary data. Primary data were obtained directly from patients through interviews regarding medication use and experienced complaints. Secondary data were collected from patient medical records to verify information consistency. All data were sourced from patients diagnosed with schizophrenia (F20).

The instruments used in this study include: (1) Structured interview sheet, which contains patient identity, history of drug use, and complaints or side effects or complaints experienced by the patient while using the drug; (2) The Naranjo algorithm scale, used to assess the probability of a relationship between a drug and a side effect, provides a score that is then categorized into four levels of probability: definite, probable, possible, and doubtful.

Inclusion criteria included patients who were willing to be interviewed, were taking one or more medications for a specified period, and were able to provide information about any effects or complaints they experienced. Exclusion criteria included patients who were uncooperative, had communication problems, or were unable to provide complete information regarding their medication use, as well as patients with incomplete medication use data.

Procedure and data collection

This study began with data collection through direct patient interviews using a structured interview form. The interview results were then analyzed to identify any suspected adverse drug reactions (ADRs) experienced by the patients. Next, each identified case was assessed using the Naranjo algorithm to determine the probability of a relationship between the drug and the side effect. The scores obtained from the algorithm were categorized into definite, probable, possible, or doubtful scales according to the Naranjo scoring guidelines. All collected data was calculated and processed using Microsoft Excel software to obtain frequency distributions and percentages for each probability category. The results of the data processing are presented in tables and descriptive sections, describing patient characteristics, the types of medications used, and the level of potential side effects.

Statistical analysis

The data obtained were analyzed using descriptive methods. Each drug side effect assessment result based on the Naranjo algorithm was processed in Microsoft Excel to determine the side effect probability scale. The data were presented in the form of frequency distribution tables and descriptive descriptions to provide an overview of the respondent characteristics, the types of drugs used, and the probability of side effects experienced by patients.

*Ethical concideration*s

The study was conducted in accordance with the Declaration of Helsinki, and the protocol was approved by the Ethics Committee of Faculty of Medicine and Health Sciences, Universitas Jambi No. 3059/UN21.8/PT.01.04/2025.

RESULTS

Table 1. Demographic characteristics of the respondents

Characteristic	Frequency	
	N	%
Gender		
Male	6	50.00%
Female	6	50.00%
Total	12	100.00%
Age		
12-16 (Early Teens)	1	8.33%
17-25 (Late Teens)	3	25.00%
26-35 (Early Adulthood)	3	25.00%
36-45 (Late Adulthood)	1	8.33%
46-55 (Early Elderly)	3	25.00%
56-65 (Late Elderly)	0	0.00%
>65 (Seniors)	1	8.33%
Total	12	100.00%
Occupation		
Doesn't work	8	66.67%
Private	1	8.33%
Farmer	1	8.33%
Students	1	8.33%
Other	1	8.33%
Total	12	100.00%
Education Level		
No formal education	3	25.00%
Elementary School	4	33.33%
Junior High School	0	0.00%
Senior High School	5	41.67%
Total	12	100.00%
Marital Status		
Married	4	33.33%
Single	7	58.33%
Divorced	1	8.33%
Total	12	100.00%

A total of 12 patients experienced multiple adverse effects, yielding 30 adverse events in total, as shown in the table below.

Table 2. Adverse Drug Reactions

No.	Effect Side	Amount	Presentation
1.	Heavy Sedation	7	23.33%
2.	Weak	6	20.00%
3.	Dizzy	3	10.00%

No.	Effect Side	Amount	Presentation
3.	Dystonia I	2	6.67%
3.	Stiff Mouth	2	6.67%
4.	Hypotension	2	6.67%
5.	Hypertension	1	3.33%
6.	High Leukocytes	1	3.33%
7.	High Blood Sugar	1	3.33%
8.	Talking Pelo	1	3.33%
9.	Hypersalivation	1	3.33%
10.	Nervous	1	3.33%
11.	Tremor	1	3.33%
12.	Fever	1	3.33%
	Total	**30**	**100.00%**

Table 3. Naranjo Algorithm Probability Scale for Schizophrenia Patients

Patient	The medicine that Prescribed	Effect Side	Algorithm Score Naranjo	Information
Patient 1	Risperidone Trihexylphenidyl Lorazepam Clozapine	Severe sedation Weakness	4	Possible
Patient 2	Lorazepam Soroquin	Severe sedation Hyperglycemia Weakness	4	Probable
Patient 3	Olanzapine Injection	Acute dystonia	7	Probable
Patient 4	Olanzapine Clozapine Soroquin Lorazepam	Slurred speech Mouth stiffness Leukocytosis	4	Possible
Patient 5	Haloperidol Injection Diazepam Injection	Severe sedation Weakness	8	Probable
Patient 6	Risperidone Olanzapine	Hypotension	3	Possible
Patient 7	Haloperidol Injection Diazepam Injection	Hypotension	4	Possible
Patient 8	Lorazepam Soroquin	Severe sedation Weakness	6	Probable
Patient 9	Soroquin	Severe sedation Weakness	4	Possible
Patient 10	Haloperidol Injection	Acute dystonia Hypersalivation	4	Possible
Patient 11	Soroquin Lorazepam Divalproex	Severe sedation Mouth stiffness Weakness	4	Possible

	Sodium			
Patient 12	Risperidone Trihexylphenidyl Lorazepam	Hypertension	4	Possible

DISCUSSION

Based on research conducted in September 2025, a total of 18 patients diagnosed with schizophrenia were recorded, of whom 12 met the inclusion criteria and exhibited symptoms of drug-related side effects. Six patients were excluded because no adverse reactions were observed after drug administration. This study aimed to identify the types and likelihood of antipsychotic-related adverse effects in schizophrenia patients using the Naranjo Algorithm. Among the 12 eligible patients receiving antipsychotic therapy, 30 adverse drug reaction (ADR) events were identified. According to the Naranjo assessment, 3 cases (27.3%) were classified as probable and 8 cases (72.7%) as possible, indicating that most side effects had a possible to fairly strong causal relationship with antipsychotic use (9).

Demographic data showed an equal distribution of male and female patients (50% each), predominantly within the 17–55 years age range. Most patients were unemployed (66.67%), had low to moderate educational backgrounds (58.33%), and were unmarried (58.33%). This sociodemographic profile reflects social and economic limitations that may hinder patients' understanding of medication use and the recognition of adverse symptoms. Previous research has shown that limited health literacy contributes to delayed reporting of side effects, underscoring the need for structured patient education as part of pharmacovigilance and therapy monitoring (10). Clinically, the most frequently reported side effects were severe sedation and weakness, each accounting for six incidents (26.09%). Sedation, commonly associated with clozapine, olanzapine, and quetiapine, results from antagonism of histamine (H1) and α1-adrenergic receptors. This adverse effect has been reported in more than 35% of patients receiving antipsychotics and may significantly reduce quality of life, increasing the risk of falls and poor adherence to therapy (11).

Extrapyramidal symptoms (EPS), including acute dystonia and mouth stiffness (each 8.70%), were also observed, primarily among patients using olanzapine. Although EPS are less common with second-generation antipsychotics, high doses or combination regimens may still induce such reactions through dopamine D2 receptor antagonism in the nigrostriatal pathway (12). In addition to neurological effects, systemic side effects were recorded, including hypotension (8.70%), hypertension (4.35%), hyperglycemia (4.35%), leukocytosis (4.35%), slurred speech (4.35%), and hypersalivation (4.35%). Metabolic disturbances were mostly associated with atypical antipsychotics such as olanzapine and clozapine, which may impair glucose metabolism and increase insulin resistance.

Therefore, routine monitoring of blood glucose levels and metabolic parameters is essential during long-term therapy (13). Furthermore, some patients received combination therapy involving lorazepam, diazepam, or divalproex sodium, which may potentiate sedative and hypotensive effects. Co-administration of antipsychotics and benzodiazepines has been shown to double the risk of central nervous system depression, highlighting the importance of rational prescribing to minimize drug interactions and cumulative toxicity (14). Detailed case analyses demonstrated varied ADR profiles. For instance, a patient receiving risperidone, trihexyphenidyl,

lorazepam, and clozapine experienced severe sedation (Naranjo score 4, possible), likely due to additive CNS depressant effects (11). Another patient on olanzapine developed muscle rigidity (score 7, probable), consistent with D2 receptor blockade-induced EPS (12).

Several patient receiving haloperidol and diazepam exhibited hypotension and sedation (scores 4–8, possible to probable) (15,17). These findings confirm that the probability of ADRs depends on drug class, dosage, and combination patterns. Overall, the results emphasize that most adverse events demonstrated a possible to probable causal link with antipsychotic treatment. The "probable" classification suggests a clear temporal association between drug use and symptom onset, whereas the "possible" category indicates uncertainty due to potential confounding factors (19). These findings have significant clinical implications, particularly for psychiatric and pharmacy practice. Early detection of side effects such as sedation, hypotension, and metabolic disturbances is vital to maintaining treatment continuity and preventing complications. Clinical pharmacists play a key role in patient counseling, ADR documentation, and therapy optimization through structured pharmacovigilance initiatives (20). This study had several limitations, including a small sample size (12 patients), a short observation period, and polypharmacy among participants, which may complicate the attribution of ADRs to specific agents. Some ADRs were subjectively reported, introducing potential reporting bias. Therefore, future research employing prospective, longitudinal designs with larger samples is recommended to strengthen causal inferences.

CONCLUSIONS

These findings underscore the importance of implementing structured adverse event monitoring (pharmacovigilance) systems in mental health facilities through validated tools such as the Naranjo Algorithm. Clinical pharmacists play a strategic role in patient education, early detection of adverse drug reactions (ADRs), systematic documentation, and the provision of pharmacotherapeutic interventions to minimize the occurrence of severe outcomes. For future research, it is recommended to employ a prospective, longitudinal study design with a larger sample size and the inclusion of objective clinical and laboratory parameters—such as blood glucose levels, body mass index, and liver and kidney function tests—to improve accuracy and generalizability. Furthermore, incorporating complementary causality assessment instruments, such as the WHO-UMC Causality Assessment Scale, may enhance the validity and reliability of determining causal relationships between drug exposure and observed side effects.

CONFLICT OF INTEREST

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

FUNDING

This study did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

DECLARATION OF ARTIFICIAL INTELLIGENCE USE

This study used artificial intelligence (AI) tools and methodologies in the following capacities to improving the grammar, sentence structure, and readability of the manuscript).

REFERENCES

[1] Devi F, Robiyanto, Yuswar MA. Studi efek samping dan profil pengobatan pada pasien skizofrenia di instalasi rawat inap rumah sakit jiwa provinsi kalimatan barat. Occup Med (Chic Ill). 2020;53(4):130.

[2] Al Hindi A, Al Balushi S, Al Ruzaiqi S, Al Busafi S, Abdulmonem S, Ali IM, et al. Adverse Drug Reactions Among Hospitalized Psychiatric Patients, Prevalence, Severity, Preventability, and Opportunities for Intervention. Oman Med J. 2024;39(3):e631–e631. doi: 10.5001/omj.2024.75.

[3] Saharuddin, Ikawati Z, Kristanto. Perbandingan Efektivitas Regimen Terapi Antipsikotik Pasien Schizophrenia di RSJ Dr. Ernaldi Bahar Palembang. Maj Farm. 2021;17(2):206–16. https://doi.org/10.22146/farmaseutik.v17i2.58508

[4] Dania H, Faridah IN, Rahmah KF, Abdulah R, Barliana MI, Perwitasari DA. Hubungan Pemberian Terapi Antipsikotik terhadap Kejadian Efek Samping Sindrom Ekstrapiramidal pada Pasien Rawat Jalan di Salah Satu Rumah Sakit di Bantul, Yogyakarta. Indones J Clin Pharm. 2019;8(1). https://doi.org/10.15416/ijcp.2019.8.1.19

[5] Oliva D, Ortega-Sánchez N, Hinojosa S, Pérez-Cisneros M. Literature Review. Mod Metaheuristics Image Process. 2022;7(11):16–35. https://doi.org/10.1201/9781003183501

[6] Meilani D, Sinuraya RK. Pharmacovigilance Dalam Aspek Penanganan Reaksi Obat Yang Tidak Diinginkan. Farmaka. 2018;16(1):103–11. https://doi.org/10.24198/jf.v16i1.17037

[7] Fadhilah H, Salman S, Hilmi IL. Review Artikel: Studi Farmakovigilans terhadap Kejadian Advers Drug Reactions (ADRs). J Pharm Sci. 2023;6(1):199–206. https://doi.org/10.36490/journal-jps.com.v6i1.20

[8] Al Madury S, Padmasari S, Jenderal Achmad Yani Yogyakarta U, Siliwangi J, Barat R, Soerojo Hospital I, et al. Laporan Kasus: Kajian Efek Samping Obat Antipsikotik pada Kejadian Gejala Ekstrapiramidal pada Pasien Skizofrenia. J Pharm [Internet]. 2024;2(2):29–39. https://doi.org/10.30989/jop.v2i2,%20Special%20Edition.1474

[9] Nugrahaningtyas OD, Rahajeng B. Antipsychotic Side Effects Identification Using the Naranjo Algorithm at Hospital X Yogyakarta. Indones J Pharm Sci Technol. 2025;12:42–50. https://doi.org/10.24198/ijpst.v12s1.57955

[10] Rusli R. FARMASI KLINIK. 2021. Jakarta. Indonesia

[11] Gedge L, Lazowski L, Murray D, Jokic R, Milev R. Effects of quetiapine on sleep architecture in patients with unipolar or bipolar depression. Neuropsychiatr Dis Treat. 2010;6:501–8. https://doi.org/10.2147/ndt.s12433

[12] Bharti P, Kumar R, Singh GP. Tardive dystonia with olanzapine: A rare case report. Indian J Psychol Med. 2012;34(2):187–9. https://doi.org/10.4103/0253-7176.101795

[13] Kırşavoğlu B, Odabaşı O. An unexpected side effect related to the use of clozapine: Neutrophilic leukocytosis and brief review of the literature. Psychiatry Res Case Reports. 2023;2(1):100101. https://doi.org/10.1016/j.psycr.2022.100101

[14] Widianto Sudjud R, Yulriyanita B. Sedasi dan Analgesia di Ruang Rawat Intensif. Anesth Crit Car. 2014;32(3):221–33.

[15] Made I, Suardiyasa DO, Dundu AE, Kairupan BHR. Efek samping glaukoma pada penggunaan antipsikotik atipikal. J Kedokt Kom Trop. 2024;12(1):537–42.

[16] Gedam SR, Ghosh S. Distonia akut yang diinduksi oleh quetiapine: laporan kasus. 2015;6:59–61.

[17] Zaporowska-stachowiak I, Oduah KS szymczak CM tiffany. Haloperidol dalam perawatan paliatif: Indikasi dan risiko. Biomedis & Farmakoterapi. 2020;132 https://doi.org/10.1016/j.biopha.2020.110772

[18] Utami VW, Darajati M, Puspitasari CE. Potensi interaksi obat pada pasien skizofrenia di Rumah Sakit Jiwa Mutiara Sukma tahun 2020. Sasambo J Pharm. 2022;3(1):36–42. https://doi.org/10.29303/sjp.v3i1.151

[19] Naranjo CA, Busto U, Sellers EM, Sandor P, Ruiz I, Roberts EA, et al. A method for estimating the probability of adverse drug reactions. Clin Pharmacol Ther. 1981;30(2):239–45. https://doi.org/10.1038/clpt.1981.154
[20] KEMENKES. Pedoman Pelayanan Kefarmasian Pada Pasien Gangguan Jiwa. 2021. Jakarta: Kemenenterian Kesehatan Republik Indonesia.