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NSAID Utilization and Safety in Malaysia: A Literature Review

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Abstract: ***Nonsteroidal anti-inflammatory drugs (NSAIDs) are widely used in Malaysia for pain and inflammatory conditions, yet their high utilization continues to raise important concerns regarding prescribing practices, public awareness, and safety. This literature review examined studies published between 2017 and 2025 to identify national trends in NSAID utilization, patterns of prescribing in clinical settings, and levels of knowledge, attitude, practice, and perception among healthcare workers, patients, and the general public, evaluate key safety concerns and adverse effects, and summarize evidence for improvement strategies and safer alternatives in Malaysia. Findings from utilization studies show extensive prescribing across primary care, hospitals, and community settings, including notable use among pediatric and postoperative orthopedic patients. Studies consistently indicate that many patients and members of the public have varying levels of knowledge, attitude, practice, and perception related to NSAID use, with common gaps in understanding safety risks. Evidence also shows ongoing concerns about adverse effects, particularly gastrointestinal complications, which remain a significant issue among NSAID users. At the same time, several studies demonstrate that educational interventions, clearer clinical recommendations, and the use of safer alternatives such as topical NSAIDs can help improve the safe and rational use of NSAIDs in Malaysia. Overall, the review underscores the need for rational prescribing, enhanced pharmacovigilance, and strengthened education strategies to promote safer and more responsible NSAID use in Malaysia.***
Keywords: NSAIDs, Malaysia, Drug Utilization

I. INTRODUCTION

Nonsteroidal anti-inflammatory drugs (NSAIDs) are important in modern medicine and are known for their strong analgesic, anti-inflammatory, and antipyretic effects. (Gondane & Pawar, 2024). NSAIDs mainly work by inhibiting the enzymes known as cyclooxygenase (COX), with a focus on COX-1 and COX-2. These enzymes have important roles in the body's normal functions and responses to inflammation, as they are key in the metabolism of arachidonic acid, leading to the creation of prostaglandins and thromboxane (Ribeiro et al., 2022; Urbański et al., 2024). COX-1 helps to maintain regular cellular operations, including the protection of the gastric lining, assisting with platelet clumping, and managing renal functions. In contrast, COX-2 is generally activated when there is injury or inflammation and is chiefly responsible for generating pro-inflammatory prostaglandins, which are involved in the sensation of pain and the occurrence of swelling (Ribeiro et al., 2022; Urbański et al., 2024).

Around 30 million people around the globe take NSAIDs on a daily basis. (Pradère et al., 2020). NSAIDs are among the most frequently prescribed medications for pain and inflammation, accounting for about 5–10% of all prescriptions annually (Wongrakpanich et al., 2018; Abdu et al., 2020). They play a vital role in managing a wide range of conditions, ranging from common problems like headaches, menstrual cramps, and minor musculoskeletal injuries to long-term conditions such as osteoarthritis (OA), rheumatoid arthritis, and other inflammatory diseases (Gondane & Pawar, 2024). Nonetheless, the extensive use of NSAIDs comes with certain drawbacks. Like any other medications, they are associated with various side effects and dangers. These may involve gastrointestinal (GI) problems such as ulcers, gastritis, and GI bleeding, issues with renal function, possible cardiovascular (CV) risks, bleeding disorders, allergic responses, and, in rare cases, liver toxicity. Therefore, the choice to prescribe or utilize NSAIDs should be made with a thorough evaluation of the possible risks and advantages for every individual patient (Robins, 2023).

NSAIDs continue to be commonly used and are easily obtainable in Malaysia (Awaluddin et al., 2017; SAHREL et al., 2025). In Malaysia, NSAIDs were identified as the eighth most commonly used medications based on the Anatomical Therapeutic Chemical (ATC) system curative groups in 2007, with a utilization rate of 12.311 defined daily doses (DDD) per 1,000 inhabitants per day and an estimated 1.23% of the population using them (Khairudin et al., 2017). In Malaysia, NSAIDs are often associated with adverse drug reactions (ADRs), potentially resulting in increased medical expenses and lower quality of life (Khairudin et al., 2017). This issue is evident from national statistics, which show frequent reports of NSAID-related ADRs.

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Data from Malaysia's National Pharmaceutical Regulatory Agency (NPRA) indicates that in 2017, there were 1,575 reported cases of ADRs related to 14 types of NSAIDs. The predominant reaction recorded was skin and subcutaneous disorders at 48%, followed by eye disorders at 29%, respiratory, thoracic, and mediastinal disorders at 10%, systemic and local administration site reactions at 7%, and GI disorders at 6% (Ministry of Health Malaysia, Pharmaceutical Services Programme, 2018). However, in 2021, the occurrences of ADRs linked to NSAIDs rose significantly. The NPRA documented 4,411 ADR cases during this year involving 13 different NSAIDs. The most frequent reactions were skin and subcutaneous disorders at 36.4%, with eye disorders at 33.3%, general disorders and administration site condition at 11.8%, respiratory, thoracic, and mediastinal disorders at 11.3%, and GI at 7.2% (Ministry of Health Malaysia, Pharmaceutical Services Programme, 2023). These figures demonstrate a clear increase in the number of reported ADRs over time, emphasizing the ongoing safety concerns associated with NSAID use in Malaysia.

The literature review was conducted with the objective to identify and summarize current trends, utilization patterns, safety concerns, and factors related to both patients and prescribers that are associated with NSAID use in Malaysia. It aimed to analyse studies addressing NSAID prescribing practices, ADRs, public and healthcare workers' knowledge, attitudes, practices, and perceptions regarding NSAID use. The review also sought to highlight evidence-based recommendations and educational interventions for improving NSAID safety and rational use. Literature published between 2017 and 2025 was reviewed using databases such as PubMed and Google Scholar, employing search keywords including "NSAID use in Malaysia," "NSAID prescribing pattern," "NSAID adverse effects," "NSAID knowledge and practice," and "NSAID patient education" etc.

II. STUDIES ON NSAID UTILIZATION AND PRESCRIBING PATTERNS IN MALAYSIA

This table presents research conducted in various Malaysian healthcare settings, focusing on the prevalence, utilization trends, and prescribing safety of NSAIDs among different patient populations.

Authors	Objectives and Methodology	Sample Size	Key Findings
Khairudin et al. (2017)	• Determined the consumption pattern of NSAIDs in primary healthcare clinics in Klang, Malaysia. • Retrospective cohort review of medical records for patients prescribed NSAIDs over 12 months (Jan–Dec 2013) carried out at Klinik Kesihatan Anika, Bukit Kuda, and Pandamaran, primary healthcare clinics within the Klang Health district, Malaysia.	• 852 patient records reviewed.	• Diclofenac (1.5725 DDD), mefenamic acid (1.4108 DDD), Ibuprofen (0.0166 DDD) and Meloxicam (0.0016 DDD) were the most used NSAIDs. • 17.6% of NSAID users had chronic diseases, and 1.8–22.9% used antihypertensives concurrently. • 8.6% of patients had potential drug–drug interactions involving NSAIDs.
Awaluddin et al. (2017)	• Determined prevalence of NSAID use and its association with chronic diseases using data from the nationwide NHMS 2011 survey. • Multivariate logistic regression was used to examine associated factors.	• 18,231 adults (≥18 years).	• Overall NSAID use was 14.2%, and 4.2% used NSAIDs daily. • Strong associations were found with arthritis (aOR 3.03), kidney disease (aOR 2.36), asthma (aOR 1.36), heart disease (aOR 1.34), high blood pressure (aOR 1.22), and difficulty carrying out daily tasks or work (aOR 2.06). • Higher NSAID use was linked to insurance coverage (aOR 1.44), higher education (aOR 1.35), higher income (aOR 1.26; 1.12), employment (aOR 1.25), and female gender (aOR 1.17), while lower use occurred in adults ≥60 years (aOR 0.83) and Chinese ethnicity (aOR 0.41) compared to Malays.
Zin et al. (2018)	• To investigate trends in analgesic prescribing among outpatients in a tertiary hospital and to evaluate the usage patterns of NSAIDs, tramadol, and opioids between 2010 and 2016. • A cross-sectional study using a prescription database that included nine NSAIDs, tramadol, and five opioids. • Descriptive statistics and linear trend analysis were performed using Stata version 13.	• 192,747 analgesic prescriptions for 97,227 patients.	• 51.8% were NSAID patients, 46.6% tramadol patients, and 1.7% opioid patients. • Tramadol (37.9%) was most prescribed, followed by ketoprofen (17.5%), diclofenac (16.2%), celecoxib (12.2%), as well as other NSAIDs (<4.5%). • With the exception of meloxicam, indomethacin, and mefenamic acid, all analgesics increased over time. • Opioids were least prescribed mostly morphine (2.2%) and oxycodone (0.5%) However, the rate of growth was the highest.

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Authors	Objectives and Methodology	Sample Size	Key Findings
Hwong et al. (2020)	• Examined NSAID prescribing patterns in Malaysian primary care and assessed the extent of high-risk NSAID prescribing. • Cross-sectional study using data from the National Medical Care Survey 2014 covering 129 public and 416 private primary care clinics. • Evaluated NSAID types, indications, and high-risk use and identified associated factors through multivariable logistic regression with weighted analysis.	• 55,489 patients received NSAIDs.	• Diclofenac (40.5%) and mefenamic acid (29.2%) were the most prescribed NSAIDs with musculoskeletal and respiratory tract infections being the most common indications (17.8% each). • High-risk NSAID prescriptions accounted for 22.9% of patients and included inadequate gastroprotection (47.8%) cardiovascular comorbidities (24.8%) and high-dose NSAID use (22.4%). • Odds of high-risk prescribing increased with number of drugs (OR 1.23) and diagnoses (OR 2.21), and were lower in patients with secondary (OR 0.52) or tertiary education (OR 0.39) compared to no formal education.
Bakrin et al. (2020)	• Evaluated the utilization of coxibs and traditional NSAIDs for postoperative orthopaedic pain control using defined daily dose (DDD) and the ratio of use density to use rate (UD/UR). • Conducted a retrospective drug utilization review (DUR) in the inpatient department of a private teaching hospital in Seremban, Malaysia. • Data collected included demographics, prescribed medications, lab results, VAS pain scores, and length of stay. • Included arthroscopy, reconstructive surgery, and fracture fixation cases; stratified random sampling used. • DDD per 100 admissions and UD/UR calculated using WHO DDD benchmarks. • Included coxibs (celecoxib capsules, etoricoxib tablets, parecoxib injections) and traditional NSAIDs (dexketoprofen injections, diclofenac sodium tablets). • Data analyzed descriptively	• 195 patient records were randomly selected from 1,169 NSAID cases.	• Surgery types included arthroscopy (55.4%), fracture fixation (35.9%), and reconstructive (8.7%). • Most patients had low comorbidity rates and minimal concomitant prescriptions causing drug interactions (74.9%) or use of gastroprotective agents (77.4%). • DDD/100 admissions for all NSAIDs were <100 except parecoxib injections (389.23). • UD/UR values were <100 except etoricoxib tablets (105.75) and parecoxib injections (108.00). • Most patients (96.9%) received other analgesics for multimodal pain control. • Arthroscopy cases showed the most appropriate NSAID utilization based on UD/UR.

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Authors	Objectives and Methodology	Sample Size	Key Findings
Zin, (2020)	• Explored patterns of analgesic prescribing among pediatric patients in tertiary hospital settings in Malaysia. • A cross-sectional study using prescription databases from tertiary hospitals between 2010 and 2016. • Included prescriptions for nine NSAIDs (diclofenac, ketoprofen, etoricoxib, celecoxib, ibuprofen, indomethacin, mefenamic acid, meloxicam, and naproxen), along with tramadol and five additional opioids (morphine, oxycodone, fentanyl, buprenorphine, and dihydrocodeine) for patients under 18 years of age. • The annual number of patients and prescriptions was analyzed using Stata version 15.	• A total of 5,040 analgesic prescriptions were issued to 2,460.	• NSAIDs accounted for 81.8% of prescriptions, followed by tramadol (17.9%) and opioids (0.3%). • Ibuprofen was the most prescribed analgesic among children below 12 years old, representing 75% of prescriptions for those aged ≤2 years, 85% for ages 3–5, and 56.3% for ages 6–12. • A wider range of analgesics was used. For those aged 13–15 years, the main drugs were naproxen (28.2%), ibuprofen (20.6%), and diclofenac (18.2%), for patients aged 16–17 years, naproxen (28.2%), diclofenac (26.7%), and tramadol (17.6%) were most frequently prescribed.

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Low et al. (2025)	• Analysed prescribing patterns and drug-related problems of NSAIDs among pediatric patients at a private tertiary care hospital in Kuala Lumpur, Malaysia. • Single-centre, ambidirectional cohort study conducted at a private tertiary care hospital in Kuala Lumpur, Malaysia. • Study period from January 2024 to March 2025. • Included pediatric patients under 18 years who were prescribed NSAIDs. • Data collected from prescriptions and clinical progress notes.	•1,958 pediatric prescriptions analysed.	• The average age of patients receiving NSAIDs was 8.26 ± 5.08 years, with a median of 8 years and IQR 8.75. • 45.05% of visits were to pediatricians and 41.01% to the emergency department • 2,072 NSAIDs prescribed, with most prescriptions (94.48%; $p < 0.001$) involved a single NSAID. • Pain was the most common indication (63.18%) • Ibuprofen was the most prescribed NSAID (58.94%), followed by diclofenac (12.75%) and celecoxib (10.57%). • There was a significant association between patient age and the type of NSAID prescribed ($p < 0.001$). • Identified 405 potential drug-related problems, with ibuprofen having the highest number (193), followed by diclofenac (142) and celecoxib (16)

III. STUDIES ON ASSESSING KNOWLEDGE, ATTITUDE, PRACTICE, AND PERCEPTION REGARDING NSAID USE IN MALAYSIA

This table presents studies conducted in Malaysia assessing knowledge, attitude, practice, and perception related to NSAID use.

Author	Objectives and Methodology	Sample Size	Key Findings
Yee & Bhuiyan, (2019)	• Assessed the level of knowledge, attitude, and practice regarding self-medication of NSAIDs among first-year non-health science undergraduates in Klang Valley, Malaysia • Cross-sectional study using a self-administered questionnaire • Excluded students on long-term NSAID use • Convenient sampling method applied	• 402 first-year non-health science undergraduates from various universities in Klang Valley participated.	• 56.47% of participants showed a low level of knowledge regarding NSAIDs. • The mean attitude score was 20.16 ± 2.674, reflecting a moderate level of attitude. • 58.95% of the participants followed the recommendations for NSAID usage. • Significant associations found between education stream and attitude ($p = 0.012$) and between ethnicity and practice level ($p = 0.025$).
Puspitasari et al. (2020)	• Assessed patients' knowledge of NSAIDs and identified potential causes for concern in NSAID use. • Conducted in eight community pharmacies in Ipoh, Malaysia, selected conveniently. • Questionnaires distributed to suitable respondents using purposive sampling. • Descriptive data analysis performed. • Causes for concern assessed using relevant references.	• 123 patients.	• 67.5% males and 32.5% females, primarily aged 45–60 years. • Most commonly used NSAIDs were ibuprofen (33.3%), diclofenac sodium (26.8%), and mefenamic acid (15.4%). • Main indications for use were joint pain (61.8%), toothache (15.4%), and headache (13.8%). • 42.3% of patients had poor knowledge of NSAIDs. • 50.4% of respondents had potential risks for serious safety implications due to drug-drug interactions, drug-supplement interactions, and drug-disease interactions with NSAIDs.
Razak et al. (2023)	• Explored the level of knowledge, attitude, and prevalence of analgesic use (NSAIDs and paracetamol) among Malaysian undergraduate healthcare students. • Descriptive, cross-sectional study using voluntary, anonymous, self-administered online questionnaires.	• 392 students from various healthcare-related courses took part in this research.	• A high percentage of respondents (84.9%) used analgesics. • The majority of respondents showed a good level of knowledge (45.4%) and attitude (44.1%) regarding analgesic use.

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Author	Objectives and Methodology	Sample Size	Key Findings
Li (2023)	• Assessed the general public's knowledge, attitude, perception, and practice regarding OTC NSAID use in community pharmacies in Selangor, Malaysia. • Cross-sectional study using structured, validated questionnaires distributed electronically and as hard copies. • Respondents recruited through convenience sampling; incomplete responses excluded. • Data analysed using SPSS to determine relationships between knowledge, attitude, perception, and practice.	• 358 respondents.	• The general public showed good knowledge (70.95%), a positive attitude (67.88%), and proper practice (58.75%) regarding OTC NSAID use. Perception of NSAID risks was low (35.64%), particularly concerning the risks of self-medication and sharing NSAIDs with friends and family. • Age, gender, and education level were major factors influencing knowledge levels. • A total of 89.39% of respondents held an encouraging perspective toward receiving information about NSAIDs, and 94.14% agreed that healthcare professionals should be responsible for providing such information. • Statistically significant positive correlations were found between knowledge and attitude ($r=0.218$, $p<0.001$), knowledge and perception ($r=0.294$, $p<0.001$), knowledge and practice ($r=0.294$, $p<0.001$), attitude and perception ($r=0.270$, $p<0.001$), attitude and practice ($r=0.585$, $p<0.001$), as well as perception and practice ($r=0.385$, $p<0.001$).
Teo et al. (2025)	• Assessed healthcare workers' knowledge and practices regarding NSAID hypersensitivity reactions. • Cross-sectional, case-based online questionnaire study. • Participants included clinical healthcare workers at two tertiary hospitals in Malaysia.	• 247 respondents (217 doctors, 30 clinical pharmacists), aged 24–49 years, participated.	• Only 15.8% of healthcare workers demonstrated sufficient knowledge and practices regarding NSAID hypersensitivity reactions. • Clinical experience of ≤10 years compared to >10 years was significantly linked to knowledge adequacy (OR 0.17, 95% CI 0.08–0.35, $P < 0.05$). • Doctors who specialize in dermatology performed better, with 58.7% giving the right answers and 81.9% accurately identifying and classifying NSAID hypersensitivity reactions. • Dermatology specialists performed better, with 58.7% answering correctly and 81.9% accurately diagnosing and classifying NSAID hypersensitivity reactions. Clinical pharmacists, non-dermatology specialists, and general doctors were 6, 16, and 41 times more likely to have insufficient knowledge compared to dermatology specialists. • The overall knowledge regarding the management of NSAID hypersensitivity reactions was weak across the groups (31%). • 57.1% believed that prescribing adrenaline autoinjectors was necessary for anaphylaxis secondary to drugs, while 29.6% remained unaware of the utilization of serum tryptase in confirming anaphylaxis.

IV. SIGNIFICANT SAFETY CONCERNS AND ADVERSE EFFECTS

Evidence of NSAID-related adverse effects is demonstrated in clinical studies assessing GI complications. Say Lee Pok et al. (2018) conducted a retrospective study of Malaysian patients with rheumatoid arthritis and/or OA receiving long-term NSAID therapy to assess the incidence and predictors of upper GI adverse events. The study included 634 patients from four rheumatology centres between 2010 and 2013, with data collected over a 24-month follow-up. Patients received either non-selective NSAIDs (58.5%) or COX-2 inhibitors (41.5%). During the study period, 84 GI adverse events occurred, giving a risk of 13.2%, with the majority being dyspepsia (92.9%) and 7.1% involving peptic ulcer disease or upper GI bleeding. Multivariate analysis identified a history of upper GI disease as the only independent predictive factor, while COX-2 inhibitors showed a non-significant trend toward GI protection. In a related study, Ghazali et al. (2021) conducted a retrospective study at Hospital Raja Perempuan Zainab II in Malaysia, the study included 403 patients. Among patients taking regular NSAIDs, 7.2% experienced upper GI bleeding. Univariable analysis identified several factors associated with upper GI bleeding, including older age ($p < 0.001$), diclofenac use ($p = 0.003$), pantoprazole use ($p = 0.003$), end-stage renal failure ($p = 0.007$), smoking ($p = 0.035$), high blood pressure ($p = 0.042$), and creatinine ($p = 0.045$). In multivariable analysis, only older age ($p = 0.001$) and diclofenac use ($p < 0.001$) remained significant predictors.

V. EVIDENCE FOR IMPROVEMENT AND ALTERNATIVES

The management of NSAID use in Malaysia presents clear opportunities for improvement through targeted patient education and the strategic adoption of safer therapeutic alternatives.

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For high-risk populations, such as heart failure patients, structured educational interventions have proven effective. A study conducted by Choong et al. (2019) at a regional referral hospital in Perak demonstrated that a pharmacist-led programme, comprising an educational leaflet and a brief counselling session, significantly improved patients' knowledge about NSAID safety. The median knowledge score increased significantly after the intervention. Furthermore, 86.7% of patients reported that the programme useful for avoiding unnecessary NSAID use in the future.

Further evidence for improving NSAID use in Malaysia was demonstrated by Ho et al. (2020), who developed a regional practice advisory aimed at guiding primary care practitioners in Asia on the appropriate use of NSAIDs. The advisory was formulated through a multidisciplinary expert meeting held in Kuala Lumpur, Malaysia, which included clinicians from Indonesia, Japan, Korea, Malaysia, the Philippines, Singapore, Thailand, Vietnam, and the United Kingdom. These experts reviewed current evidence on the GI, CV, and renal risks associated with NSAID use. A modified Delphi consensus process was applied to achieve agreement on key recommendations, with consensus defined as 75% agreement among members. The findings indicated that, for patients with low GI and CV risk, any nonselective NSAID plus a proton pump inhibitor (PPI) or celecoxib alone was considered appropriate. For high CV risk patients, low-dose celecoxib or naproxen combined with a PPI was recommended, while for high GI risk patients, celecoxib plus a PPI was suitable when CV risk was low, and low-dose celecoxib with a PPI or opioid alternatives were appropriate when both GI and CV risks were elevated. The advisory also emphasized that NSAID therapy should only be initiated after confirming normal renal function, with continuous monitoring recommended thereafter.

An important alternative to oral NSAIDs is the use of topical formulations. A Malaysian consensus recommendation developed by Lee et al. (2020) advocated the use of topical NSAIDs as a safer and more practical approach for managing OA-related pain. Pain was identified as a principal manifestation of OA, and although topical NSAIDs are widely recommended by international guidelines as an early treatment option, their utilization in Malaysia remains limited and they are not commonly considered a preferred choice among prescribers. The study also noted a lack of comprehensive local guidance from Malaysian medical bodies regarding the appropriate use of topical NSAIDs in OA management. To address this gap, eight key statements and recommendations were developed, covering aspects such as the burden of OA, available topical NSAID formulations, evidence of safety and efficacy, and the importance of patient education. The consensus confirmed that robust evidence supports the efficacy and safety of topical NSAIDs, with added advantages of accessibility and ease of application.

VI. CONCLUSION

This review highlights that NSAIDs are widely utilized in Malaysia, emphasizing the importance of rational prescribing and monitoring. Studies on utilization and prescribing patterns indicate their extensive use, while research on knowledge, attitude, practice, and perception reveals the need for greater awareness among healthcare professionals and patients. Persistent safety concerns and adverse effects underline the importance of pharmacovigilance and patient education. Evidence for improvement and alternatives supports pharmacist-led education, adherence to clinical guidelines, and promoting safer formulations such as topical NSAIDs to enhance therapeutic outcomes and ensure responsible NSAID use in Malaysian healthcare.

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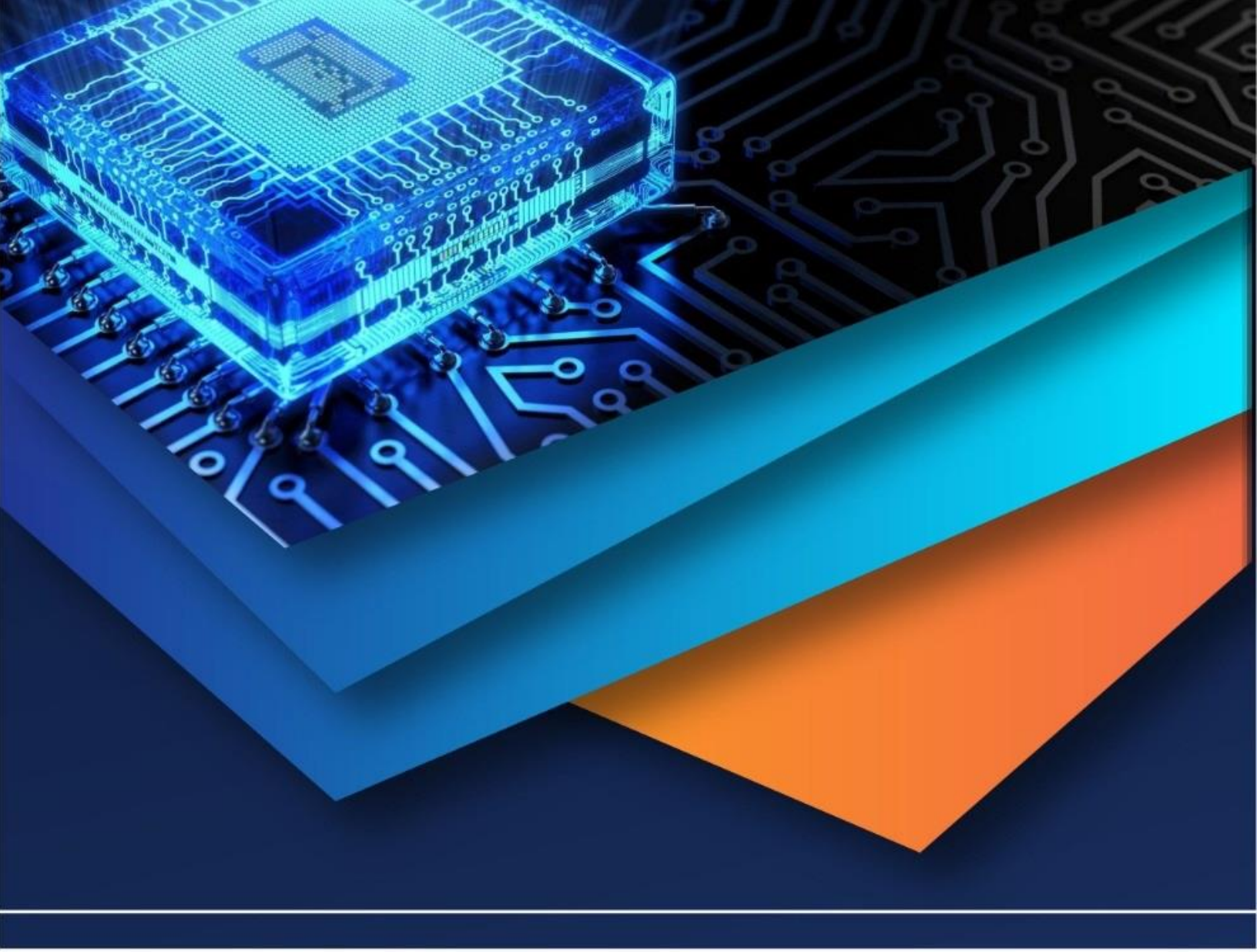
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