iJRASET
International Journal For Research in Applied Science and Engineering Technology

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 13 **Issue:** IX **Month of publication:** September 2025

DOI: https://doi.org/10.22214/ijraset.2025.74418

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International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 13 Issue IX Sep 2025- Available at www.ijraset.com

A Review on "Gastrointestinal Disease - Ulcer and it's Treatment

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Abstract: ***To enhance self-esteem and life skills, adolescent girls need to be empowered to resist social and family pressures. However, traditional dressings, due to their simple structure and single functionality, are inadequate for clinical needs. As a result, researchers have focused on advanced polymer dressings and hydrogels to address therapeutic challenges in ulcer treatment. Recent innovations, including self-healing hydrogels, stimuli-responsive hydrogels, nanocomposite hydrogels, bioactive hydrogels, and 3D-printed hydrogels, have shown greater therapeutic potential, leading to improved patient outcomes. This review highlights the importance of various hydrogels at different stages of wound healing in managing diabetic foot ulcers, emphasizing their role in advancing diabetic wound care through phase-specific and targeted approaches. Gastric ulcers extend into the muscularis propria layer of the gastric epithelium, commonly occurring in the stomach and proximal duodenum, though they may also appear in the lower esophagus, distal duodenum, or jejunum. Patients with gastric ulcers usually experience epigastric pain within 15–30 minutes after a meal, whereas duodenal ulcers are typically painful 2–3 hours post prandially.High blood glucose is a hallmark of diabetes, a chronic metabolic disease. Diabetic foot ulcers are significant complications of diabetes mellitus, associated with high morbidity, mortality, and healthcare costs. These ulcers are often infected, with the risk of progressing to cellulitis, bloodstream infections, gangrene, or even amputation. Enhancing the health of patients with diabetic foot ulcers requires knowledge of current treatment options and the limitations of these therapies. Chronic and complex ulcers in the lower limbs are frequent, persistent, and clinically significant complications, especially in patients with diabetes, peripheral vascular disease, or dermatological conditions. These lesions are marked by delayed healing, high recurrence rates, and significant risk of infection, amputation, and functional decline, placing a substantial burden on both patients and healthcare systems. Inresponse, recombinant human epidermal growth factor (rhEGF) has emerged as a novel and effective therapeutic strategy.***

Keywords: Peptic ulcer, diabetic ulcer , treatment of ulcer , causes of ulcer, natural remedies for peptic ulcer.

I. INTRODUCTION

A shift in terminology has been noted for wounds that fail to heal properly and are linked to chronic diseases. These wounds are now referred to as complex wounds. For the purposes of this article, and in line with the above definitions, we use the term complex ulcers. For a simple wound to progress into a complex ulcer, several characteristics must be present. These include ulcers that remain unhealed for more than three months, presence of infection, reduced tissue viability with necrosis or impaired circulation, and association with systemic conditions that disrupt normal healing. Such wounds often cause pain, disability, and markedly reduce the quality of life of affected individuals. The most frequent causes of complex ulcers are related to patient-specific physical and pathological factors, such as diabetes mellitus, obesity, ischemia, peripheral vascular disease, cancer, organ failure, sepsis, mobility limitations, pharmacological treatments, and immune system dysfunction. These conditions impair healing and can give rise to multiple pathologies, including venous and arterial ulcers, diabetic foot ulcers, pressure ulcers, thermal and electrical burns, traumatic burns, necrotizing fasciitis, immunosuppression, and trauma. Their rising prevalence, combined with risk factors like aging populations, smoking, obesity, and diabetes, has made these lesions a significant global challenge for healthcare systems.Epidemiological studies reveal that these ulcers affect about 1% of adults, 3.6% of individuals over 65, and more than 5% of those above 80 years of age. Over a lifetime, nearly 10% of the population is at risk of developing such ulcers, which carry an ulcer-related mortality rate of 2.5%. In the United States, an estimated 7 million people suffer from ulcers that are hard to treat, yet only half receive adequate care. The economic burden is substantial, with treatment costs exceeding $20 trillion annually. If left untreated, these ulcers may result in amputations, with a 30% chance of this outcome. Alarmingly, half of the amputations lead to death within five years. During the COVID-19 pandemic, the number of amputations in 2020 rose by 50% compared to 2019.Among the major causes, diabetic foot ulcers are particularly significant, with diabetes being a leading contributor to complex ulcers. More than 10% of the global population is diabetic or at high risk.

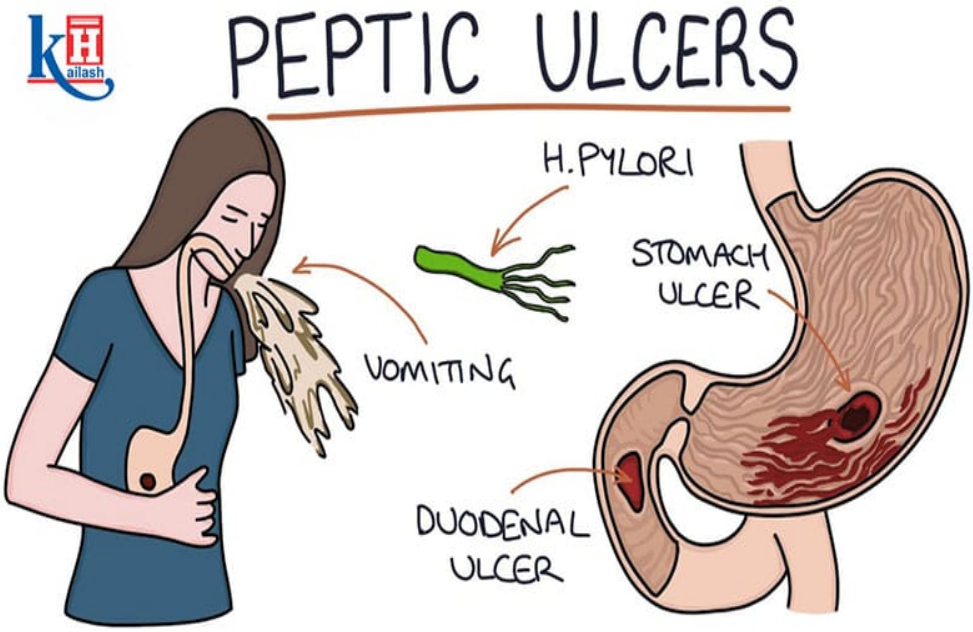
Worldwide prevalence stands at 6.3%, with the highest rates in North America (13%) and the lowest in Oceania (3%). In Asia, Europe, and Africa, prevalence rates are 5.5%, 5.1%, and 7.2%, respectively. Diabetes is also one of the primary causes of non-traumatic lower-limb amputations: one in six diabetic patients (25%) will develop an ulcer during their lifetime, and 15% of those with diabetic foot will require amputation.Diabetes itself is a chronic, metabolic, and genetically heterogeneous disorder characterized by elevated blood glucose levels. It has become a major global public health concern, particularly in Asia, where prevalence continues to rise due to lifestyle factors such as sedentary behavior and unhealthy diets. In 2014, the global prevalence of diabetes among adults over 18 was estimated at 9%.In addition to complex ulcers, peptic ulcers remain a significant medical issue. The two most common types are gastric ulcers (in the stomach) and duodenal ulcers (in the duodenum, the first part of the small intestine). Both types can occur simultaneously in the same patient. Peptic ulcer disease poses a serious health burden, with approximately 500,000 new cases reported annually and around 5 million affected in the United States alone.Those most at risk are individuals born in the mid-20th century, making this largely a disease of older adults, with peak incidence between 55 and 65 years of age.Duodenal ulcers are more common in men, while gastric ulcers occur more frequently in women. Alarmingly, 35% of gastric ulcer cases lead to severe complications.To address these challenges, recent advances in biomaterials have shown great promise. Natural polymers such as hyaluronic acid, chitosan, and cellulose derivatives, as well as synthetic polymers including polyethylene glycol, polyacrylic acid, poly(2-hydroxyethyl methacrylate), and polyacrylamide, are increasingly used in hydrogel fabrication for diabetic footulcer management through phase-specific strategies. Innovations such as self-healing hydrogels, stimuli-responsive hydrogels, nanocomposite hydrogels, bioactive hydrogels, and 3D-printed hydrogels have demonstrated enhanced therapeutic outcomes, significantly improving patient recovery.Overall, ulcers continue to represent a major global health burden, associated with high morbidity, slow healing, and frequent recurrence. Effective management requires a deep understanding of their causes as well as the complex biological processes involved in tissue repair. Emerging advances in pharmacology, biomaterials, and regenerative medicine provide promising avenues to accelerate ulcer closure and restore tissue integrity.

II. DEFINE OF ULCER

1) An ulcer is a sore or open wound on the skin or inside the body that does not heal properly and keeps coming back.
2) It usually happens when the skin or the lining of an organ (like the stomach, mouth, or legs) gets damaged and the tissue breaks down.

III. GENERAL CAUSES OF ULCERS

1) Infection – especially Helicobacter pylori (H. pylori) in peptic ulcers.
2) Excess stomach acid – hyperacidity due to stress, irregular meals, or genetic factors.
3) Medications – prolonged use of NSAIDs (aspirin, ibuprofen, naproxen, etc.) or corticosteroids.
4) Poor blood circulation – leads to ischemic or arterial ulcers.
5) Venous insufficiency – causes venous leg ulcers due to poor vein function.
6) Diabetes mellitus – impaired wound healing leads to diabetic foot ulcers.
7) Hypertension & vascular diseases – reduce blood flow, promoting ulcer formation.
8) Smoking & alcohol consumption – irritate mucosa and delay healing.
9) Autoimmune conditions – e.g., Crohn's disease, vasculitis, or Behçet's disease.
10) 10.Physical trauma or pressure – burns, injuries or continuous pressure (pressure ulcer).
11) Malignancy – cancers (like gastric carcinoma) may present as ulcers.
12) Nutritional deficiencies – protein, vitamin C, zinc deficiencies delay tissue repair. 12
13) Stress & emotional factors – increase acid secretion, indirectly contributing to ulcers.



IV. TREATMENT OF ULCER

General Principles of Ulcer Treatment :-

1) Enhance self-esteem and independence in adolescents, which are essential for them to withstand social and family pressures.
2) Promote tissue healing and prevent complications such as perforation, infection, and gangrene.
3) Address underlying causes such as infection, poor circulation, pressure, and diabetes.

V. TYPES OF ULCERS AND THEIR TREATMENT

A. Peptic Ulcer (stomach or duodenum)

1) Medications:

- Proton pump inhibitors (PPIs: omeprazole, pantoprazole) – reduce stomach acid production.
- H2 blockers (ranitidine, famotidine) – decrease acid secretion.
- Antacids – for temporary relief of symptoms.
- Antibiotics (clarithromycin, amoxicillin, metronidazole) – if Helicobacter pylori infection is present.

2) Lifestyle measures:

- Avoid alcohol, smoking, NSAIDs, and spicy/acidic foods.
- Stress reduction.

B. Venous Leg Ulcer

1) Compression therapy (bandages, stockings) – to improve venous return.
2) Wound care – cleaning, moist dressings, and removal of dead tissue.
3) Medications – pentoxifylline or aspirin may aid healing.
4) Surgery – vein surgery or skin grafting in resistant cases.

C. Diabetic Foot Ulcer :-

1) Blood sugar control – strict management of diabetes.
2) Wound care – regular cleaning, debridement, and use of advanced dressings (hydrogels, foam, alginates).
3) Offloading – use of special footwear or casts to reduce pressure on the ulcer.

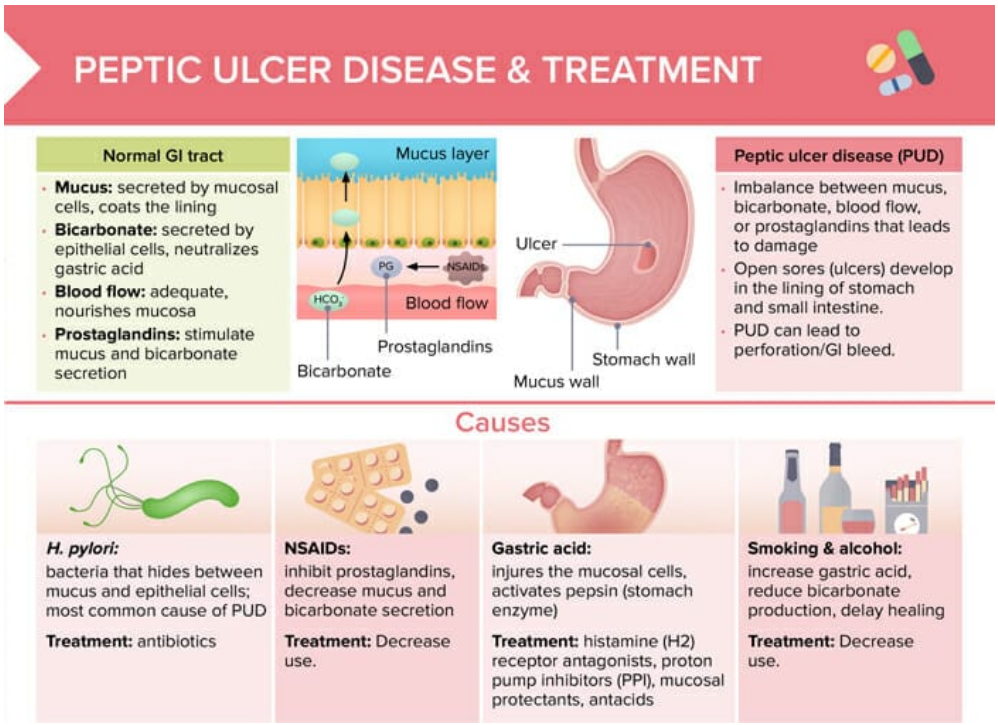
4) Antibiotics – if infection is present.
5) Surgery – vascular surgery for poor blood flow, or amputation in severe cases.

D. Pressure Ulcer (Bedsores) :-

1) Pressure relief – repositioning, special mattresses or cushions.
2) Wound management – moist dressings, debridement.
3) Nutrition – high-protein, vitamin-rich diet to support healing.
4) Treatment of infection – topical or systemic antibiotics if required.

VI. SUPPORTIVE & ADVANCED TREATMENTS

1) Negative Pressure Wound Therapy (NPWT) – vacuum-assisted closure to promote healing.
2) Hyperbaric Oxygen Therapy – enhances oxygen supply to poorly perfused tissue.



Summary:-

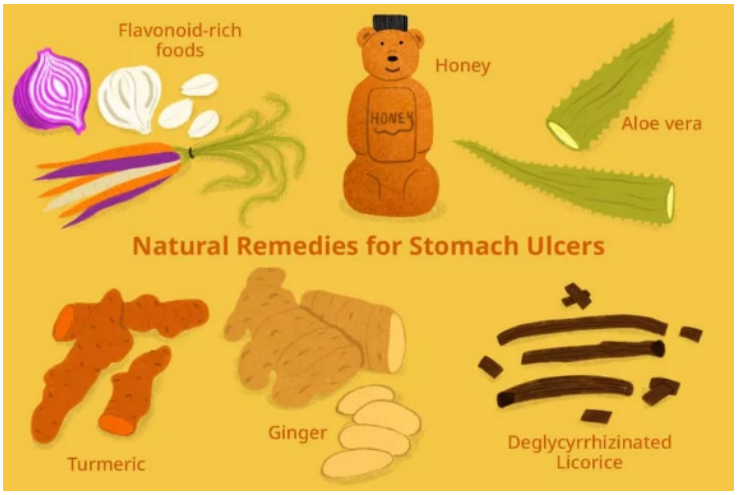
1) Peptic ulcer → PPIs + antibiotics (if H. pylori).
2) Venous ulcer → compression + wound care.
3) Diabetic ulcer → blood sugar control + offloading + infection management.
4) Pressure ulcer → pressure relief + wound care + nutrition.

VII. NATURAL REMEDIES FOR GASTRIC/PEPTIC ULCER

1) Probiotics (yogurt, kefir, fermented foods) - Help restore gut flora and may reduce H. pylori infection.
2) Honey - Has antibacterial and wound-healing properties; may reduce ulcer size and prevent infection.
3) Licorice Root (Deglycyrrhizinated Licorice – DGL) - Promotes mucus secretion in the stomach, protecting the lining.
4) Garlic - Contains allicin with antimicrobial effects against H. pylori.
5) Turmeric (Curcumin) - Anti-inflammatory and antioxidant; may protect the stomach lining and promote healing.
6) Ginger - Reduces inflammation and may help protect the gastric mucosa.
7) Aloe Vera Juice - Soothes irritation, reduces inflammation, and supports healing of gastric ulcers.
8) Cabbage Juice - Rich in vitamin U (S-methylmethionine), traditionally used for ulcer healing.
9) Green Tea & Polyphenols - May reduce H. pylori growth and protect stomach lining.

A. Important Notes :-

- Natural remedies are supportive, not replacements for medical treatment.
- For peptic ulcers, H. pylori infection or long-term NSAID use often requires medical therapy.
- For diabetic/pressure ulcers, controlling blood sugar, infection, and circulation is essential.
- Always consult a healthcare professional before using herbal remedies, especially if on other medications.



B. Evidence and limitations :-

- Many randomized controlled trials exist for individual therapies (e.g., compression for VLUs, NPWT for complex wounds, HBOT for selected DFUs), but heterogeneity in study design, patient selection, and outcome measures hampers direct comparisons.
- Emerging therapies (EGF, MSCs, hydrogels with drugs) show promise, but large high-quality RCTs with standardized endpoints and cost-effectiveness analyses are often lacking. Animal studies dominate early-stage work; translation to humans has been slow.

C. Research gaps and future directions :-

- Standardized endpoints and consensus on core outcome sets for chronic wound trials.
- Better delivery systems for growth factors and biologics to prolong activity and reduce burst release (e.g., smart hydrogels, nanoparticles).
- Mechanistic human studies to identify molecular biomarkers predictive of healing and to tailor individualized therapies.
- Large animal models (e.g., porcine) to improve translational relevance before human trials.
- Combination strategies (e.g., engineered scaffolds + cellular therapy + controlled growth factor release) tested in rigorous trials.
- Health-economics analyses in different healthcare settings to inform policy and reimbursement.

VIII. CONCLUSION

The pathophysiology of chronic ulcers, developments in molecular biology and technology, and the desire to find early indicators of delayed healing have all contributed to the creation of a variety of cutting-edge modalities that may have a beneficial impact on the molecular processes underlying epithelialization. Among these is the application of EGF, which has been researched for more than 45 years. In comparison to other application techniques, its intra- and perilesional application gives the molecule more stability, improves its bioavailability in the wound, avoids denaturation, and produces more notable outcomes. It has shown great promise as an adjuvant therapy to shorten the healing period of chronic lesions in studies and a growing body of literature around the world. Intralesional administration has demonstrated high rates of epithelialization and granulation, which increases its bioavailability and effectiveness in the treatment of chronic ailments.

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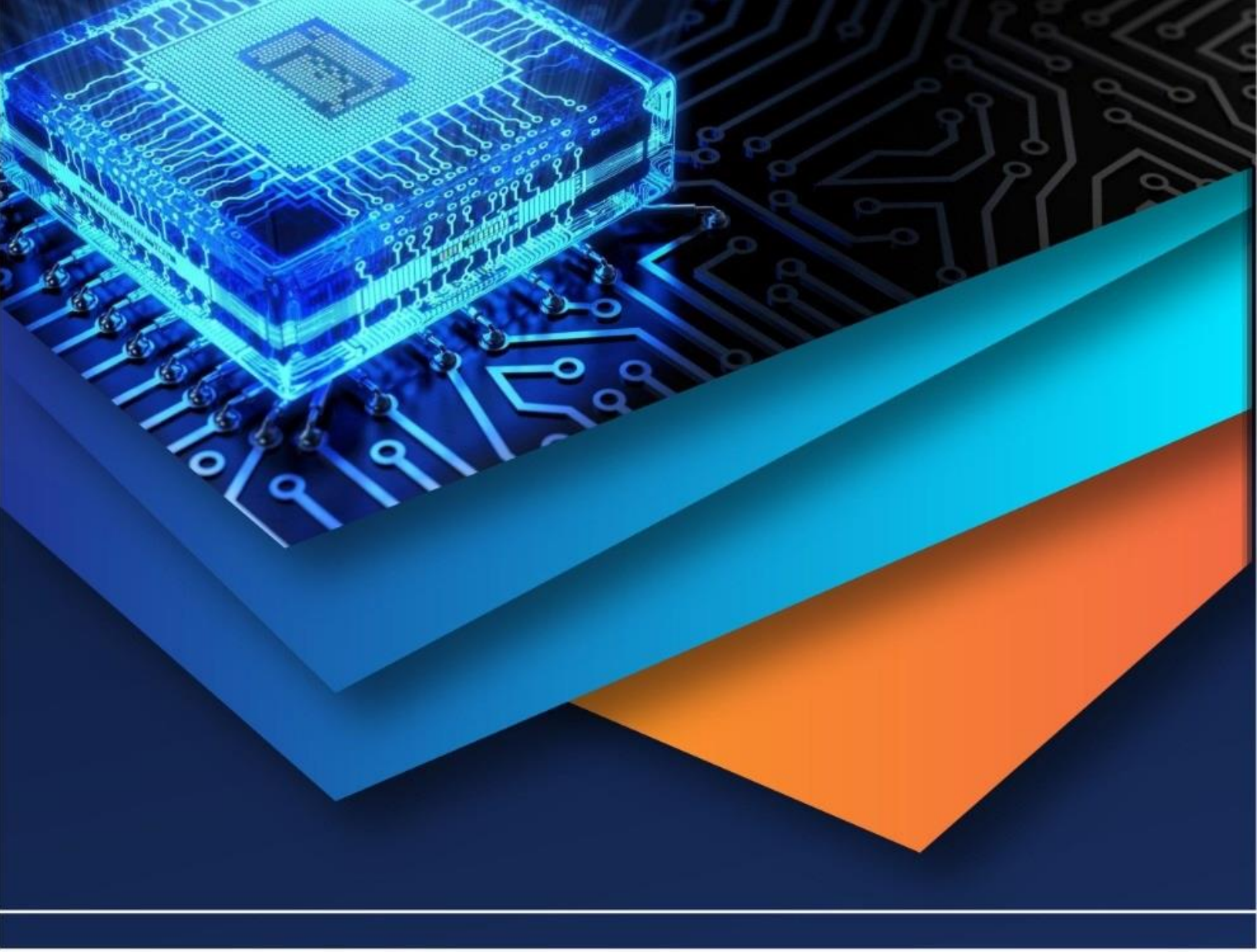

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