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An Overview of Ashwagola: *Plantago Ovata*

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Abstract: ***The main aim of the study was to review different aspects of Ashwagola- Plantago ovata together with its morphology, pharmacological and therapeutic attributes. Ashwagola commonly known as Isabgol belongs to Plantaginaceae family. It is a native of Persia and has not been described in any of the Nighantus. Latest books like Ayurveda vijnana, Shaligrama nighantu and Siddha bheshaja manimala have delineated it.***

Due to western lifestyle, constipation is seen to be a major concern in majority of the individuals and Isabgol known for its bulk forming laxative action can be used in a daily regime for effective management of the same. Further it is having gunakarmas like madhura, kashaya rasa, madhura vipaka, sheeta virya, guru, snigdha, picchila guna, ishat vatakrit kaphapittahrut, trushnadahahara, graahi, balya, jwaraghna, mutrala, adhmanahara karma and can be used for the management of raktaatisara, raktapitta, trushna, daha etc. Although numerous studies regarding Ashwagola are available, there still lies a scope for the evaluation and analysis of this topic.

Keywords: Ashwagola, Plantago ovata, Ayurveda, Isabgol, Constipation.

I. INTRODUCTION

Ashwagola, commonly named as isabgol is one of the most commonly used home remedy for constipation. Seeds of Ashwagola (*Plantago ovata* Forsk.) resemble ear of horse.

The original word Isapgol is a Persian word made up of two words 'Isap' and 'Gol'. Isap means horse and gol means ear. Literal meaning of Isabgol is ear of the horse. [1]

Ashwagola is known by various synonyms like Ashwakarna, Snigdha beeja, Sheeta beeja, Snigdha jeeraka, Ishat goloma. [1] Owing to its numerous chemical constituents like aucubin (a glucoside), mucilage, fixed fatty oil, albuminous matter in large quantities etc. it is known to possess various pharmacological activities like cooling, demulcent, emollient, laxative and diuretic action etc [2]. In Ayurveda these properties are correlated with the terms like dahahara, mutrala, mutrakrichrahara, vibandhahara, jwarahara, shothahara etc. Due to its therapeutic efficacy; extensive study regarding Ashwagola is needed to gain knowledge about it in depth.

II. AIMS AND OBJECTIVES

This study is aimed at reviewing the literature of Ashwagola in texts of Ayurveda thoroughly to bring out the information available. The main objective of this study is to present the knowledge regarding Ashwagola under one heading.

Scientific Name: *Plantago ovata* Forsk.
Plantago- Having a flat level surface
Ovata-Egg shaped as solid in outlined
Family: Plantaginaceae
Kula-Ashwagola

A. Vernacular names: [1]

English- Spogel seed or Isapgol seed
Hindi- Isabgol
Kannada- Isabgol
Malayalam- Snigdha jirakam
Marathi- Isabgol

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III. LITERATURE REVIEW

A. Classical categorization:

It is not mentioned in Brihatrayees of Ayurveda. Brief information is given by the author Sri K.C. Chunekar in Parisista-1 of Bhavaprakasa Nighantu[3]. Latest books like Ayurveda vijnana, Shaligrama nighantu and Siddha bheshaja manimala have described it by the name Shatabja, Isadgol and Ishwarabola respectively. [4]

B. Taxonomy: [3]

Kingdom	-	Plantae
Class	-	Dicotyledons
Sub class	-	Gamopetalae
Series	-	Bicarpellatae
Order	-	Lamiales
Family	-	Plantaginaceae
Genus	-	Plantago
Species	-	Ovata

C. Synonyms: [1]

Ashwakarna (Seeds resemble ear of horse), Snigdha beeja, (Seeds contain oily substances), Sheeta beeja (Seeds are cold in potency), Snigdha jeeraka (Seeds are oily and resemble cumin seeds).

IV. HABITAT[3]

Isabgol is a native plant of Persia. It is cultivated in Punjab, Gujarat, Rajasthan, Karnataka and Bengal. It can be cultivated in hot and dry places.

V. GEOGRAPHICAL SOURCE [5]

Isabgol is an annual herb cultivated in India in the states of Gujarat, Maharashtra, Punjab, and in parts of Rajasthan and Sindh Province of Pakistan. India exports about 90 % of the gross production of isabgol and nearly 93 % of the export being husk. USA is the largest buyer of isabgol from India and accounts for about 75 % of the total husks exports from India.

VI. VARIETIES [3]

Based on colour of the seeds, there are 3 types-

1) White
2) Red
3) Black

VII. MORPHOLOGY

Fig. 1 Morphology of Ashwagola plant [6]

Fig. 2 Ashwagola beeja [7]

A. Macroscopic Features [3] [2]

A stemless or nearly stemless softly hairy or woolly annual herb.
Leaves - 7.5-20 cm long, scarcely reaching 0.6 cm broad, narrowly linear or filiform, finely acuminate, entire or distantly toothed, attenuated at the base, usually 3-nerved. Scapes are longer or shorter than the leaves, glabrous or pubescent.
Inflorescence - Spike
Flowers - 1-4 cm long, bracts 4 mm long, glabrous calyx, sepals are elliptic, obtuse, corolla lobes rounded, 3 mm long.
Fruit - Capsule, 8 mm long, ellipsoid, obtuse, the upper half coming off as a blunt conical lid, membranous, glabrous.
Seed - 3 mm long, ovoid-oblong, boat shaped, smooth, yellowish brown in colour.
Useful parts - Beeja (Seed) and Husk
Seed is hard, translucent, boat shaped structure upto 8 mm long and 1 mm broad. surface is glossy and shining, having a pinkish brown colour. There is an oval spot in the centre of convex (dorsal) surface. On the concave (ventral) surface a deep furrow is seen with a hilum which appears as a red spot in the center. Seeds are mucilaginous and don't have any odour.
Husk is thin, curved or boat shaped structure of papery texture, representing the seed coat. It measures upto 4 mm long and 1 mm broad at the broadest point. The material consists of a lot of broken pieces also. Husk is mucilaginous and doesn't have any characteristic odour.

B. Microscopic Features [5]

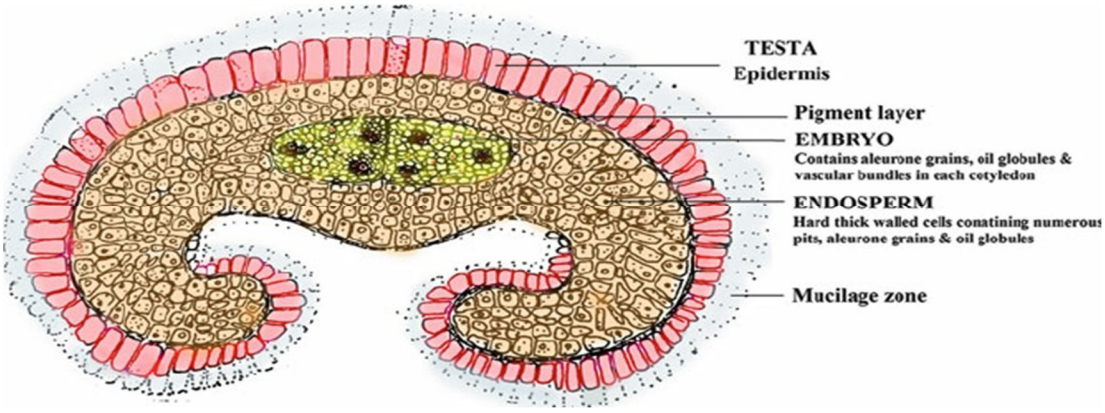

Fig. 3 Microscopic features of Ashwagola beeja [8]

The transverse sections of the seed that cut through the central region possess a reniform outline and exhibit a spermoderm, endosperm, and embryo. The spermoderm shows an outer epidermis of mucilaginous epidermal cells with obliterated walls in glycerine mounts; the radial and inner walls swell and disintegrate to form a clear mucilage upon irrigation of the mount with water, and a pigment layer with brown amorphous content. The endosperm is composed of irregular-shaped, thick-walled cells with walls of reserve cellulose. The outer layer of this region consists of palisade cells 15–40 mm in height. Aleurone grains and fixed oils are found in the endosperm cells (Bruneton 1995).

VIII. IMPORTANT PHYTOCONSTITUENTS [2]

Seeds contain a glucoside called Aucubin, it also contains mucilage, fixed fatty oil and albuminous matter in large quantities and other constituents like amino acids, xylose arabinose, galacturonic acid, rhamnose and galactose also present
Seed coat contains fatty acids like linoleic, oleic and palmitic acids

IX. RASADI PANCHAKA [2]

Rasa – Madhura, Madhura kashaya[9], [10]
Guna - Snigdha, Guru, Picchila
Vipäka- Madhura
Virya – Sheeta
Dosha karma – Pittanilapaham
Kinchit vatakrut kaphapittahrut[10]
Karma: Snehana, Mutrajanana. Dahahara, Trṣṇahara, Balya, Jwaraghna, Brhmana
Pharmacological Actions: Cooling. Demulcent. Emollient, Laxative and Diuretic
Therapeutic indications: Daha, Mutrakrchra, Trṣṇa, Jwara, Dourbalya, Arsha, Vibandha, Sotha

X. AAMAYIKA PRAYOGA

1) Vibandha –
a) One to two table spoons of powdered Isabgol taken with water twice a day
b) Isabgol seeds are soaked in adequate water, and then 1 teaspoon sugar is added and administered twice a day will be beneficial in Vibandha (Constipation).
c) Seeds are boiled in water and taken at intervals. [11]
2) Rheumatic and gouty swelling – The crushed seeds are made into a poultice with vinegar and oil and applied to rheumatic and gouty swelling. [12]
3) Mutradaha, pravahika, raktatisara, raktarsha – Internal use of husk of isabgol mixed with equal quantity of sugar along with milk or water or buttermilk reduces the condition. [13]
4) Snayuka – Application of poultice made up of isabgol and sindura causes death of snayuka krimi and is expelled out. [13]
5) Shirodaha – Isabgol is soaked in water and applied over the head reduces shirodaha. [13]
6) Cough and chronic diarrhea – Decoction made out of isabgol can be given internally. [12]
7) Inflammatory conditions of mucous membrane of GIT and genito urinary tract - Isabgol seeds along with tender coconut water. [14]
8) Bleeding, syphilitic taint – 2-4 tolas of isabgol seeds soaked in the water overnight, rubbed well in the morning and mixed with 2 tolas of sugarcandy and to be taken daily in the morning. [15]
9) Gonorrhea - decoction in doses of 2-3 drachms, plain or mixed with sugar to be taken internally. [15]
10) Arsenic poisoning - Isphagul deprived of its bland mucilage by keeping it soaked in water and strained, mixed with pomogranate, curd and rose water is a remedy for poisoning by arsenic. [16]

XI. MODE OF ACTION[14]

The seeds of *P.ovata* are very beneficial in chronic dysenteries of amoebic and bacillary origin and chronic diarrhoea due to irritative conditions of the gastro-intestinal tract. A glucoside named 'aucubin' has been found in the seeds, but it is physiologically inactive. The tannins which are present in appreciable quantities have little action on the entamoeba or bacteria. The action of the drug would therefore appear to be purely mechanical, being due to the large amount of mucilage which is contained in the superficial layers of the seeds. This mucilage is shown not to be acted on by the digestive enzymes, and therefore passes through the small intestine unchanged. It lines the mucous membrane of this part of the gut and its demulcent properties give it a protective and sedative action. In the large gut the intestinal bacteria have been shown to have little or no action on be mucilage. Practically the whole of it is passed out unchanged during the 12 to 24 hours following its administration, During its passage through the gut it coats the inflamed and ulcerated mucosa and protects it from being irritated by the fluids and gases, the products of gastro-intestinal and bacterial digestion. This enables the lesions to heal quickly. The toxins present in the gut are further absorbed by the gel and their absorption into the system is prevented. The seeds are taken in large quantities and as they swell up in contact with water they increase the bulk of the intestinal contents and in this way relieve chronic constipation by mechanically stimulating the intestinal peristalsis.

The mucilage of *P.ovata* seeds acts in very much the same way as liquid paraffin. It is very much cheaper and is further free from the injurious effects produced by the habitual use of the latter drug, e.g., malignant diseases of the colon, eczema ani, paraffin pains etc.

XII. DOSAGE

Seeds - 2-3 heaped dessert spoonfuls, 2-3 times a day (depending on the condition). [17]
Beeja churna – 3-5 gms. [11]

XIII. FORMULATIONS AVAILABLE IN MARKET

Ashwagola beeja churna
Constiwin capsule
Laxoherb powder
Golax powder
Laxogold capsule

XIV. SUBSTITUTES[11]

1) Plantago major
2) Plantago psyllium
3) Plantago purshit
4) Plantago aristata
5) Plantago rhodosperma
6) Plantago argentiana

XV. ADULTERANTS [11]

1) Plantago lanceolata

XVI. ADVERSE DRUG REACTION

Excess use of the seeds or husk of Isabgol may cause moderate to severe purgation, leading to dehydration.
In a high dose of 25 grams per day, Isabgol was tested in 11 healthy individuals. It resulted in urinary excretion of phosphorus and iron; fecal excretion of calcium, phosphorus and iron; and the serum calcium, phosphorus and iron levels decreased significantly ($P < 0.05$). It means that, in higher doses and if used for longer duration (example more than 2 months), isabgol can cause decrease in iron, phosphorus and calcium. [18]

XVII. PRECAUTIONS [5]

The recommended dose for isabgol seeds varies as per the age and clinical indication. Nonetheless the precautions are common regarding safe use of isabgol. Isabgol should not be taken in case of suspected intestinal obstruction (ileus), diseases of the esophagus, and patients with difficulty in swallowing. It is also not recommended for patients with intestinal atresia and stenosis and for children below 6 years. It should be consumed with sufficient quantity of water, failing which may cause choking due to blockage of the throat or esophagus (New HMPC Commission 2014).

XVIII. PREVIOUS RESEARCH WORK

Some of these pharmacological activities are described below on the basis of various research works that have been conducted.

A. Anti-hyperglycemic Activity [11] [9]

Aqueous extracts of Plantago ovata reduce hyperglycaemia in diabetes via inhibition of intestinal glucose absorption and enhancement of motility. These attributes indicate that P.ovata may be a useful source of active components to provide new opportunities for diabetes therapy Hannan JM. Ali L, Khaleque J. Akhter M. Flatt PR Abdel Wahab .YH Aqueous extracts of hunks of Plantegemata reduce hyperglycaemia in type 1 and type 2 diabetes by inhibition of intestinal glucose absorption Br J Nutr. 2006 Jul; 96.(1) 1317.

B. Anti-inflammatory Activity [9]

Dietary fiber supplementation ameliorated colonic damage in HLA-B27 transgenic rats. This effect was associated with an increased production of SCFA, which can act synergistically in inhibiting the production of pro inflammatory mediators. Rodriguez-Cabezas ME, Galvez J. Camuesco D. Lorente MD. Concha A, Martinez-Augustin O, Redondo L. Zarzeuelo A. Intestinal anti-inflammatory activity of dietary fiber (Plantago ovata seeds) in HLA-B27 transgenic rats Clin Nutr 2003 Oct:22(5):463-71.

C. Digestibility and Bulking Effect of isphaghula husk in Healthy Humans [9]

Ispaghula is more resistant to fermentation than previously reported in humans. and its bulking effect largely results from intact material. Marteau P. Floure B, Cherbut C. Coreze JL, Pellier P. Seylaz J. Rambaud JC Digestibility and bulking effect of ispaghula husks in healthy humans Gut 1994 Dec.35(12):1747-52.

D. Cholinergic Activity [19]

The alcoholic extract showed a fall in BP in spinal cats and also inhibited the isolated and perfused hearts of rabbits and frogs and stimulated the intestine of rabbits, rat and guinea pigs Thus, the extract revealed cholinergic properties (Khorana et al. 1958).

The CDRI, Lucknow has developed a cervical dialator named Isaptent (Dilex-<), wing granulated P.ovata seed husk (Khanna et al., 1980). [19]

XIX. DISCUSSION

Ashwagola (*P.ovata*) is stemless or nearly stemless softly hairy or wooly annual herb. Leaves are linear or filiform, finely acuminate, and attenuated at the base usually 3-nerved. Scapes are longer or shorter than the leaves. Flowers in ovoid or Cyllindric spikes. Fruit is a capsule. Seeds are 3mm long, ovoid-oblong, boat shaped, smooth, yellowish brown. It is cultivated in Punjab, Gujarat, Rajasthan, Karnataka and Bengal. It can be cultivated in hot and dry places. It consists of various chemical constituents like aucubin. It also contains mucilage, fixed fatty oil and albuminous matter in large quantities and other constituents like amino acids, xylose arabinose etc. Aucubin is a highly active compound possessing extensive biological effects including antioxidant, anti-aging, anti-inflammatory, anti-fibrotic, anti-cancer, hepatoprotective, neuroprotective and osteoprotective properties. [20]

It is having gunakarmas like madhura kashaya rasa, madhura vipaka, sheetavirya, guru, snigdha, picchila guna, ishat vatakrit kaphapittahrut, tushnadahahara, graahi, balya, jwaraghna, mutrala, adhmanahara karma. Hence it can be used in the management of various diseases like vibandha, mutrakrichhra, mutradaha, atisara, pravahika etc. by considering the dosha-dushya involvement.

Isabgol can be beneficial in reducing the absorption of fats in the small intestine and may help in reducing the blood cholesterol levels. [20]

Isabgol is a hydrophilic bulk forming agent, which swells if it comes in contact with water. If a drug is taken along with Isabgol its effect may be delayed, as gastric emptying time will increase because of Isabgol (a bulk forming agent), or its effect may be reduced, as Isabgol decreases the absorption of the drug because of the adsorption phenomena. [20]

Various study has shown that isabgol decreases both the rate and absorption of carbamazepine. It also decreases the absorption of aspirin if given concomitantly due to the adsorption and formation of a mucilage film of isabgol on the intestinal wall. Therefore, ingestion of carbamazepine or aspirin and isabgol should not be concomitant. [21]

It is contra indicated in suspected intestinal obstruction (ileus), diseases of the esophagus, and patients with difficulty in swallowing. It is also not recommended for patients with intestinal atresia and stenosis and for children below 6 years.

XX. CONCLUSION

Ashwagola has been widely used and accepted by most of the people as a potent home remedy for the management of constipation and for getting cooling effect. It increases the volume of the feces by absorbing water in the gastrointestinal tract, which stimulates peristalsis and induces easy defecation.

Liquid paraffin is used in the contemporary science for the management of constipation, but its repeated use can cause side effects like malignant diseases of the colon, eczema ani etc. Instead of liquid paraffin, isabgol seeds can be used as they are easily available, cost effective, with minimal or no side effects. It can also be used as a dietary supplement in the management of obesity and blood cholesterol levels.

The ingestion of carbamazepine or aspirin and isabgol should not be concomitant. Thus there is a need of further research in exploring the various uses of this drug.

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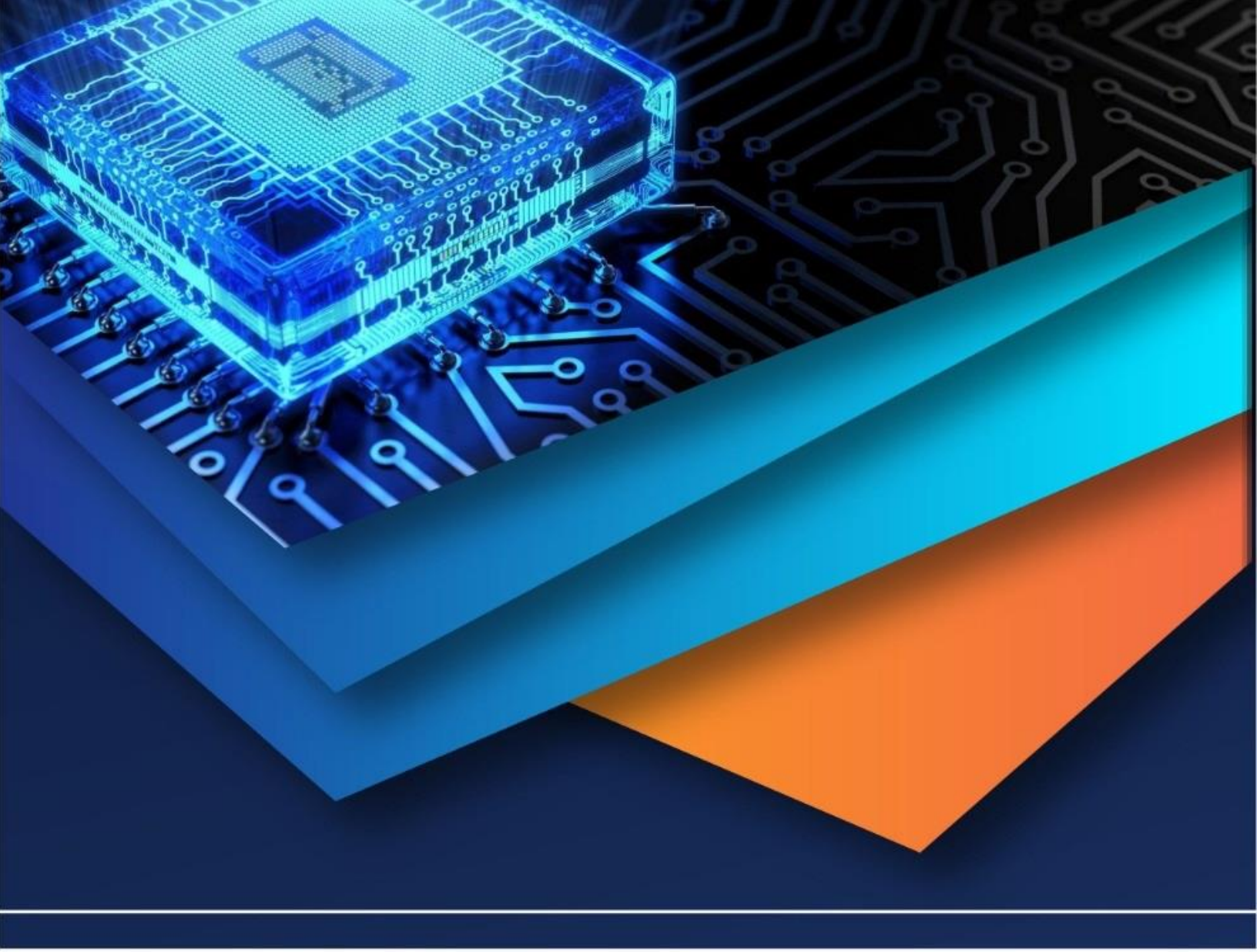

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