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Anatomical Study of *Garbha* with Respect to *Garbhaj* Vikritiya

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Abstract: ***Ayurveda, an ancient system of medicine, is deeply intertwined with the pursuit of Moksha, emphasizing the importance of health and well-being through the balance of Dharma, Artha, Kama, and Moksha. Central to Ayurvedic teachings is the understanding of the human body and its functions, as described in texts by Acharya Charaka and Sushruta. These scholars highlight the significance of "Rachana Sharir" in diagnosing health and disease, underscoring the importance of the balance between the five elements within the body. A critical area of focus in Ayurveda is the study of congenital deformities or "Garbhaja Vikriti," which arise during fetal development. These deformities often linked to genetic factors (Beeja Dosha), maternal health, and environmental influences, are detailed in Ayurvedic texts as imbalances in the body's elemental composition. Modern genetic science corroborates these ancient teachings by identifying chromosomal mutations and gene mutations as primary causes of congenital abnormalities. This abstract explores the relevance of Ayurvedic concepts such as Garbhaja Vikriti in understanding fetal development and congenital deformities, offering a bridge between ancient wisdom and modern genetics. By analyzing both perspectives, we gain a deeper understanding of human development, health, and the causes of abnormalities, highlighting the enduring value of Ayurvedic principles in contemporary medicine and genetics.***
Keywords: Garbhaja vikriti, congenital deformities, Beeja dosha, Gene mutation, fetal development.

I. INTRODUCTION

Ayurveda, as described in ancient texts, is considered an integral part of the *Atharveda*, serving as a guide to attaining *Moksha* through proper adherence to *Dharma, Artha, Kama,* and *Moksha*. The science of Ayurveda is deeply rooted in understanding the health and well-being of individuals, emphasizing the importance of both physical and mental health in the pursuit of spiritual enlightenment. *Charaka,* one of the key figures in Ayurvedic tradition, highlights the significance of studying the human body and its functions to discern whether a person is in a state of health or disease. According to *Charaka* and *Sushruta*, the human body is a harmonious integration of the five elements, and any imbalance in these elements can lead to diseases or abnormalities.

A key aspect of Ayurveda involves the study of "*Rachana Sharir*," which helps in identifying the causes and effects of various diseases, including congenital deformities or "*Garbhaja Vikriti*." These deformities, originating during fetal development, can be influenced by hereditary factors (*Beeja Dosha*), maternal health, or environmental influences. Ayurvedic texts detail how such deformities are associated with imbalances in the body's fundamental elements, leading to developmental abnormalities.

Modern science further connects these abnormalities to genetic mutations and chromosomal disorders, demonstrating the relevance of both *Ayurveda* and contemporary biology in understanding human development. The study of *Garbhaja Vikriti* in *Ayurveda* aligns with the modern understanding of genetic inheritance, emphasizing the crucial role of genetics in shaping the human body and its potential abnormalities. Therefore, the ancient Ayurvedic perspective on fetal health and abnormalities is highly relevant in the modern context of genetics and embryology.

II. AIMS AND OBJECTIVES

1) Study of *Garbha* according to Ayurveda
2) Study of *Garbha* according to Modern
3) Study of *Garbhaj vikara* according to Ayurveda
4) Study of *Garbhaj vikara* according to Modern

III. MATERIAL & METHODS

This study was conducted in the Department of *Rachana Sharir* at the National Institute of Ayurveda, Jaipur. The literature was collected from different *Samhitas,* published journals, modern books, and other published literature.

IV. LITERATURE REVIEW

Ayurveda, a time-honored science, has long acknowledged the natural processes occurring in the body. While modern science has validated the existence of these processes, Ayurveda also calls for deeper research to prove the facts established by ancient *Acharyas*. One such area of study is the development of the embryo (*Garbha*) and its potential deformities (*Garbhaj vikriti*). In Ayurveda, it is universally acknowledged that the embryo develops through the fusion of male and female gametes. This corresponds to the scientific understanding that an embryo forms when the sperm (*Shukra*) and ovum (*Shonita*) unite, with the involvement of *Jiva* (soul). The embryo's growth is further supported by the nutrition derived from the mother's *Aahara Rasa* throughout the gestational period.

In addition to *Shukra* and *Shonita*, several factors, including *Garbha samagri (Ritu, Kshetra, Ambu,* and *Beeja), Shadbhavas*[i] (six states of existence), and *Garbhini Paricharya* (maternal care) are essential for the healthy development of the *Garbha*. *Acharyas* emphasized that the presence of all these factors is crucial for successful conception and gestation; the absence of any may result in complications or the failure to form a *Garbha* altogether.

This study highlights the relevance of *Garbhaj vikriti* in today's life, as *Acharyas* recognized both genotype anomalies (*Aadibal pravruta vikritij*) and phenotype anomalies (*Janmabal pravruta vikritij*) in the development of the embryo. Ayurveda states that *Garbha* forms when *Shukra, Artava* (ovum), and *Atma* (soul) unite within the uterus (*Kukshi*).[ii] This process, along with the association of *Prakriti* (nature) and *Vikaras* (disorders), leads to the development of physical body parts. Modern science explains this as the combination of 23 chromosomes from the male and female pronuclei, forming 23 pairs, and undergoing mitotic division to form an embryo

तं चेतनावस्थितं वायुर्विभजति, तेज एनं पचति, आपः क्लेदयन्ति, पृथिवी संहन्ति, आकाशं विवर्धयति; एवं विवर्धितः स यदा हस्तपादजिह्वाघ्राणकर्णनितम्बादिभिरङ्गैरुपेतस्तदा 'शरीरं' इति सञ्ज्ञां लभते । तच्च षडङ्गं- शाखाश्चतस्रो, मध्यं पञ्चमं, षष्ठं शिर इति ॥३॥ (su.sa.5/3)[iii]

In modern science, embryo development begins with the fusion of male and female gametes, followed by cleavage division, formation of morula and blastocyst, and implantation. Trophoblast and chorion differentiation occurs, leading to the appearance of bilaminar and trilaminar germ discs. The three germ layers then differentiate, forming tissues and organs, followed by rapid fetal growth and placenta development. In Ayurveda, *Shadbhavas*[iv] are the key factors responsible for fetal formation, while modern science attributes it to maternal, paternal, hereditary, environmental, and nutritional factors, as well as etiological influences on the embryo's development.

Table No.1: Month-wise development of the foetus

Month	Ayurveda[v,vi]	Modern
1.	*Kalalam*	-Embryo- morula- trophoblast- blastocyst -fore limb bud appears. (26th days) -Hind limb bud appears. (28th days) -Avoid cigarettes, junk food and alcohol during pregnancy as they can harm baby's development or cause in low birth weight. - Baby's sex, eye & hair color, facial features, height & other inherited parameters are now determined & the baby is approximately 2 mm in length in the first month.
2.	*Ghan/ pinda/ pesi/ arbuda*	- Facial, eye muscles, eyelids, fingerprints begin to develop & a tiny heart begins to beat. - Baby now grows inside a sac formed by a thin membrane that resembles a plastic wrap. - Over next few months, this sac gets filled with warm fluid in which the baby floats & acts as a cushion from bumps on mother's abdomen. - Baby's lungs start getting formed & the brain, spinal cord, basic facial features, arms, legs start to grow. - By the end of the second month, women experience mood swings & food cravings due to temporarily higher hormone levels in their body. - Women start putting on marginal weight or increase in waistline & the baby grows to about 1 inch (2.5 cm) by end of this month.

3.	*Hastpadsirsam pancpindaka nivartante angprtyang Vibhagsch suchmo bhvati*	- Finger & toe nails appear. The head is made up to half of its length. Small amount of hair begin to cover baby's body. - Kidneys start working this month & produce urine which fills the sac in which baby floats. - By end of this month, male reproductive gland in boys and ovaries in girls are formed though external sex organs remain indistinguishable. - By end of this month, the baby is about 2.5 inches (6 cm) long & weighs about 30 grams.
4.	*Sarvangprt yangvibhagh pravyakto bhavati*	- Pregnancy now starts to show as the baby grows inside the body causing slight occasional pain which is normal. - By end of this month, external sex organs become distinctly male or female so a male baby may be now distinguished from a female baby. - Growth of baby's head slows down compared to the rest of the body. Hair begins to grow on baby's body. Baby grows to about 5 inches (12 cm) & weighs about 80 grams.
5.	*Mana prtibudhitam bhvati*	- Halfway milestone through the pregnancy is reached in this month & baby's brain now grows rapidly. - Baby's kidneys start producing urine (which forms most of the fluid in the sac) & is not harmful to the baby. - Baby has a more human appearance now & may suck his thumb if it floats up to his mouth. Baby grows to about 7 inches (18cm) & weighs about 250 grams.
6.	*Budhi Bala & varna*	- From now on, the baby gains weight relatively more as compared to growing in length. - Different organs within the baby mature & bones begin to harden. - Baby's heartbeat becomes strong and beats at the rate of about 120 to 150 times a minute. - Even at this stage, the baby is about 10inches (25cm) long & weighs just about half kg (500 grams).
7.	*Sarvangprt yangvibhagh prvyktar garbhherdy abhavti*	- This month onwards, baby grows about 25 to 30 grams every day. - Women gain maximum weight from the seventh month onwards till delivery. - Baby's eyes begin to open a bit, eyelashes grow & he may react to strong light now. - Baby's bone marrow is now in full control to produce blood. - Baby grows to about 14 inches (35cm) long & weighs about 1.1 kg.
8.	*Aistirbhvatyojsh*	- Baby's hearing is developed, may be startled by loud sound & is now able to hear your voice. - Baby gets immunity to many diseases as antibodies from mother's blood pass into baby's blood. - Baby has a good chance of survival if born during this month although he might be given oxygen or kept in an incubator for sometime. - Baby grows to about 17inches (43cm) long & weighs about 1.8kg.
9 & 10	*Atoanyatha Vikari bhavati*	- Baby grows to its full size by now & growth slows down now. -Baby's fingernails are quite long but toe nails are not yet fully developed. - By end of the month, baby tries to settle into a 'head down' position for delivery. - Baby is now about 20 inches (50cm) long & weighs about 2.75 Kg. After 38 weeks, baby is considered full term & now has a full length of about 21 inches (53 cms). The World Health Organization defines normal duration for delivery as between 37 and 42 weeks. -Childbirth usually occurs about 38 weeks after conception & the baby may weigh anywhere from 2.75 kg to 3.5 kg

A. Review Of Garbha Posahan[vii]

The fetus does not experience hunger or thirst and is entirely reliant on the mother for sustenance. In the early stages, while specific body parts are present but not fully developed, it obtains nourishment through moisture and osmosis. As the body parts become

more distinct, the fetus derives nourishment through *Upasneha* (moisture) that permeates the skin, particularly through hair follicles, and through the umbilical cord. The umbilicus of the fetus is connected to the umbilical cord, which links to the placenta, and the placenta is connected to the mother's heart. The mother's heart circulates blood through the placenta, providing essential nutrients. The nutrients from the mother's diet form *Rasa*, which nourishes the fetus, giving it strength and complexion, allowing it to develop in the uterus.

Acharya Charaka[viii] emphasizes that the *Rasa* derived from the mother's food serves three functions: nourishing the mother, producing milk, and sustaining the fetus. Initially, the blastocyst implants in the uterine wall, receiving nutrition via diffusion from maternal blood, eventually leading to the formation of the placenta.

B. Review about "garbhaj vikriti"

In Ayurveda, *Acharyas* emphasize the importance of "*sudha shukra*" (pure semen) and "*sudha artva*" (pure ovum) for the creation of healthy offspring. When these elements combine during the right "*ritu*" (season) and "*kshetra*" (place), the result is a healthy foetus with desired characteristics. However, any deformity in the "*Beeja*" (seed), "*Beeja bhag*" (part of seed), "*Beeja bhagavayav*" (parts of the seed organ), "*ritu*," or "*kshetra*" may lead to foetal deformities in size, shape, and behavior.[ix] Ayurvedic texts describe various foetal abnormalities, including serpent-like, scorpion-like, and monster-like forms such as "*nagaudara*," "*upvistaka*," and "*lina Garbha*."

TABLE NO.2:- "*GARBHAJ* VIKRITI"

S. no.	Ayurveda	Modern
1.	*Raktakshas Garbha*[x]	Monster
2.	*Sandha*[xi]	Impotent persons
	i. Askeya *ii. Saugandhika* *iii. Kumbhika* *iv. Sandhaka*	
	v. Irsyaka	Mixoscopia
3.	*Anasthi Garbha (stri vyavaya)*[xii]	Lesbinasim
4.	*Svapn me maithun se Garbha(Garbhabhasa)*[xiii]	False pregnancy/ pseudocyesis
5.	*Dvireta*	Hermophrodite
6.	*Pavanedriya*	Aspermia
7.	*Samskaravahya*	Anaphrodisia
8.	*Klib/bandha*	Sterility/impotent
9.	*Vakri*	Hypospadia
10.	*Garbhasrava*[xiv]	Miscarriage
11.	*Garbhapata*	Abortion
12.	*Upavistaka*[xv]	1.U.D.
13.	*Nagodara or Upsusaka*[xiv]	I.U.D. or missed abortion
14.	*Lina Garbha*[xvi]	I.U.D.
15.	*Garbhasosa or Vatabhinna Garbha*	Under-weight-fetus (L.B.W.)
16.	*Garbhkshya*	L.B.W.
17.	*Garbhavridhi*	Over-weight-fetus
18.	*Amgarbhapata*	Miscarrige
19.	*MudhaGarbha*	Obstructed labour

		malpresentation and retention of the foetus
20.	*Jivit gudGarbha*	
21.	*Mruta Garbha*[xvii]	Intrauterine death of fetus/still birth
	- *Garbhasayantar*	- .L.U.D
	- *Mrutajata*	- Fresh still birth, Perinatal death
	- *Jatmatra*	- Perinatal death
22.	*Bhuthata or Negmeshata*	Pseudocyesis
23.	*Jad*	Idiot
24.	*Janmaandhya*	Congenital blindness
25.	*Upshirshak*	Caput succedaneum
26.	*Vamanatva*	Dwarfism(short stature)
27.	*Mastuluagachya*	Microcephaly
28.	*Pangulya*	Paraplegia
29.	*Mukatva*	Aphonia
30.	*Khandaosta*	Hare lips. Cleft lips
31.	*Khandatalu*	Cleft palate

C. Review of foetal anomalies w.r.s. To teratology

Teratology is the study of abnormal fetal development, focusing on teratogenic exposures such as drugs, chemicals, infections, physical agents (radiation, heat), and maternal or metabolic factors like diabetes and phenylketonuria. Fetal defects include cranioschisis, cleft palate, heart defects, scoliosis, Klinefelter's syndrome, and spina bifida, among others. These anomalies arise from causes such as infections, radiation, mutations, hormonal imbalances, maternal diseases, nutritional deficiencies, and exposure to heavy metals. Various diagnostic methods, including ultrasonography, maternal serum screening, amniocentesis, chorionic villus sampling, and fetal therapy, are available for detecting fetal anomalies.

D. Concept Of Chromosome And Foetal Defects

Chromosomes are the basic plateform to transfer the genes from one generation to another generation. If there is any deformity in chromosome it leads to foetal deformity. There are two types of chromosome in human being, autosome and allosome.

Autosomes are responsible for vegetative maintenance and allosomes are responsible for sexual activities. The no. of autosome is 22 pairs and no. of allosome (sex chromosome) is 1 pair (X&Y). So total no.of chromosome in human body is 23 pairs which is responsible for heredity.

Chromosomes may be affected by many causes. Firstly mutation may take place which affects the chromosomes. Chromosomal aberration may occur. One change is in the chromosome number and other is structural changes in the chromosome. Monoploidy, polyploidy, aneuploidy etc. are the main cause for foetal anomalies. Another chromosome affects are monosomy, trisomy, and nulli-somy.

Ex. "Putiprijan"

शोणित गर्भाशय बीजभागावयवः प्रदोषमापधते । (Ch.s.sa.4/30)

पुरुषस्य यदा बीजे बीजभागावयवः प्रदोषमापधते । (Ch.s.sa. 4/31)

It means the deformity in the chromosomes of sperm and ovum leads to abnormal foetus named as "*Putiprijan*".

E. Review About Genes And Foetal Anomalies

Genes are hereditary units that transfer characteristics from one generation to the next, composed of DNA sequences. These sequences define genes, with specific genes located on autosomes or X/Y chromosomes, responsible for sexual characteristics inheritance. Disorders like hemophilia, color blindness, sickle cell anemia, Prader-Willi syndrome, and Edwards's syndrome are chromosomal gene-related conditions that contribute to fetal anomalies.

Genes function in triplet codes, known as genetic codons, specific to amino acids. The basic structures of genes—cistron, muton, and recon—are involved in inheritance, mutation, and recombination. Any deformity in these processes can result in specific fetal organ abnormalities.

V. DISCUSSION

The concept of "*Garbhaj vikriti*" described in Ayurvedic texts has significant alignment with modern genetic research. Ayurveda ancient knowledge, found in texts such as the "*Brihatrayi*" and "*Laghutrayi*", emphasizes that the "*Beeja*" (seed) is fundamental to creation. *Acharyas* have described how vitiation of the *Beeja*, at the micro level—similar to modern genetic defects—leads to specific fetal anomalies. Ayurvedic texts mention deformities like serpentine or scorpion-like shapes, which correspond to the modern understanding of congenital malformations. The concept of twins, referred to as "*Yamala*," demonstrates the advanced insight of Ayurveda, predicting what modern science now recognizes in twin births.

Foetal anomalies caused by "*Beeja dosha*" in Ayurveda show strong parallels with genetic disorders known today. For example, "*Bandya*," described as an inability to conceive due to genetic flaws in the *Beeja*, closely resembles modern cases of sterility, which may result from conditions like oligospermia, azoospermia, or defective ovulation. Similarly, the term "*Putiprijan*" refers to the loss of a fetus before birth, indicating that while the *Beeja* has some potential, it is incapable of producing a viable offspring.

Terms like "*Trinputika*" and "*Varta*" describe conditions where offspring do not fully express sexual characteristics, reflecting genetic abnormalities in secondary sexual traits. Ayurvedic texts also explain twins as the result of the breakage of "*Beeja-anu*" (zygote) by *Vata dosha*, which aligns with modern scientific understanding of identical twins formed by the division of the zygote. After thoroughly reviewing all available literature, it becomes clear that Ayurvedic descriptions closely mirror modern genetic theories.

VI. CONCLUSION

In conclusion, Ayurveda provides profound insights into fetal formation and development, highlighting the importance of factors like *Shukra, Shonita, Atma, Prakriti*, and *Vikara* in the creation of *Garbha* (fetus). Teachings from *Acharyas Charaka* and *Sushruta* emphasize the need for a balanced womb environment, supported by proper maternal care, diet, and adherence to *Garbhini Charya* for healthy fetal development. The six Bhav*as—Maasa, Shukra, Atma, Prakriti, Vikara*, and *Rasaja*—are crucial to fetal growth, with imbalances leading to *Garbhaj Vikriti* (congenital deformities).

From a modern scientific viewpoint, fertilization results in the formation of a zygote, followed by cell division, differentiation, and organ development. Genetic mutations and environmental factors like malnutrition, stress, and drug exposure contribute to fetal abnormalities. Interestingly, Ayurveda anticipated many modern concepts of fetal development, stressing the interconnectedness between mother and fetus and the influence of environmental and hereditary factors. Both Ayurveda and modern science agree that congenital deformities stem from genetic and environmental factors, suggesting that an integrated approach to maternal and fetal health is essential.

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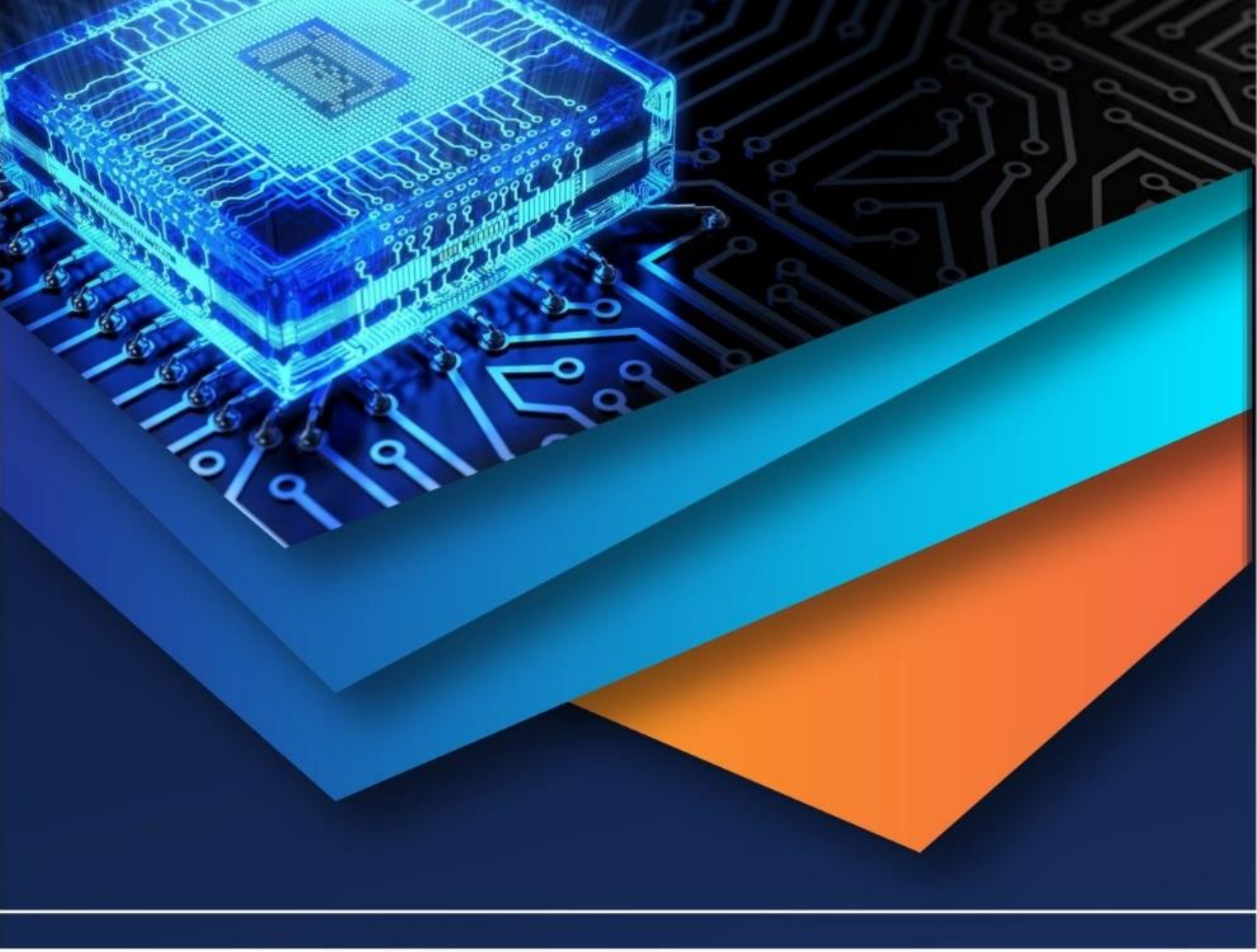

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