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Assessment of Nutritional Status of Women Belonging to Self-Help Group in North Chennai and Conduct of a Nutrition Education Program

M. N. Ayswarya[1], Dr. Sheba Sangeetha Jeyaraj[2],
[1]*PG Scholar, Department of Food Service Management and Dietetics, Women's Christian College, Chennai, India*
[2]*Associate professor, Department of Foods and Nutrition, Women's Christian College, Chennai, India*

Abstract: ***Lifestyle and dietary habits play a significant role in determining the risk of developing metabolic disorders, particularly among women in low-income communities. This study was undertaken to assess the nutritional status and health awareness of women belonging to Self-Help Groups (SHG) in North Chennai and to implement a targeted Nutrition Education Program. The study included 150 participants and involved the collection of demographic data, anthropometric measurements (height, weight, BMI, waist circumference, and skinfold thickness), blood pressure recording and dietary assessment using a food frequency questionnaire and a 3-day food record. A pre- and post -test questionnaire was used to evaluate the effectiveness of the Nutrition Education Program. The findings revealed that many participants had unhealthy eating patterns, including low intake of whole grains, fruits and green leafy vegetables, along with frequent consumption of refined oils and fried snacks. Most of the participants were overweight or obese with elevated BMI and skinfold thickness and were hypertension. Nutrient analysis showed excessive intake of energy, carbohydrate and fats, with deficiencies in iron and vitamin D. The Nutrition Education Program significantly improved participants' knowledge of balanced diets and healthy lifestyle practices. The study concluded that awareness and education can serve as effective tools in improving nutritional habits and reducing the risk of lifestyle-related disorders in community settings.***

Keywords: Nutritional status, Self-Help Group (SHG), Dietary assessment, Anthropometry, Nutrition Education Program, Micronutrient deficiency, Metabolic disorders, Community health

I. INTRODUCTION

Nutritional status is a vital indicator of health, determined by nutrient intake, absorption and utilization. Globally, unhealthy dietary habits such as high consumption of saturated fats, sugars and processed foods have led to a rise in non-communicable diseases (NCDs) and malnutrition [28]. In developing countries, rapid urbanization and lifestyle changes contribute to dietary imbalances, increasing the risk of both communicable and non-communicable diseases. This highlights the need for regular nutritional assessments using anthropometric, biochemical, clinical and dietary methods [13].

NCDs like diabetes, cardiovascular disease and certain cancers now account for over 70% of global deaths, with poor diet being a leading risk factor [29]. In India, malnutrition ranging from undernutrition and overnutrition to micronutrient deficiencies remains a persistent issue. Women, especially those aged 30 to 50, face higher risks due to physiological demands, with conditions such as anaemia, osteoporosis and intergenerational malnutrition affecting their productivity and well-being [27].

India is currently facing a "triple burden" of malnutrition: undernutrition, overnutrition and micronutrient deficiencies. Urban women, particularly in low-income groups, are significantly impacted. According to NFHS-5 (2019-2021), 53% of women aged 15 to 49 in Tamil Nadu are anaemic. The National Nutrition Monitoring Bureau (2005-2006) also reported high rates of goitre and chronic energy deficiency among tribal women. While urbanization has improved access to food, challenges like anaemia, osteoporosis and obesity persist [21],[11].

Iron deficiency anaemia is a common issue, lowering immunity and productivity. In urban areas like Chennai, socio-economic challenges and cultural dietary practices, such as vegetarianism, limit the intake and absorption of iron. Additionally, calcium and vitamin D deficiencies are common due to poor awareness and limited sunlight exposure, increasing the risk of osteoporosis. Sedentary lifestyles and the consumption of processed foods further contribute to obesity, diabetes and cardiovascular diseases [6],[17].

Poor maternal nutrition has long-terms consequences on women and their offspring, leading to low birth weight, developmental delays and a cycle of malnutrition across generations [26]. Food insecurity, especially during critical life stages, further reduces dietary diversity and quality, directly impacting maternal and child health.

Programs like UNICEF's interventions and the anaemia Mukt Bharat campaign aim to address these issues through supplementation and education. However, women from low-income households, such as those in Self-Help Groups (SHGs), still face nutritional challenges due to limited access to healthcare, education and nutrient-rich foods [5].

In Tamil Nadu, SHGs play a crucial role in supporting underprivileged women through schemes like DAY-NRLM, MKSP, Ujjwala Yojana and the Swachh Bharat Mission. While these groups empower women socially and economically, members often lack adequate nutrition education and healthcare access. Income, education and cultural practices significantly influence food choices, nutritional status and health outcomes. Gender norms may further restrict women's access to nutritious food, impacting maternal and family health [16].

Nutrition education is a powerful tool to empower women with knowledge about balanced diets, nutrient needs and safe food practices. It encourages healthier choices, improved food hygiene and better maternal and child health outcomes. Programs like the Integrated Child Development Services (ICDS) demonstrate how structured interventions can enhance community health through education and practical learning [18].

Long term benefits of such interventions include reduced malnutrition, anaemia and NCDs, especially when tailored to local food systems and cultural preferences [3]. This study focuses on women aged 30 to 50, aiming to identify nutritional deficiencies and barriers they face.

The findings can guide targeted interventions like screenings, affordable diet plans and community health programs through SHGs. Integrating nutrition education into SHG activities can strengthen their role in promoting health and breaking the cycle of poor nutrition, ultimately leading to improved community well-being.

II. REVIEW OF LITERATURE

A. Self-Help Groups and Women Empowerment

Self-Help Groups (SHGs) are community-based platforms that plays a vital role in empowering women economically and socially, while also addressing critical issues like poverty, inequality and health disparities. National initiatives such as the National Rural Livelihoods Mission (NRLM) and Tamil Nadu's Magalir Thittam involve SHGs in promoting financial independence, entrepreneurship and health awareness. Programs like SWABHIMAAN, where SHG women act as "Poshan Sakhis" have shown promising results in improving maternal and child health outcomes [14].

B. Nutritional Challenges and SHGs as Enablers

Women in SHGs often face poor dietary diversity, food insecurity and limited healthcare access. However, the group dynamic offers social support, resource sharing and nutrition education. SHGs have been found effective in improving health outcomes through community involvement and increased decision-making power [22],[7],[19].

C. Good Nutrition and Women's Health

Adequate nutrition is essential for physical, mental and reproductive health. It plays a key role in preventing chronic illness such as anaemia, osteoporosis, cardiovascular diseases and certain cancers. Nutrients like iron, folate, calcium and vitamin D are especially crucial during key life stages including menstruation, pregnancy, lactation and menopause [2],[28]. Well balanced diets reduce the risk of non-communicable diseases (NCDs) and local interventions, such as those seen in Kerala, prove early action can improve public health [23].

D. Nutritional Challenges in Marginalized Communities

Women from economically disadvantaged backgrounds, including many in SHGs, are at higher risk of nutrient deficiencies due to limited access to healthy food and inadequate nutrition education. Micronutrient deficiencies, or "hidden hunger", such as those involving iron, calcium, and vitamin A, remain widespread and impact productivity, immunity, and maternal health [25],[8].

E. Nutritional requirements for Adult Women

The recommended dietary allowance for Indian Women who are Sedentary Workers [4] is presented in table 1.

TABLE I
RECOMMENDED DIETARY ALLOWANCES FOR ADULT WOMEN

Nutrients	RDA per day
Energy (kcal)	1900
Protein (g)	46.0
Carbohydrate (g)	130
Fat (g)	25
Fiber (g)	25
Calcium (mg)	1000
Magnesium (mg)	310
Iron (mg)	29
Zinc (mg)	10
Iodine (µg)	150
Thiamine (mg)	1.0
Riboflavin (mg)	1.1
Niacin (mg)	12
Vitamin B_6 (mg)	2.0
Folate (µg)	200
Vitamin B_{12} (µg)	1.0
Vitamin C (mg)	40
Vitamin A (µg)	600
Vitamin D (IU)	600

(ICMR, 2020)

F. Impact of Deficiencies: Anaemia, Osteoporosis, and Beyond

The National Family Health Survey (NFHS-5) highlights that 57% of Indian women between 15–49 years are anaemic. Vitamin D and calcium deficiencies are also prevalent and linked to osteoporosis and bone fractures in later life. A study in South India revealed that over 74% of postmenopausal women consumed less than the recommended daily calcium intake [15],[1].

G. Regional Perspective: Tamil Nadu and SHG Populations

Women in Tamil Nadu, particularly in rural and tribal areas, face a high prevalence of micronutrient deficiencies such as anaemia, goitre, and vitamin A deficiency. Among SHG members, low diet diversity and limited access to fortified foods increase the risk of hidden hunger, especially in resource-constrained settings [12],[24].

H. Influencing Factors: Socio-Economic and Cultural Aspects

Socio-economic status, education, access to healthcare, dietary habits, and cultural norms significantly influence a woman's nutritional status. In many communities, gender-biased food distribution results in women receiving smaller or less nutritious food portions, affecting maternal and child health [16],[9].

I. Nutrition Education and SHGs as a Platform for Change

Nutrition education is a critical tool to improve dietary choices among women. SHGs can serve as effective platforms to deliver targeted interventions, raise awareness about balanced diets, food hygiene, and cooking methods. Programs like ICDS and community cooking sessions have demonstrated success in changing dietary behaviours and reducing malnutrition rates [18],[10].

J. Case Studies and Community-Based Success Models

In Tamil Nadu, the *Mahalir Thittam* initiative encouraged SHG women to promote kitchen gardens, improving household vegetable consumption. Similarly, in Andhra Pradesh, SHGs under SERP implemented anaemia control programs, reducing anaemia prevalence in tribal areas [20].

III. RESEARCH METHODOLOGY

This study evaluates the nutritional status of women in Self-Help Groups (SHGs) in North Chennai and examines the impact of a Nutrition Education Program tailored to their needs. A Descriptive research design was adopted. The study aims to assess baseline nutritional health, dietary patterns and awareness levels, followed by evaluating the effectiveness of an intervention program designed to improve knowledge and practices. A total of 150 women aged 30 to 50 years were selected from the Magalir Mandram Association in Madhavaram using random sampling method.

At initial phase, informed consent was obtained from all the participants. Then data were collected through structured tools, including anthropometric measurements (height, weight, BMI and skinfold thickness), clinical assessments and dietary assessment (food frequency and 3 -day food record) surveys. A pre-test was administered to assess existing knowledge regarding nutrition, food groups and healthy eating practice.

Following this, Nutrition Education Program was implemented using visual aids like flex charts, posters and pamphlet highlighting the importance of making right food choices, effects of breakfast skipping, harmful effects of junk foods, general health tips, and food demonstration on healthy foods and ingredients, formed an integral part of the program. Following the program, a post-test was conducted to evaluate the knowledge gains.

For data analysis, descriptive and inferential statistical analysis were used to get deeper insights into the nutritional knowledge, status, and behavioral and social factors influencing nutrition among SHG women. The findings are expected to contribute to effective nutritional interventions and policies that can empower SHG women with knowledge and skills for better health outcomes.

IV. RESULTS

Descriptive and Inferential statistical results are presented in the following tables:

1) Descriptive Results

TABLE III
DEMOGRAPHIC PROFILE OF PARTICIPANTS

S. No	Study design	Statistical analysis	Sample size	Variable	Observation	Interpretation
1	Descriptive	Descriptive Statistics (Mean, standard deviation and percentage)	N=150	Age	Mean age: 41.26 ± 6.9 (years) (Range: 30–50 years)	Middle-aged SHG women
2				Education	60.7% completed school 25.3% illiterate 14% graduates	Moderate literacy
3				Occupation	48% unemployed 11.3% employed 6.7% self-employed 34% others	Majority not earning
4				Income	94% in very low-income group (≤ ₹25,000/month)	Vulnerable economic group
5				Family Type	85.3% nuclear 14% joint 0.7% extended	Nuclear families dominate
6				Marital Status	84.7% married 8% widowed 6.7% single 0.7% divorced	Predominantly married group

TABLE IIIII
LIFESTYLE AND HEALTH BEHAVIOURS

S. No	Study design	Statistical analysis	Sample size	Variable	Observation	Interpretation
1	Descriptive	Descriptive Statistics (Mean, standard deviation and percentage)	N=150	Sleep Duration	100% slept <8 hrs/day	All sleep-deprived
2				Sleep Quality	68% disturbed sleep 32% sound and refreshing sleep	Potential metabolic impact
3				Physical Activity	52.7% active (mainly walking) 47.3% inactive	Limited structured activity
4				Frequency of Exercise	27.3% once a week 4.7% daily	Low consistency
5				Leisure Activities	64.7% mobile/TV 32% family time 3.3% reading	Predominantly sedentary
6				Family Disease History	Diabetes (30%) Hypertension (24%)	High non-communicable disease predisposition
7				Personal Medical History	22% with chronic illness mostly diabetes	Lower than family history
8				Medication Use	80.7% not treated 19.3% on treatment	Reflects very low health service access

TABLE IVV
MENSTRUAL AND REPRODUCTIVE HEALTH

S. No	Study design	Statistical analysis	Sample size	Variable	Observation	Interpretation
1	Descriptive	Descriptive Statistics (Mean, standard deviation and percentage)	N=150	Reproductive Stage	51.3% pre-menopause 14.7% peri-menopause 34% post-menopause	Mid-life transition group
2				Cycle Regularity	37.3% very regular 11.3% irregular	Some hormonal imbalance
3				Duration	47.3% had 3 to 4-days periods	Within normal range
4				Symptoms	Fatigue (26%) Cramps (24.7%) Headache (12.7%)	Mild to moderate issues
5				Diet and Menstruation	Only 8.7% aware of diet's impact	Poor nutritional literacy
6				Menstrual Products	63.3% used sanitary pads 2.7% cloth pads	Low diversity in hygiene options

TABLE V
DIETARY BEHAVIOURS AND FOOD FREQUENCY

S. No	Study design	Statistical analysis	Sample size	Variable	Observation	Interpretation
1	Descriptive	Descriptive Statistics (Mean, standard deviation and percentage)	N=150	Dominant Diet	84.7% non-vegetarian	Protein intake potential
2				Meal Skipping	63.3% skipped meals (mainly breakfast 46.7%)	High metabolic risk
3				Outside Food Intake	32.7% ate out, but mostly rarely	Low exposure to junk food
4				Beverage Intake	97.3% consumed beverages mostly were Tea (76%) and Coffee (53.3%)	High caffeine use
5				Cooking Oil	Groundnut oil (58%) sunflower (25.3%) palm (9.3%)	Mixed fat profile
6				Water intake	65.3% consume >10 glasses	Good water intake

TABLE VI
FOOD GROUP CONSUMPTION SUMMARY

S. No	Study design	Statistical analysis	Sample size	Food Group	Frequent Intake	Rare/Never Consumed	Interpretation
1	Descriptive	Descriptive Statistics	N=150	Cereals	Parboiled rice (86%) raw rice (45.3%)	Millets (foxtail, pearl, oats) rarely used	Limited grain diversity
2				Pulses	Red gram (44.7% daily)	Soybean, lentil, cowpea infrequent	Need to expand plant protein
3				Vegetables	Onion (94.7%) Cabbage (54%) drumstick leaves (54%) Coriander (81.3%) Curry leaves (90%)	Broccoli, spinach, kohlrabi	Green leafy intake low
4				Fruits	Banana (24.7%) Guava (45.3%) orange (weekly)	Dragon fruit, musk melon, sweet lime, and pomegranate rare	Poor fruit diversity
5				Nuts/Seeds	Mustard (86%) Groundnut (39.3%) Coconut (40.7%) Sunflower oil (61.3%)	Walnuts (64.7%) and Palm oil (52.7)	Unsaturated fats underused
6				Animal Foods	Fish (64.7%) egg (40.7%) Prawns (40.7%)	Pork (100%), beef (3.3%)	Cultural preferences clear

7				Dairy	Milk (83.3%) Curd (46%) buttermilk (41.3%) was common	Butter (23.3%) Ghee (25.3%)	Good calcium intake potential
8				Sugars	Sugarcane (33.3% daily)	Jaggery and honey (occasionally)	Excess added sugar risk
9				Snacks	Vadai (42.75%) Bajji (36%) weekly puffs/pakoda (26.7%) monthly Puffed rice (38%)	Cutlet, cakes and fried chips	Non-Communicable disease risk if overconsumed

2) Inferential Statistical Analysis

TABLE VII
ANTHROPOMETRIC AND CLINICAL FINDINGS

S. No	Study design	Statistical analysis	Sample size	Variable	Observation	Interpretation
1	Descriptive	Descriptive Statistics (Mean, and standard deviation)	N=150	BMI (kg/m²)	27.21 ± 5.44	Obese category
2				Waist Circumference (inches)	34.92 ± 4.95	Above normal risk threshold
3				Skinfold Thickness (mm)	28.53 ± 6.42	High body fat stores
4				Systolic BP (mmHg)	125.28 ± 21.14	Pre-hypertensive
5				Diastolic BP (mmHg)	81.15 ± 9.52	High normal

TABLE VIII
NUTRIENT INTAKE COMPARED TO RDA

S. No	Study design	Statistical analysis	Sample size	Nutrient	RDA	Mean Intake ± S.D.	Level of Significance	Interpretation
1	Descriptive	One sample T-test	N=150	Energy (kcal)	1900	2567.32 ± 647.11	$p < 0.0001$	Excess energy
2				CHO (g)	130	397.39 ± 95.47	$p < 0.0001$	High risk of insulin resistance
3				Protein (g)	46	89.76 ± 29.79	$p < 0.0001$	High animal protein
4				Fat (g)	25	63.54 ± 24.10	$p < 0.0001$	Excess fat intake
5				Fiber (g)	25	63.56 ± 25.04	$p < 0.0001$	Good intake, but possibly too high
6				Calcium (mg)	1000	987.05 ± 543.49	NS	Little lower
7				Iron (mg)	29	19.40 ± 7.53	$p < 0.0001$	Deficient
8				Vitamin D (IU)	600	493.49 ± 57.68	$p < 0.0001$	Deficient

TABLE IX
NUTRITION EDUCATION IMPACT

S. No	Study design	Statistical analysis	Sample size	Test	Mean Score ± S.D.	't' value	Level of Significance	Interpretation
1	Descriptive	Paired Sample test T-test	N=150	Pre-test	5.65 ± 2.90	27.57	p < 0.0001	Low baseline knowledge
2				Post-test	15.46 ± 2.92			Significant knowledge gain

TABLE X
CORRELATION ANALYSIS

S. No	Study design	Statistical analysis	Sample size	Correlation	'r' value	't' value	Level of significance	Interpretation
1	Descriptive	Karl Pearson Correlation	N=150	Mean body mass index (kg/m2) / Mean waist circumference (cms)	+ 0.84	18.83	p < 0.0001	very highly significant and strong positive correlation
2				Mean body mass index (kg/m2) / Mean systolic blood pressure (mmHg)	+0.25	3.20	p < 0.01	significant mild positive correlation
3				Mean body mass index (kg/m2) / Mean diastolic blood pressure (mmHg)	+0.25	3.24	p < 0.01	significant mild positive correlation
4				Mean energy intake / Mean body mass index (kg/m2)	+0.27	3.52	p < 0.001	highly significant mild positive correlation

V. DISCUSSION AND CONCLUSIONS

The discussion section aims to interpret the findings of the present study in the context of existing literature and dietary guidelines. It provides a deeper understanding of the nutritional and lifestyle patterns observed among the participants, while also considering the possible implications on their metabolic health. Furthermore, this section explores the relevance and impact of the nutrition education program conducted, and how it may have influenced the participants' knowledge and behaviour. Based on the analysis, key observations are discussed to draw meaningful conclusions and suggest future directions for improving health outcomes.

A. Highlights of the Research Study

Summary of findings of the research study is given below

The study revealed that participants had inadequate consumption of essential food groups such as whole grains, green leafy vegetables, a variety pulses and fresh fruits, which are important sources of fiber, vitamins and minerals necessary for maintaining good health and metabolic balance.

1) A common dietary pattern observed among the participants was high intake of refined oils, sugar and deep-fried snacks, which are rich in unhealthy fats and empty calories. These dietary habits can lead to increased body fat accumulation, elevated blood sugar levels and a higher risk of chronic such as obesity and cardiovascular diseases.
2) Many participants frequently consumed tea and coffee multiple times a day, often in place of nutritious meals or snacks. This excessive intake of caffeinated beverages may interfere with the absorption of certain nutrients like calcium and iron, further contributing to micronutrient deficiencies.
3) Skipping meals, especially breakfast, was a prevalent behaviour among the participants. This irregular eating pattern can disrupt metabolic processes, affect energy levels and lead to overeating, which may contribute to weight gain and impaired glucose metabolism over time.
4) Physical activity levels among the participants were found to be insufficient, with many leading a predominantly sedentary lifestyle. Lack of regular exercise isa known risk factor for metabolic syndrome, insulin resistance and increased cardiovascular risk.
5) Despite having waist circumference measurements within the normal range, most participants had BMI and skinfold thickness values that exceeded the recommended levels. This indicates that although abdominal fat may not be visibly high, there is still an excess accumulation of body fat, increasing the risk of obesity-related health complications.
6) Both systolic and diastolic blood pressure readings were slightly elevated among participants and a significant positive correlation was found between BMI and blood pressure values. This suggest that increased body weight and fat composition may be directly contributing to the early onset of hypertension.
7) Dietary analysis showed that the participants intake of total energy, carbohydrate, proteins, fat and fiber was above the recommended dietary allowances. While excessive nutrient intake may appear beneficial, in reality, such imbalances can overload the metabolic system, leading to weight gain and metabolic disorders.
8) On the contrary, their intake of key micronutrients such as iron and vitamin D was notably deficient and calcium were slightly lower. Long-term deficiencies in these nutrients can result in fatigue, weakened immunity, poor bone health and increased susceptibility to infections and chronic diseases.
9) However, the implantation of a structured nutrition education program was shown to be highly effective in improving participants knowledge and awareness. The sessions helped them understand the importance of balanced eating, meal timing, physical activity and conscious lifestyle choices.
10) As a result of the awareness created through the education program, participants were better equipped to adopt healthier dietary and lifestyle practices. These positive changes are expected to reduce their risk of developing metabolic disorders and contribute to improved long-term health outcomes.

B. Conclusion

The study provided valuable insights into the dietary habits, lifestyle practices and health awareness among Self-Help Group women from Magalir Mandram Association, Madhavaram, Chennai. The results revealed that the overall dietary pattern and lifestyle among the participants were not satisfactory, emphasizing the potential risk of metabolic disorders and non-communicable diseases. The mean nutrient intake of energy, protein, carbohydrate, fat, and fiber were significantly higher than the recommended dietary allowances among the women because their nutritional quality of their diets was poor. Their food choices showed limited intake of whole grains, green leafy vegetables, pulses, fruits and high consumption of refined oils, sugars, fried snacks, as well as frequent tea and coffee consumption which contributes to micronutrient deficiencies and metabolic disturbances. Interestingly, despite the limited intake of whole plant foods, fiber intake was found to be high – possibly due to the frequent consumption of traditional snacks made with gram flour or coarse ingredients. However, this fiber was not accompanied by the broader nutritional benefits typically provided by whole foods, leading to imbalanced nutrient profiles and potential health risks. Additionally, majority of them skipped meals, especially breakfast, which further enhances these risks. Majority of the participants were deficient in iron and vitamin D and it is essential to correct these deficiencies by incorporating iron and Vitamin D rich foods in their diet to lead a healthy life. Calcium also slightly lower than RDA, to overcome that they have to include more dairy products and other calcium rich foods in their diet. Importantly, the nutrition education program conducted as part of this study served as a critical intervention. It significantly improved the participants' awareness of healthy eating practices and the importance of balanced nutrition. The program empowered women with practical knowledge, helping them make informed dietary and lifestyle choices. This educational effort represents a crucial step toward reducing nutrition-related health risks and promoting long-term well-being. Continued community-based nutrition education can be a powerful tool in enabling women to lead healthier and more productive lives.

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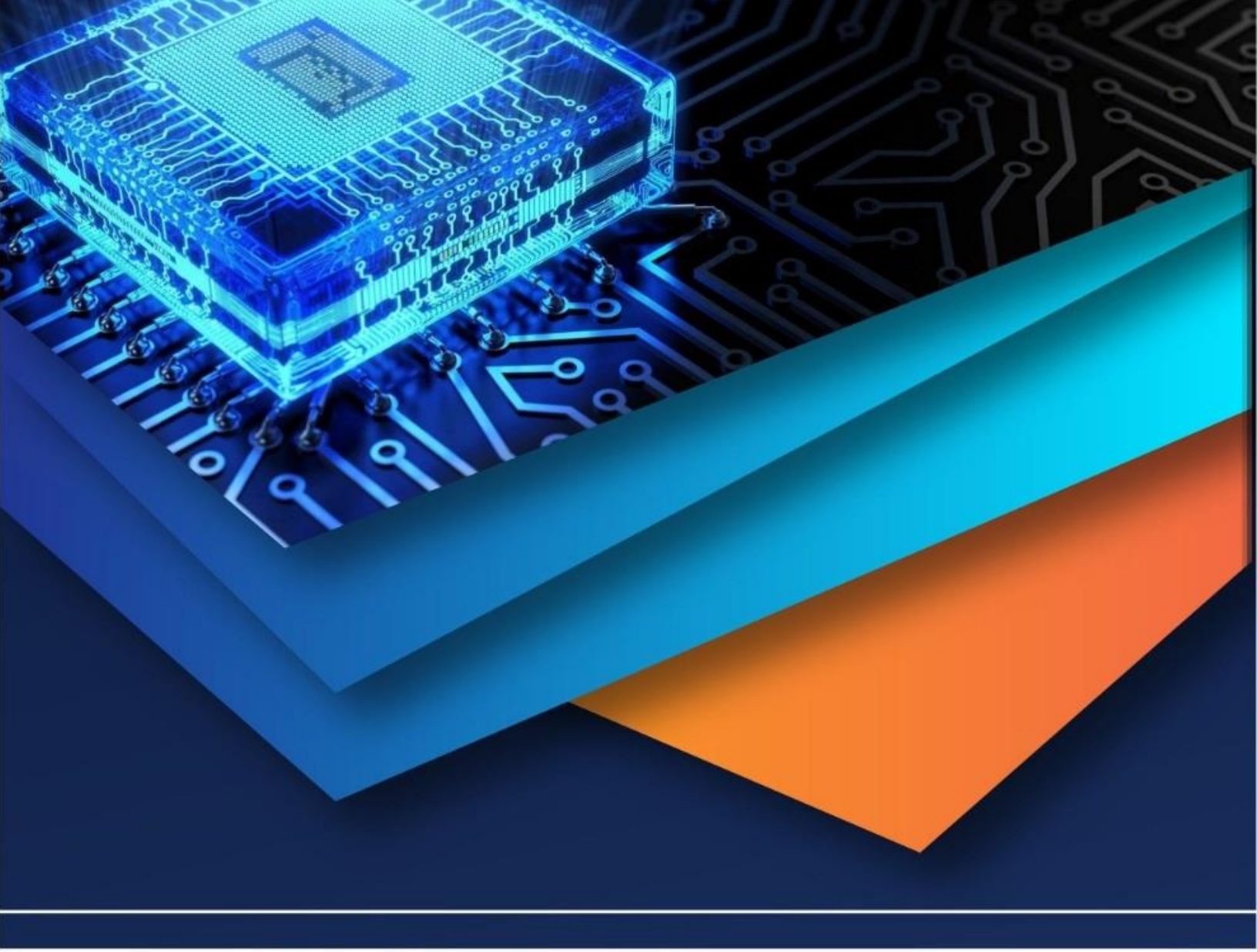

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