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Assessment of Nutritional Status among Selected School Teachers in South Chennai and Conduct of a Nutrition Education Program

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Abstract: ***Nutritional awareness and dietary practices among working women in the teaching profession are critical aspects of their overall health and productivity, particularly in an urban setting like Chennai city. Female educators often juggle professional duties alongside domestic responsibilities, leading to compromised eating habits and nutritional neglect. This review involves the understanding of balanced diets, actual dietary behaviour and the barriers they face in maintaining consistent nutrition. A descriptive research method was employed, collecting data from 150 participants using a structured questionnaire. The findings indicated a moderate level of awareness but a noticeable gap in practical adherence due to time limitations, work pressure and lifestyle constraints. The findings underscore the importance of regular nutrition education and workplace wellness initiatives tailored to the needs of working women in the education sector***
Keywords: Nutritional awareness, working women, school teachers, dietary patterns, health behaviour

I. INTRODUCTION

The world Health Organization's (WHO) 2016-2025 nutrition strategy plays a crucial role in setting global nutrition standards and supports countries to improve nutritional outcomes through evidence-based guidance on key issues such as malnutrition, obesity and diet-related non-communicable diseases [36]. The systematic assessments include dietary intake, nutrient deficiencies and anthropometric measurements to ensure effective application of nutrition standards [24]. The Subjective Global Assessment (SGA) is widely used to evaluate medical history (weight loss, dietary intake changes, gastrointestinal and functional impairments) and physical examination (loss of subcutaneous fat muscle wasting, edema and ascites). SGA uses anthropometric measurements (BMI, skinfold thickness, waist circumference), dietary intake tools (Food frequency and 3-day dietary record) and clinical evaluation (Blood pressure) to assess nutritional health [26]. These assessments help address dietary gaps and support long-term health improvements, especially for women who face distinct nutritional needs during menstruation, pregnancy, lactation and menopause. Nutrients like iron, calcium, vitamin D and folic acid are essential to prevent anaemia, osteoporosis and cardiovascular diseases [4].

Cultural and socio-economic factors often cause women to prioritize family needs over their own leading to inadequate nutrient intake [29]. Working women, particularly in demanding sectors like educators face additional nutritional challenges due to stress, time constraints and reliance on convenience foods [14]. This increases the risk of health issues such as obesity, cardiovascular diseases and chronic conditions especially for post-menopause women when hormonal changes heighten the vulnerability. Cardiovascular disease is the leading cause of death among women globally with risk factors including hypertension, diabetes and obesity [19]. Teachers juggle profession and family duties and often reply on quick, nutrient-poor meals leading to fatigue, bone health issues, diabetes and nutrient deficiencies. The rise of food delivery apps promotes processed, calorie- dense options that compromise dietary quality contributing to chronic illnesses [30].

Mental health and nutrition are closely linked with stress and hormonal shifts leading to emotional eating and consumption of high-calorie and low-nutrient foods. A study in Kerala and Oslo highlights that working women often lack tie and nutrition literacy, resulting in sub-optimal dietary habits. Working women also faces increased risks of sleep issues, gastrointestinal problems and musculoskeletal pain due to physical inactivity [1]. Therefore, educational institutions should adopt supportive policies like flexible meal breaks and wellness programs to support teachers' nutritional needs. Improving working women especially teachers' nutrition yields substantial benefits by enhancing health, immunity and workplace productivity. However, there remains a gap in research focused on improving teachers' own nutrition, despite efforts to educate them on childhood nutrition. Addressing this gap can improve their health and enable them to serve as role models for healthy living [27].

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II. REVIEW OF LITERATURE

Working women, especially teachers, face nutritional challenges due to busy schedules and limited time for healthy meals. This leads to nutrient deficiencies and low energy affecting their health and job performance [32].

A. Status of Women in India

Women constitute a significant portion of the teaching workforce, especially in primary and secondary education where roles align with traditional societal norms. Their nutritional status reflects the demands of their profession and domestic responsibilities. In urban areas, female teachers in higher education manage research, teaching and administrative tasks leading to stress and poor dietary choices [25]. The implications of poor nutritional status among women teachers extend beyond their personal health to their professional roles, as malnourished teachers are less likely to sustain the energy and focus required for effective teaching [33].

B. Importance of good Nutrition among Women

Nutrition is particularly important for women between the ages of 30 to 45 years, as they face various physiological changes like perimenopause, hormonal shifts and increased responsibilities [10]. Good nutrition helps prevent chronic diseases, supports energy levels, and improves mental well-being. Furthermore, focusing on a meal-based approach rather than relying solely on supplementation has been shown to be effective in promoting overall health [28].

C. Factors Influencing Nutritional Status of Working Women

The nutritional status of women is a significant concern, and it is even more crucial for women in the workforce. Working women, especially in low-income and high-stress jobs, may have less time to prepare healthy meals, resulting in poor nutritional intake. Research indicates that many teachers have moderate to insufficient nutritional knowledge, which can negatively affect their eating habits. For instance, a research study highlighted that teachers' nutritional knowledge levels were insufficient, leading to sub-optimal dietary practices [2]. The recommended dietary allowance (RDA) for sedentary women (ICMR) is given in table I [11].

TABLE I

RECOMMENDED DIETARY ALLOWANCE FOR SEDENTARY ADULT WOMEN

Nutrient	RDA per day
Energy (Kcal)	1900
Protein (g)	46.0
Carbohydrates (g)	130
Fat (g)	25
Fibre (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 B6 (mg)	2.0
Folate (µg)	200
Vitamin B12 (µg)	1.0
Vitamin C (mg)	40
Vitamin A (µg)	600

(*ICMR,2020)

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Balanced nutrient intake is vital for maintaining overall health and preventing chronic diseases. Carbohydrates provide essential energy, proteins aid muscle maintenance, and fats support hormonal and vitamin functions. Fibre enhances gut health and satiety, while minerals like calcium and iron are crucial for bone strength and oxygen transport. Vitamins such as D regulate immune and bone health. Essential minerals like magnesium, potassium, and iodine play key roles in bodily processes, emphasizing the importance of a diverse, nutrient-rich diet [21].

D. Nutritional Deficiencies among Working Women

Many working women suffer from deficiencies in essential nutrients such as iron, calcium, vitamin D, vitamin A, B12, and folate. These deficiencies are due to consumption of energy-dense but nutrient-poor diets, long working hours, stress, and skipping meals. This can lead to anaemia, osteoporosis, fatigue, cognitive impairment, and reduced work performance [34]. Hidden hunger, defined as the chronic lack of essential vitamins and minerals, often occurs without overt signs of undernutrition. This condition is particularly concerning among working women who may consume sufficient calories but lack micronutrient-rich foods. A review exploring strategies to tackle micronutrient deficiencies highlights that hidden hunger results from consuming energy-dense but nutrient-poor diets [23].

E. Working Women and Their Health-Related Problems

Due to poor dietary intake, sedentary lifestyles, and high stress, working women are increasingly affected by lifestyle-related disorders. Health issues and key concerns among teaching women are presented in table II.

TABLE II
HEALTH ISSUES AND KEY CONCERNS AMONG TEACHING WOMEN

Health Issue	Key Concerns
Anaemia	High prevalence due to poor dietary intake, low consumption of iron-rich foods, menstrual blood loss, and stress. Among teachers, long hours and irregular meals worsen the condition, leading to fatigue and reduced productivity [3].
Bone Health and Osteoporosis	Estrogen decline during perimenopause impairs calcium absorption. Inadequate calcium and vitamin D intake increases risk of bone loss. Weight-bearing exercises are also essential for maintaining bone density and preventing fractures [20].
Diabetes Mellitus	Type 2 diabetes risk is elevated due to sedentary lifestyle, high sugar intake, and chronic stress. Teachers often lack time for exercise and balanced meals. Nutrition education improves food choices and glycemic control [31].
Metabolism and Weight Management	Metabolic rate declines with age; lack of physical activity and increased caloric intake lead to weight gain. A fiber-rich, protein-balanced diet supports metabolism and helps prevent obesity in working women [9].
Obesity	Emotional eating due to stress, irregular schedules, and limited access to healthy meals contribute to obesity. Shift work disrupts eating patterns, further increasing BMI and lowering nutrient intake [16], [17].
Hypertension	Prolonged working hours, poor stress management, and socio-economic factors elevate blood pressure levels. Women often overlook symptoms, leading to delayed diagnosis and higher cardiovascular risk [12], [5].
Cardiovascular Health	Workplace stress and job strain negatively affect heart health, increasing blood pressure and cholesterol. Hormonal and psychosocial factors make women more vulnerable. Managing stress is key to prevention [6].
Breast Cancer	Poor lifestyle choices like unhealthy diets, lack of physical activity, and stress increase risk. Plant-based diets and soy intake may offer protective benefits. Early education can help reduce modifiable risks [18].
Mental Health Problems	Chronic stress, workload, lack of support, and caregiving responsibilities lead to anxiety and depression. Teachers face burnout due to emotional labour and insufficient time for self-care [13].

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F. Physical Activity

The World Health Organization (WHO) recommends at least 150 minutes of moderate-intensity physical activity per week; however, studies suggest that only 25–30 per cent of working women meet this benchmark. Female teachers, in particular, face unique challenges in maintaining active lifestyles due to long hours spent teaching, grading, preparing lessons, and managing administrative responsibilities. These job-related demands are often coupled with household and caregiving duties, leaving little time or energy for self-care [35]. Engaging in regular physical activity helps in preventing chronic diseases, improving cardiovascular fitness, mental health, and managing weight. However, many women, especially teachers, struggle to maintain consistent physical activity due to time constraints, fatigue, and professional demands.

G. Nutritional Assessment

Nutritional assessment is a critical process for evaluating an individual's nutritional status and identifying any deficiencies or excesses that may impact health. This process involves a combination of methods, including anthropometry (measurements of body size and composition), biochemical analysis (laboratory testing of nutrients and metabolites), clinical evaluation (physical examination for signs of malnutrition) and dietary assessment (analysis of food intake patterns). A comprehensive nutritional assessment involves anthropometric measurements (BMI, waist circumference, skinfold thickness and mid-upper arm circumference), clinical assessment (blood pressure) and dietary evaluation (food frequency questionnaire, 3-day dietary record). This helps in identifying nutritional risks, monitoring dietary patterns and planning appropriate interventions to prevent long-term health issues. Proper assessment can lead to more personalized interventions, improving overall health and quality of life [27]. The BMI classification is presented in table III [22].

TABLE III

BMI CLASSIFICATION FOR ADULTS

Classes	BMI value
Underweight	<18.5
Normal weight	18.5-24.9
Overweight	25-29.9
Obese	≥30

(WHO,2022)

H. Nutrition Education

Nutrition education programs are designed to equip individuals or groups with knowledge and skills that promote healthier food choices and lifestyle habits. These programs aim to raise awareness about the importance of balanced diets, proper meal planning and nutrition's role in disease prevention and overall well-being. They often include topics like portion control, the role of macronutrients and micronutrients, the benefits of whole foods, and strategies for managing common health issues such as obesity, diabetes and heart disease. By providing targeted education on the importance of nutrition, such programs can help teaching professionals mitigate the risks of diet-related health issues and improve their quality of life [7].

This study on the nutritional status of school teachers highlights the importance of proper nutrition in supporting their overall health and performance. Given the demands of their profession, balanced dietary habits are crucial for sustaining energy, focus, and productivity. Addressing nutritional gaps through education and wellness programs can promote healthier lifestyles and reduce health risks. Prioritizing teachers' nutrition enhances their quality of life and strengthens both personal and professional roles.

III.METHODOLOGY

The study was conducted to assess the nutritional status of women school teachers and to implement a nutrition education program to create awareness about good nutrition and health. The methodological framework was designed in several phases. The research design adopted for the study was descriptive in nature. The area selected for the study was South Chennai, and the sample included women teachers from two private schools. A total of 150 samples were selected by simple random sampling. Inclusion criteria for the study included women teachers in the age group of 30–45 years, working in the selected schools, willing to participate in the study and available during the time of data collection. Exclusion criteria included women teachers above 45 years of age, pregnant and lactating mothers.

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Tools used for the study included a structured questionnaire to collect general information such as age, marital status, family type, educational qualification, income and working hours. A detailed dietary assessment included a food frequency questionnaire and a 3-day dietary record. Anthropometric measurements such as height, weight, waist circumference, and skinfold thickness (triceps and subscapular) were taken using standard procedures. Body mass index (BMI) was calculated and interpreted based on WHO classification. Clinical assessments were also carried out to identify signs of nutritional deficiencies. Blood pressure was recorded to check for hypertension using a digital sphygmomanometer. The food frequency questionnaire included a list of commonly consumed foods, and the frequency of intake was recorded using the options: daily, weekly, occasionally and never. The 3-day dietary record included two weekdays and one weekend day to calculate the average intake of energy, protein, fat, carbohydrates, calcium, iron, and other nutrients, which were then compared with the Recommended Dietary Allowances (RDA).

A pre-test was conducted to assess the nutritional knowledge of the selected women teachers. Following this, a structured nutrition education program was developed and implemented, covering topics like balanced diet, importance of macro and micronutrients, healthy eating habits, physical activity, stress management and lifestyle diseases. Various teaching aids such as posters, charts, PowerPoint presentations and pamphlets were used to deliver the educational content. After a period of one month, a post-test was conducted using the same questionnaire to evaluate the effectiveness of the program. The data collected were compiled, tabulated, and subjected to statistical analysis using mean, standard deviation, percentage, correlation and t-test wherever applicable.

IV. RESULTS AND DISCUSSION

The study assessed the nutritional status and dietary practices of 150 women school teachers aged 30–45 years. The socio-demographic data revealed that the majority were between 36–40 years (38.6%), married (89.3%), belonged to nuclear families (72.6%), were postgraduates (50.6%), and had an income between Rs. 15,000–30,000 (47.3%). Regarding lifestyle factors, 78.6% of respondents did not engage in regular physical activity, and 64.6% reported high stress levels. Food habits showed that 84.6% were non-vegetarians, 42.6% skipped meals often (mostly breakfast), 59.3% consumed processed foods frequently, and 64.6% drank less than 1 liter of water per day. Only 27.3% had the habit of reading nutrition labels, and 61.3% consumed fruits only once or twice a week.

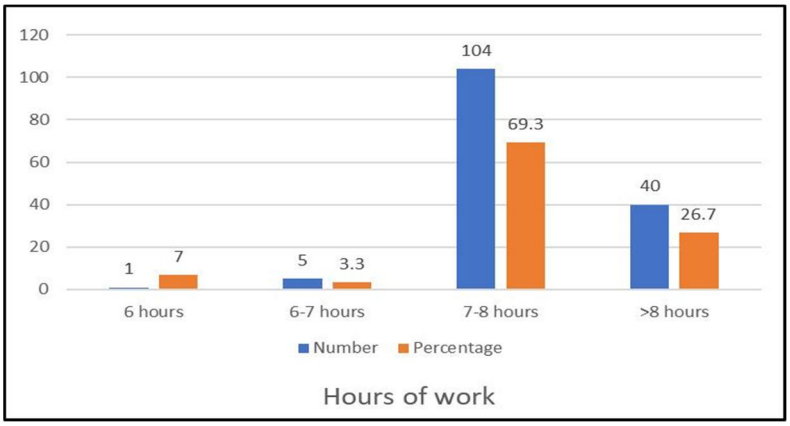

Fig. 1 Percentage distribution of participants based on their hours of work

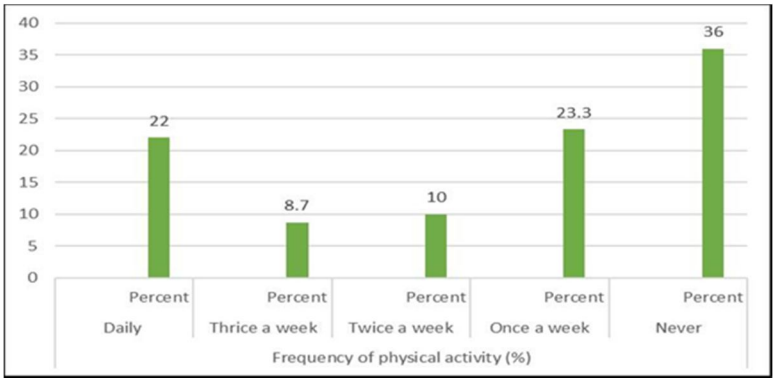

Fig. 2 Percentage distribution of participants based on frequency of physical activity

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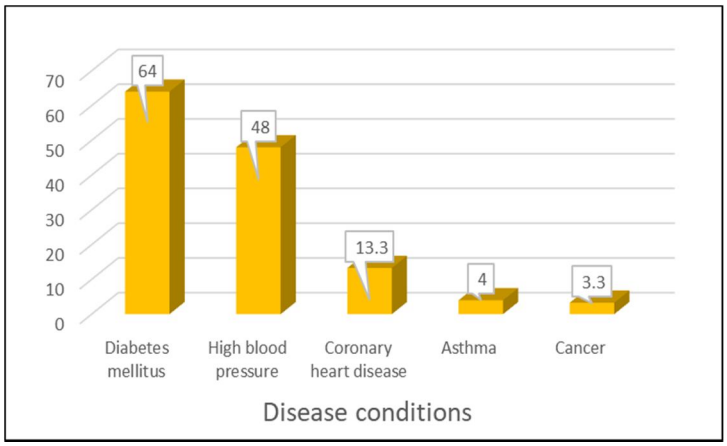

Fig. 3 Percentage distribution of participants based on family history of disease conditions

Anthropometric assessments showed that 52.6% of respondents were overweight and 21.3% were obese. According to BMI classification, 54% were in the pre- obese category (25.0–29.9), and 21% were obese (30.0–34.9). Waist circumference results indicated that 56% of participants had central obesity (>88 cm), and 30.6% had high subscapular skinfold thickness. Blood pressure assessment revealed that 28.6% of respondents had pre-hypertension, and 15.3% had hypertension. Clinical assessments revealed visible signs of nutritional deficiencies: 40% had pale conjunctiva (indicative of anaemia), 28% had brittle nails, 24% had dry skin, and 18.6% had hair loss. The food frequency table showed irregular and inadequate intake of green leafy vegetables, pulses, fruits, and dairy products. Correlation Coefficient of BMI with other variables is presented in table IV.

TABLE IV
Comparison of the mean nutrient intake of the participants with the recommended dietary allowances

Variables	Correlation Coefficient (r)	Strength of Correlation
BMI and Waist Circumference	0.81	Strong Positive
BMI and Systolic Blood Pressure	0.76	Strong Positive
BMI and Diastolic Blood Pressure	0.69	Moderate Positive

The table presents the correlation between Body Mass Index (BMI) and selected health parameters. A strong positive correlation was observed between BMI and both waist circumference and systolic blood pressure. BMI also showed a moderate positive correlation with diastolic blood pressure, indicating related trends among these variables. The Comparison of the mean nutrient intake of the participants with the recommended dietary allowances is presented in table V.

TABLE V
Comparison of the mean nutrient intake of the participants with the recommended dietary allowances

Nutrient	**Intake**	**Status**
Energy	1384 Kcal	Below RDA
Protein	41 g	Below RDA
Fat	28 g	Above RDA
Carbohydrates	223 g	Above RDA
Fibre	15 g	Below RDA
Calcium	45 mg	Below RDA
Iron	13 mg	Below RDA
Vitamin D	3.4 µg	Below RDA

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Fibre, calcium, and vitamin D are essential nutrients that play critical roles in maintaining overall health. Dietary fibre supports digestive health by promoting regular bowel movements, preventing constipation, and helping control blood sugar and cholesterol levels. Calcium is vital for the development and maintenance of strong bones and teeth, and its deficiency can lead to weakened bones, increasing the risk of osteoporosis and fractures. Vitamin D enhances calcium absorption and supports immune function; without adequate levels, bone mineralization is impaired, potentially resulting in conditions like rickets in children and osteomalacia in adults. A long-term deficiency in these three nutrients can significantly compromise bone health, metabolic function, and overall well-being [8].

The pre-test and post-test results of the nutrition education program revealed a significant improvement in knowledge levels. Mean score of the nutritional knowledge of the participants before and after the Nutrition education program is presented in table VI.

TABLE VI
Mean score of the nutritional knowledge of the participants before and after the Nutrition education program

Aspect	Details
Pre-test Mean Score	11.2 out of 20
Post-test Mean Score	18.4 out of 20
Statistical Test Used	t-test
Significance Level	$p < 0.0001$
Key Finding	Significant improvement in knowledge after nutrition education
Identified Risks	Poor dietary habits, lack of physical activity, and stress
Conclusion	Nutrition education programs are effective in improving knowledge and practices

Overall, the results suggested that working women, especially teachers, are at high nutritional risk due to poor dietary habits, lack of physical activity, and stress. Education and awareness programs can bring significant improvement in their knowledge and practices.

V. SUMMARY AND CONCLUSION

The present study was conducted to assess the nutritional status and dietary practices of women school teachers aged 30–45 years in South Chennai. A total of 150 participants were selected from two private schools using simple random sampling. The study design was descriptive in nature, and the methodology involved multiple phases including the collection of demographic data, dietary assessment through food frequency questionnaire and 3-day record, anthropometric measurements, clinical assessments, blood pressure recording, and evaluation of nutritional knowledge before and after a structured Nutrition Education Program.

The study revealed that a significant number of respondents had unhealthy eating habits such as skipping meals (especially breakfast), frequent consumption of processed and outside food, low intake of fruits and vegetables, inadequate water consumption, and minimal physical activity. The anthropometric measurements indicated that 52.6% of the women were overweight and 21.3% were obese. Waist circumference and skinfold thickness suggested central obesity in more than half of the participants. Clinical observations showed visible signs of nutritional deficiencies like pale conjunctiva, brittle nails, hair fall, and dry skin. Blood pressure levels also indicated that many participants were in the pre- hypertensive or hypertensive category.

Nutrient intake analysis revealed that energy, protein, fat, fibre, calcium, iron and vitamin D consumption was significantly below the recommended dietary allowances. The mean intake of energy was 1384 kcal (69.2% of RDA), and protein was 41g (68.3%). These deficiencies were attributed to poor food choices and time constraints due to workload and domestic responsibilities. The correlation analysis showed a strong positive relationship between BMI and waist circumference, and a significant association with blood pressure. The Nutrition Education Program conducted for the respondents proved to be effective. Pre- and post-test results indicated a significant increase in nutritional knowledge after the intervention. The findings underscore the importance of regular nutrition assessments and health awareness programs for working women. Women teachers, in particular, play a critical role in influencing young minds, and their health and nutrition are essential not only for their well-being but also for setting a healthy example for students.

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In conclusion, the study emphasized that women teachers in the 30–45 age group are at nutritional risk and require targeted interventions to improve their dietary habits and lifestyle. The structured education program helped enhance their understanding of nutrition and motivated them to adopt healthier practices. There is a need for continuous nutrition education, wellness initiatives, and support systems at the workplace to ensure long-term health benefits and improved quality of life for women in the teaching profession

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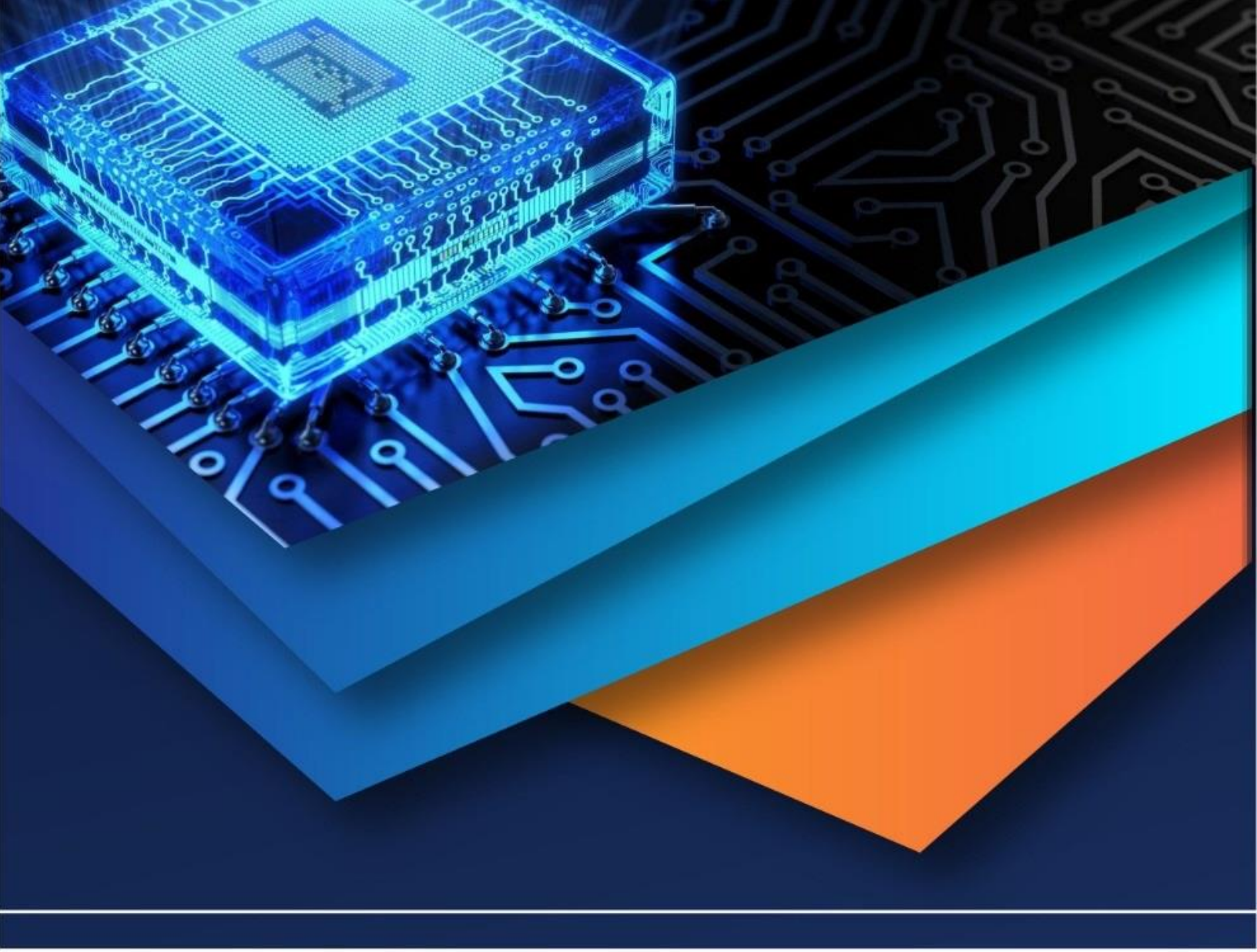

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