iJRASET
International Journal For Research in Applied Science and Engineering Technology

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 10 **Issue:** IX **Month of publication:** September 2022

DOI: https://doi.org/10.22214/ijraset.2022.46594

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International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 10 Issue VIII Aug 2022- Available at www.ijraset.com

Effect of Yogic Practices and Weight Training on Motor Fitness of College Level Volleyball Players

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Abstract: ***The purpose of this study was to determine the effect of yogic practices and weight training on motor fitness of college level volleyball players. The analysis of data revealed that the two experimental groups, administered with yoga and weight training showed significant gains in performance of motor fitness variables after administration of training for duration of 12 weeks.***
The control group did not show any significant increase in the performance of variables except vertical jump (explosive strength), 1500 mts run (speed endurance) and shuttle run (agility) of motor fitness, systolic blood pressure under study.
Keywords: Yogic Practice, Weight Training, Motor Fitness and Volleyball players

I. INTRODUCTION

Motor fitness components are pre - requisite traits for every sports person for a better and skilled performance in a given sport. Inclusion of activities such as weight training and practice of yoga within the training schedule of volleyball game, the players may improve their motor fitness capabilities towards better performance.
Sivaramakrishnan et.al., (2019) in their study stated that Yoga has been recommended as a muscle strengthening and balance activity in national and global physical activity guidelines.
Eungpinichpong et.al, (2021) using Seefeldt`s classic motor development pyramid model found that it support the promotion of physical activity and motor skill development in primary school children.
The purpose of this study was to determine the effect of yogic practices and weight training on motor fitness components of college level volleyball players

II. METHODOLOGY

Ninety (90) volleyball male players were scouted randomly from the volleyball intramural competition of Baliapal College of Physical Education and chosen as subjects for the research work undertaken.
The ages of the subjects were ranged between 19 to 23 years and they were professional students. All subjects were, then, randomly assigned into three groups i.e., two experimental groups (A and B) and one control group (C), each consisting of 30 students. The groups A and B were given yogic practices and weight training programmes, respectively.
The group C served as control group.Random group design was adopted for the study as all the subjects were randomly selected and randomly divided into three groups. Both the training programmes were conducted for a total duration of twelve weeks.
Keeping the feasibility criterion in mind, especially in the case of availability of instruments, the following dependant variables for motor fitness explosive Strength (measured by Vertical Jump and medicine ball throw), strength endurance (measured by sit-ups and push-ups), speed endurance (measured by 1500 mts. run), speed (30 mts. flying start), agility (shuttle run 6x10 mts) and flexibility (sit and reach test).
The statistical analysis of data on motor fitness variables of the subjects belonging to two experimental groups and one control group, each comprising of thirty subjects, were examined by applying analysis of variance as well as analysis of covariance with regard to two experimental groups and one control group to find out the inter-group variability to allow for the comparison between initial and final scores and to effect adjustments in final or terminal scores which allowed for difference in same initial variables.

III. FINDINGS

Table 1: Significance of differences between pre-test and post-test means of the two experimental groups and control group in vertical jump.

Groups	Pre-test mean±SE	Post-test mean±SE	Difference between means	SE	't' ratio
Yogic Practice Group	56.833±0.969	66.467±0.252	9.634	1.040	9.263*
Weight Training Group	56.367±0.882	66.267±0.307	9.900	0.877	11.292*
Control group	57.80±0.84	59.23±1.00	1.43	0.436	1.288

* Significant at 0.05 level of confidence 't' 0.05 (29) = 2.045

Table 1 clearly revealed that the yogic practice group and weight training group improved significantly yielding 't' value 9.263 and 11.292, respectively, where as the control group did not show any significant improvement in vertical jump performance of subjects indicating 't' values of 1.288.

Table 2: Analysis of variance and covariance of the means of two experimental groups and the control group in vertical jump.

	Yogic Practice Group	Weight Training group	Control group	Sum of squares	df	Mean square	F ratio
Pre-test means	56.833	56.367	56.233	B 141.956 W 2368.500	2 87	70.978 27.224	2.607
Post-test means	66.467	66.267	57.800	B 1468.356 W 752.133	2 87	734.178 8.645	84.923*
Adjusted post-test means	66.650	66.582	57.301	B 1639.660 W 561.017	2 86	819.830 6.523	125.674*

* Significant at 0.05 level of confidence N = 90, B = Between group variance W = Within group variance

The analysis of covariance for vertical jump showed that the resultant 'F' ratio of 2.607 was not significant in comparison to pre-test means. The post test means yielded 'F' ratio of 84.923, which was found to be significant. The adjusted final means yielded the 'F' ratio of 125.674 and was found significant. The 'F' ratio, needed for significance at 0.05 level of confidence (df 2, 87) was 3.07.

Table 3: Paired adjusted final means and differences between means for the two experimental groups and the control group in vertical jump.

Yogic Practice Group	Weight Training group	Control group	Difference between means	Critical differences for adjusted mean
66.650	66.582		0.068	1.347
66.650		57.301	9.349	1.347
	66.582	57.301	9.281	1.347

* Significance at 0.05 level of confidence

It was clear from the Table 3 that the mean differences with respect to performance in vertical jump of yogic practice group and weight training group were found to be significantly greater than that of control group. No significant difference between yogic practice group and weight training group was found with respect to vertical jump performance.

Table – 4: Significance of difference between pre-test and post-test means of the two experimental groups and the control group in medicine ball throw.

Groups	Pre-test mean±SE	Post-test mean±SE	Difference between mean	SE	't' Ratio
Yogic Practice Group	64.767±1.192	66.367±0.756	1.600	0.619	2.585*
Weight Training group	64.333±1.275	71.233±0.290	6.900	1.228	6.617*
Control group	65.100±1.164	64.967±1.262	0.133	0.202	0.660

* Significant at 0.05 level of confidence 't' 0.05 (29) = 2.045

Table 4 revealed that both the experimental groups improved significantly yielding 't' value 2.585 and 6.617, whereas, control group did not show any significant improvement in medicine ball throw performance of subjects indicating 't' values of 1.214.

Table 5: Analysis of variance and covariance of the means of two experimental groups and the control group in medicine ball throw.

	Yogic Practice Grp.	Weight Training Gr..	Control group	Sum of squares	df	Mean square	F ratio
Pre-test means	64.767	64.333	65.100	B 8.867 W 3828.733	2 87	4.433 44.008	0.101
Post-test means	66.367	71.233	64.967	B 649.156 W 1955.300	2 87	324.578 22.475	14.442*
Adjusted post-test means	66.349	71.448	64.770	B 729.173 W 856.250	2 86	364.587 9.956	36.618*

* Significant at 0.05 level of confidence N = 90
B = Between group variance W = Within group variance

The analysis of covariance for medicine ball throw showed that the resultant 'F' ratio of 0.101 was not significant in case of pre-test means. The post test and adjusted final means yielded the 'F' ratio of 14.442 and 36.618, respectively, which were found to be significant.

Table 6: Paired adjusted final means and differences between means for the two experimental groups and the control group in medicine ball throw.

Yogic Practice Group	Weight Training group	Control group	Difference between means	Critical differences for adjusted mean
66.349	71.448		5.099*	1.713
66.349		64.770	1.579	1.713
	71.448	64.770	6.678*	1.713

* Significant at 0.05 level

It was very much clear from the Table 6 that the mean differences with respect to performance in medicine ball throw of both yogic practice group and weight training group were found to be significantly greater than that of control group.

Table 7: **S**ignificance of difference between pre-test and post-test means of the two experimental groups and the control group in sit ups

Groups	Pre-test mean±SE	Post-test mean±SE	Difference between mean	SE	't' Ratio
Yogic Practice	25.267±0.386	27.800±0.147	2.533	0.409	6.195*
Weight training	25.133±0.431	26.767±0.345	2.667	0.222	7.350*
Control	25.367±0.403	25.167±0.458	0.200	0.111	1.795

* Significant at 0.05 level of confidence, 't' 0.05 (19) = 2.045

Table 7 clearly shows that both yogic group and weight training group improved significantly yielding 't' value of 6.195 and 7.350, respectively, whereas, control group did not show any significant improvement in sit ups performance of subjects indicating 't' values of 1.795.

Table 8: Analysis of variance and covariance of the means of two experimental groups and the control group in sit-ups.

	Yogic Practice Group	Weight Training Gr	Control group	Sum of squares	df	Mean square	F ratio
Pre-test means	25.267	25.133	25.367	B 0. 822 W 432.300	2 87	0.411 4.969	0.083
Post-test means	27.800	26.767	25.167	B 105.622 W 304.333	2 87	52.811 3.498	15.097*
Adjusted post-test means	27.793	26.843	25.098	B 112.072 W 137.329	2 86	56.036 1.597	35.094*

* Significant at 0.05 level of confidence, N = 90

B = Between group variance W = Within group variance

The analysis of covariance for sit ups showed the resultant 'F' ratio of 0.083, which was not significant in case of pre test means. The post test means and adjusted final means yielded the 'F' ratio of 15.097 and 35.094 and were found significant.

Table 9: Paired adjusted final means and differences between means for the two experimental groups and the control group in sit ups.

Yogic Practice Group	Weight Training group	Control group	Difference between means	Critical differences for adjusted mean
27.793	26.843		0.950	1.576
27.793		25.098	2.695*	1.576
	26.843	25.098	1.745*	1.576

* Significant at 0.05 level of confidence

It was clear from the Table 9 that, the mean difference with respect to performance in sit ups of yoga group and weight training group was found to be significantly greater than that of control group. No significant difference between yoga group and weight training group was found with respect to sit ups performance.

Table 10**: S**ignificance of difference between pre-test and post-test means of the two experimental groups and the control group in push-ups.

Groups	Pre-test mean±SE	Post-test mean±SE	Difference between mean	SE	't' Ratio
Yogic Practice	24.100±0.399	27.900±0.175	3.800	0.483	7.871*
Weight training	24.533±0.452	26.600±0.286	2.067	1.818	6.226*
Control Group	24.400±0.428	24.567±0.310	0.167	0.173	0.961

* Significant at 0.05 level of confidence 't' 0.05 (29) = 2.045

Table 10 revealed that both yoga group and weight training group improved significantly yielding 't' value of 7.871 and 6.226, respectively, whereas, control group did not show any significant improvement in push-up performance of subjects indicating 't' values of 0.961.

Table 11: Analysis of variance and covariance of the means of two experimental groups and the control group in push-ups.

	Yogic Practice Group	Weight Training group	Control group	Sum of squares	df	Mean square	F ratio
Pre-test means	24.100	24.533	24.400	B 2.956 475.367	2 87	1.478 5.464	0.270
Post-test means	27.900	26.600	24.567	B 169.356 W 181.267	2 87	84.678 2.084	40.64*
Adjusted post-test means	27.349	26.448	24.770	B 729.173 W 856.250	2 86	364.587 9.956	36.618*

* Significant at 0.05 level of confidence N = 90
B = Between group variance W = Within group variance

The analysis of covariance for push-up showed that the resultant 'F' ratio of 0.270 was not significant in case of pre-test means. The post test and adjusted final means yielded the 'F' ratio of 40.64 and 36.618, respectively and were found to be significant.

Table 12: Paired adjusted final means and differences between means for the two experimental groups and the control group in push-ups.

Yogic Practice group	Weight training group	Control group	Difference between means	Critical differences for adjusted mean
27.349	26.448		1.099	1.604
27.349		24.770	2.579	1.604
	26.448	24.770	1.678	1.604

* Significant at 0.05 level of confidence

It was very much clear from the Table 12 that the mean differences with respect to performance in push-up of yoga group and weight training group were found to be significantly greater than control group. No significant difference between yoga group and weight training group was found with respect to push-up performance.

Table 13: Significance of difference between pre-test and post-test means of the two experimental groups and the control group in 1500m run.

Group	Pre-test mean±SE	Post-test mean±SE	Difference between mean	SE	't' Ratio
Yogic Practice	51.600±0.247	50.100±0.399	1.500	0.409	3.668*
Weight training	51.600±0.261	41.867±0.261	9.733	0.359	27.144*
Control	52.000±0.209	51.933±0.230	0.067	0.143	0.465

* Significant at 0.05 level of confidence 't' 0.05 (29) = 2.045

Table 13 revealed that yoga group and weight training group improved significantly yielding 't' value of 3.668 and 27.144, respectively, whereas, control group did not show any significant improvement in 1500m run performance of subjects indicating 't' values of 0.465.

Table 14: Analysis of variance and covariance of the means of two experimental groups and the control group in 1500 mts. run.

	Yogic practice Group	Weight training group	Control group	Sum of squares	df	Mean square	F ratio
Pre-test means	51.600	51.600	52.000	B 3.200 W 150.400	2 87	1.600 1.729	0.926
Post-test means	50.100	41.867	51.933	B 1724.867 W 244.033	2 87	862.433 2.805	307.465*
Adjusted post-test means	49.958	41.871	51.872	B 36.869 W 42.913	2 86	18.435 0.449	36.943*

* Significant at 0.05 level of confidence N = 90
B = Between group variance W = Within group variance

The analysis of covariance for 1500m run showed that the resultant 'F' ratio of 0.926 was not significant in case of pre-test means. The post test and adjusted final means yielded the 'F' ratio of 307.465 and 36.943, respectively and were found to be significant.

Table 15: Paired adjusted final means and differences between means for the two experimental groups and the control group in 1500m run.

Yogic Practice Group	Weight Training group	Control group	Difference between means	Critical differences for adjusted mean
49.958	41.871		8.087*	4.339
49.958		51.872	1.914	4.339
	41.871	51.872	10.001*	4.339

* Significant at 0.05 level of confidence

It was evident from the Table 15 that the mean differences with respect to performance in 1500m run of weight training was found to be significantly lower than that of both yogic practice group and control group. No significant difference between yogic practice group and control group was found with respect to 1500m run performance.

Table 16: Significance of Difference Between Pre-Test and Post-Test Means of two Experimental Groups and Control Group in 30m Flying Start

Groups	Pre-test mean±SE	Post-test mean±SE	Difference between mean	SE	't' Ratio
Yogic Practice	3.897±o.378	3.131±0.127	0.766	3.512	21.810*
Weight training	3.918±0.445	3.919±0.445	0.001	0.033	1.000
Control	3.901±0.337	3.910±0.373	0.009	0.679	1.276

* Significant at 0.05 level of confidence 't' 0.05 (29) = 2.045

Table 16 clearly revealed that Yoga group improved significantly yielding 't' value 21.810, whereas, weight training group and control group did not show any significant improvement in 30m flying start performance of subjects indicating 't' values of 1.0 and 1.276, respectively.

Table 17. Analysis of Variance and Covariance of the Means of two Experimental Groups and the Control Group in 30m Flying Start

	Yogic Practice Group	Weight Training Gr.	Control group	Sum of squares	df	Mean square	F ratio
Pre-test means	3.897	3.918	3.901	B 0.771 W 396.478	2 87	0.386 4.548	0.085
Post-test means	3.131	3.919	3.910	B 1226.821 W 307.701	2 87	613.410 3.536	173.437*
Adjusted post-test means	3.138	3.909	3.913	B 1196.258 W 86.231	2 86	598.129 1.003	596.527*

* Significant at 0.05 level of confidence N = 90
B = Between group variance W = Within group variance

The analysis of covariance for 30 m flying start showed that the resultant 'F' ratio of 0.085 in case of pre-test means, which was not significant. The post test means were found to be significantly different with regard to 30m flying start having estimate of 'F' ratio as 173.437. The adjusted final means also yielded the 'F' ratio of 596.527 and was found to be significantly different from each other.

Table 18. Paired Adjusted Final Means And Differences Between Means For The Two Experimental Groups And The Control Group In 30m Flying Start

Yogic Practice Group	Weight Training group	Control group	Difference between means	Critical differences for adjusted mean
3.138	3.909		0.771*	0.471
3.138		3.913	0.775*	0.471
	3.909	3.913	0.004	0.471

* Significant at 0.05 level of confidence

It was clear from the Table 18 that the mean difference with respect to performance in 30m flying start of yogic group was found to be significantly better than that of both weight training group and control group. No significant difference between weight training group and control group was found with respect to 30m flying start performance.

Table 19: Significance of difference between pre-test and post-test means of the two experimental groups and the control group in shuttle run.

Groups	Pre-test mean±SE	Post-test mean±SE	Difference between mean	SE	't' Ratio
Yogic Practice	17.300±0.153	15.767±0.133	1.533	0.208	7.389*
Weight training	17.267±0.143	16.867±0.124	0.400	0.149	2.693*
Control	17.267±0.172	17.267±0.166	0.000	0.107	0.008

* Significant at 0.05 level of confidence 't' 0.05 (29) = 2.045

Table 19 clearly reveals that yoga group and weight training group improved significantly yielding 't' value of 7.389 and 2.693, respectively, whereas, control group did not show any significant improvement in shuttle run performance of subjects indicating 't' values of 0.008.

Table 20: Analysis of variance and covariance of the means of two experimental groups and the control group in shuttle run.

	Yogic Practice Group	Weight Training group	Control group	Sum of squares	df	Mean square	F ratio
Pre-test means	17.300	17.267	17.267	B 0.022 W 64.033	2 87	0.011 0.736	0.015
Post-test means	15.767	16.867	17.267	B 36.200 W 52.700	2 87	18.100 0.606	29.880*
Adjusted post-test means	15.758	16.871	17.271	B 36.869 W 42.913	2 86	18.435 0.499	36.943*

*Significant at 0.05 level of confidence. N=90, B: Between group variance, W: within group variance

The analysis of covariance for shuttle run showed that the resultant 'F' ratio of 0.015 was not significant in case of pre test means. The post test and adjusted final means yielded the 'F' ratio of 29.880 and 36.943, respectively and differences among means were found significant.

Table 21. Paired Adjusted Final Means and Differences between Means for the Two Experimental Groups and the Control Group in Shuttle Run

Yogic Practice Group	Weight Training group	Control group	Difference between means	Critical differences for adjusted mean
15.758	16.871		1.113*	0.599
15.758		17.271	1.513*	0.599
	16.871	17.271	0.400	0.599

*Significant at 0.05 level of confidence

It was clear from the Table 21 that the mean differences with respect to performance in shuttle run of plyometric training group was found to be significantly better than that of both plyometric based circuit training and control group. No significant difference between control group and plyometric based circuit training group was found with respect to shuttle run performance.

Table 22. Significance of Difference Between Pre-Test and Post-Test Means of the two Experimental Groups and the Control Group in Sit and Reach Test

Groups	Pre-test mean±SE	Post-test mean±SE	Difference between mean	SE	't' Ratio
Yogic Practice	21.733±0.230	24.100±0.130	2.367	0.212	11.183*
Weight training	21.700±0.240	20.567±0.114	1.133	0.202	5.613*
Control	21.700±0.120	21.600±0.243	0.100	0.130	0.769

*Significant at 0.05 level of confidence 't' 0.05 (29) = 2.045

Table 22 clearly reveals that both the plyometric training group and plyometric based circuit training group improved significantly yielding 't' value of 11.183 and 5.613, respectively, whereas, control group did not show any significant improvement in forward bend and reach performance of subjects indicating 't' values of 0.769.

Table 23. Analysis of Variance and Covariance of the Means of two Experimental Groups and the Control Group in Sit and Reach Test

	Yogic Practice Group	Weight Training Gr	Control group	Sum of squares	df	Mean square	F ratio
Pre-test means	21.733	21.700	21.700	B 0.022 W 130.467	2 87	0.011 1.500	0.007
Post-test means	24.100	20.567	21.600	B 198.022 W 77.267	2 87	99.011 0.888	111.484*
Adjusted post-test means	24.090	20.572	21.605	B 196.168 W 50.313	2 86	98.084 0.585	167.653*

*Significant at 0.05 level of confidence N = 90
B = Between group variance W = Within group variance

The analysis of covariance for sit and reach test showed that the resultant 'F' ratio of 0.007 was not significant in case of pre test means. The post test and adjusted final means yielded the 'F' ratio of 111.484 and 167.653 and were found to be significant.

Table 24. Paired Adjusted Final Means and Differences between Means for the Two Experimental Groups and the Control Group in Sit and Reach Test

Yogic Practice Group	Weight Training group	Control group	Difference between means	Critical differences for adjusted mean
24.090	20.572		3.518*	1.515
24.090		21.605	2.418*	1.515
	20.572	21.605	1.033	1.515

*Significant at 0.05 level of confidence
It was clearly evident from the Table 24 that the mean differences with respect to performance in sit and reach test of yoga group was found to be significantly greater than that of both weight training group and control group. No significant difference between plyometric based circuit training group and control group was found with respect to forward sit and reach test performance

IV. CONCLUSION

The analysis of data revealed that the two experimental groups, administered with yoga and weight training showed significant gains in performance of motor fitness variables after administration of training for duration of 12 weeks. The control group did not show any significant increase in the performance of variables except vertical jump (explosive strength), 1500 mts run (speed endurance) and shuttle run (agility) of motor fitness under study.

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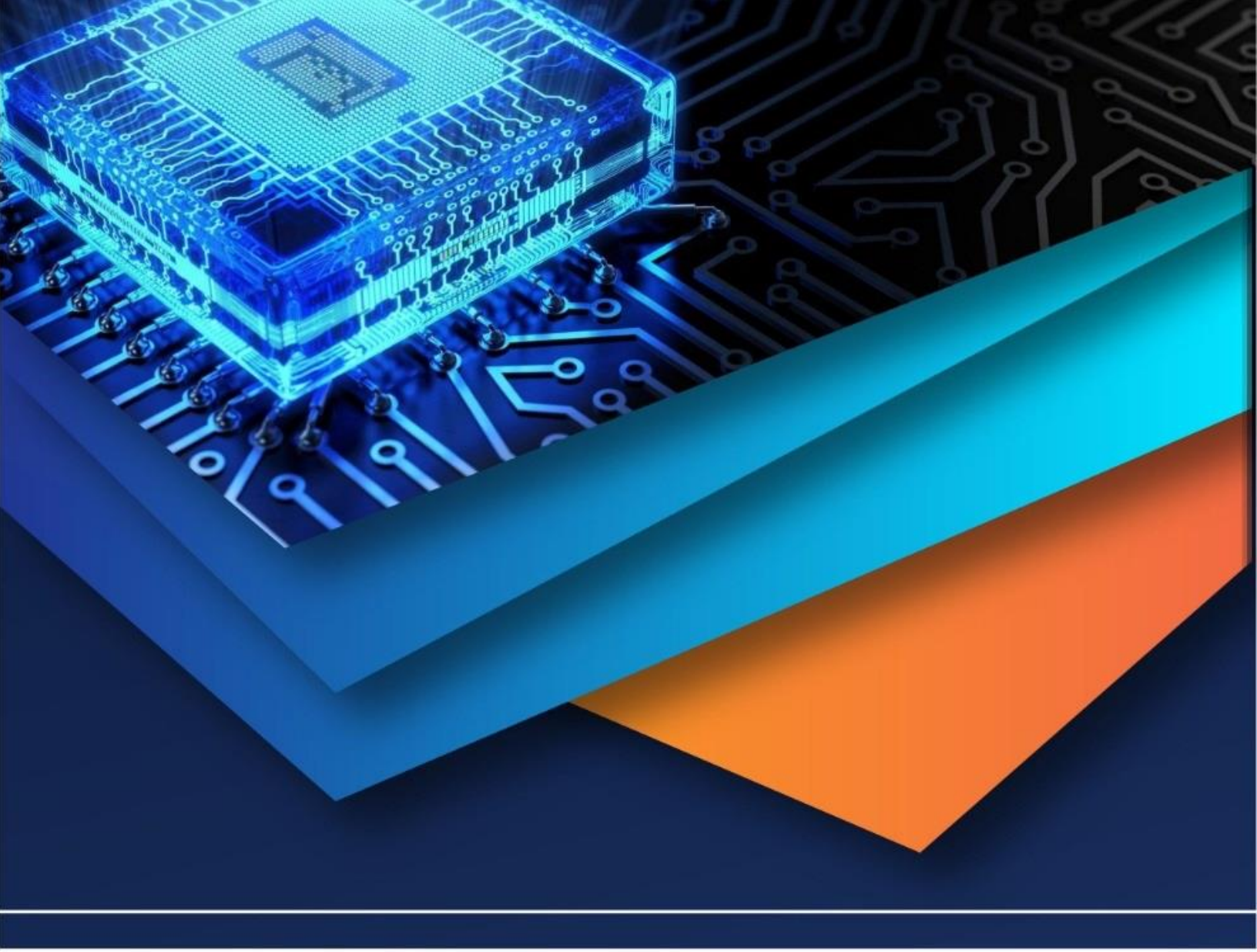

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