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FLUID INTAKE AND FLUCTUATION IN TOTAL BODY WATER (TBW), INTRACELLULAR WATER (ICW), EXTRACELLULAR WATER (ECW), SKELETAL MUSCLE MASS (SMM) AND PERCENTAGE BODY FAT (PBF) OF TRACK AND FIELD ATHLETES

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Abstract

The purpose of this study was to examine the effect of Fluid intake on the Total Body Water (TBW), Intracellular Water (ICW), Extracellular Water (ECW) level, Skeletal Muscle Mass (SMM) and Percentage Body Fat (PBF) of Track and Field Athletes. Ten track and field athletes were randomly selected to fulfil the purpose of the study. All the athletes were in the age group of 23-26 only. A combination of four drugs namely: Sodium chloride, potassium chloride, dextrose, and sodium citrate were given as the fluid intake during different durations of time at controlled condition and intensity of the endurance run. The selected variables were measured by using a Body analyzer or bioelectrical impedance frequencies. The obtained data were analyzed by applying Repeated measure Analysis of Variance (ANOVA) to identify the effect of fluid intake at different intervals and to analyze if there was an interaction effect or not. An α-value <0.05 was considered statistically significant. Results indicate that significant differences were found in the selected variables as 250 ml of fluid intake shows Fluctuation in Total Body Water (TBW) of Track and Field Athletes, as the p-value (.000) was < 0.05, also a significant difference in the Fluctuation in Intra-Cellular Water Mass (ICWM) of Track and Field Athletes, as the p-value (.000) was < 0.05, a significant difference in the Fluctuation in Extracellular Water Mass (ECWM) of Track and Field Athletes, as the p-value (.003) was < 0.05, a significant difference in the Fluctuation in Skeletal Muscle Mass (SMM) of Track and Field Athletes, as the p-value (.006) was <0.05 and a significant for the scores of Fluctuation in Percentage Body Fat (PBF) of Track and Field Athletes, as the p-value (0.000) was < 0.05 at 5 % level of significance.

Keywords: Fluid Intake, Total Body Water (TBW), Intracellular Water (ICW), Extracellular Water (ECW), Skeletal Muscle Mass (SMM), Percentage Body Fat (PBF), Track and Field Athletes.

INTRODUCTION

Human bodies are composed of 60–70% water, 40% of which is contained within cells, and is an essential factor in sustaining life. Water acts as a solubilizer of minerals, amino acids, vitamins, glucose and electrolytes which are pivotal to the control of body homeostasis. The percentage (total amount of water content) in the body by mass can range from 78% in infants to as little as 45% in the elderly. The intracellular fluid compartment refers to the total space inside cells.

Two-thirds of the body's total water is found here. The extracellular fluid compartment refers to both the space between cells ("interstitial" fluid) and blood plasma. Combined, these contain one-third of the total water in the body. Sweat is also made up of

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minerals called electrolytes, which include sodium, magnesium, calcium chloride and bicarbonate. Thus, dehydration reduces exercise performance because of reduced blood flow to the muscles or skin during exercise and accelerates hyperthermia because of prolonged exercise. So, In the present study researcher has tried to give the consumptions of parameters that an athlete loses through sweating.

METHODOLOGY

Participants in the Study

Ten track and field athletes were randomly selected to fulfill the purpose of the study. All the athletes were in the age group of 23-26 only. The training age of the athletes was measured as a minimum of 3 years ± 0.06 years. The consent form was taken from the athletes so that they were free from all types of diseases or injuries.

Variables of the Study

Further, Based on the available literature, expert's advice and by researcher's own understanding variables selected for the study were fluid intake which was considered the independent variable whereas, Total Body Water (TBW), Intracellular Water (ICW), Extracellular Water (ECW) level, Skeletal Muscle Mass (SMM) and Percentage Body Fat (PBF) of Track and Field Athletes was considered as the dependent level.

Research Design

To fulfill the objectives of the present study and to find out the effect of fluid intake on total body water (TBW), intracellular water (ICW), extracellular water (ECW) level, skeletal muscle mass (SMM) and Percentage Body Fat (PBF) after different time duration Time Series design was used in the study.

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Fluid Intake Treatment

Before the ingestion of fluids, the participants were asked not to eat or drink anything at least two hours before starting the experiment protocol. The fluids used in this study were Oral Rehydration Salt Electral based on the WHO Formula. One Sachet of Electral weighing 21.80 gm was used in the study. This amount of electoral was the combination of four drugs namely: Sodium chloride, potassium chloride, dextrose, and sodium citrate. As per the instructions indicated in the product manual, one sachet (21.80 g) was diluted in 500 mL of water. After shaking to completely dissolve the powder of Electral, it was hydration for 5 to 10 min. This volume (500 mL) was asked to be consumed at regular intervals

Criterion Measures

Total Body Water (TBW), Intracellular Water (ICW), Extracellular Water (ECW), Skeletal Muscle Mass (SMM) and Percentage Body Fat (PBF) of Track and Field Athletes were measured by using a Body Analyzer or Bioelectrical Impedance Frequencies.

Experimental Protocol

Submaximal aerobic exercise was performed by the subjects using a computerized treadmill. The participants were asked to perform a 5-minute warm-up before starting the experiment protocol. Followed by an aerobic workout for a period of 30 minutes, which was further divided into 3 sets. Each set of aerobic workouts consists of 10 minutes and 45 sec rest was given in between each set and data was recorded on the selected variables in between these sets.

Statistical Analyses

The obtained data were analysed by applying Repeated measure Analysis of Variance (rANOVA) to identify the effect of fluid intake at different intervals and to analyse if there was an interaction effect or not. An α-value <0.05 was considered statistically significant.

Table 1: Mauchly's Test for the Assumptions of Sphericity of Fluctuation in Total Body Water (TBW) of Track and Field Athletes

Within Subjects Effect	Mauchly's W	Approx. Chi-Square	Df	Sig.	Epsilon[a]		
					Greenhouse-Geisser	Huynh-Feldt	Lower-bound
Total Body Water (TBW)	0.582	4.179	5	0.527	0.801	1	0.333

Table 1 indicates that the value of Mauchley's test statistic was insignificant for the scores of Fluctuation in Total Body Water (TBW) of Track and Field Athletes, as the p-value (0.527) was > 0.05 at 5 % level of significance. So, in this case it can be asserted that the assumption of sphericity was considered to be fulfilled. As the Mauchly's test statistic was found insignificant in the above table, the researcher has employed one-way rANOVA to test the within-subject effects of Fluctuation in Total Body Water (TBW) of Track and Field Athletes. The result for one-way rANOVA is presented in table no.2

Table 2: Repeated Measure ANOVA of Fluctuation in Total Body Water (TBW) of Track and Field Athletes

Source		Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Total Body Water	Sphericity Assumed	62.093	3	25.840	11.098	.000	0.552
Error (Time)	Sphericity Assumed	50.357	2.403	2.328			

The results shown in the above table indicate that there was a significant difference in the Fluctuation in Total Body Water (TBW) of Track and Field Athletes, as the p-value (.000) was < 0.05 at 5% level of significance. On the basis of the above table it may be concluded that 55.2% of variance of fluid intake treatment along with error attached is explained by the treatment itself in Pre-Test (before the endurance training), Post-test first (After 10 mints of endurance run), Post-test second (after the After 20 mints of endurance run and after 30 mints of endurance run). Post-Hoc test was applied and pair-wise mean comparisons of the different time durations were computed and shown in table no.3

Table 3: Pairwise Comparison of Fluctuation in Total Body Water (TBW) of Track and Field Athletes

(I) TBW	(J) TBW	Mean Difference (I-J)	Std. Error	Sig.[a]	95% Confidence Interval for Difference[a]	
					Lower Bound	Upper Bound
Pre	After 10Mints	-3.130*	0.675	0.007	-5.401	-0.859
	After 20Mints	-0.35	0.683	1	-2.649	1.949
	After 30Mints	-0.5	0.654	1	-2.701	1.701
After 10Mints	Pre	3.130*	0.675	0.007	0.859	5.401
	After 20Mints	2.780*	0.382	0	1.494	4.066
	After 30Mints	2.630*	0.656	0.018	0.423	4.837
After 20Mints	Pre	0.35	0.683	1	-1.949	2.649
	After 10Mints	-2.780*	0.382	0	-4.066	-1.494
	After 30Mints	-0.15	0.558	1	-2.026	1.726

In the above table no.3 Bonferroni correction was applied for pairwise comparison and the results of pairwise comparison Fluctuation in Total Body Water (TBW) of Track and Field Athletes reveal that a significant effect of fluid intake treatment was found after endurance run.

The analysis shows that there was a significant difference in the Total Body Water (TBW) pre test and after 10 mints and after 20 mints and after 10 mints and after 30 mints of endurance run due to fluid intake (treatment), as the p -value was 0.000, 0.007 and 0.018 which is less than 0.05 at 5 %level of significance.

Whereas, an Insignificant difference was found in the TBW among pre test, after 20 mints and after 30 mints of endurance run due to fluid intake (treatment), as the p-value was 1.000 which is > 0.05 at 5% level of significance.

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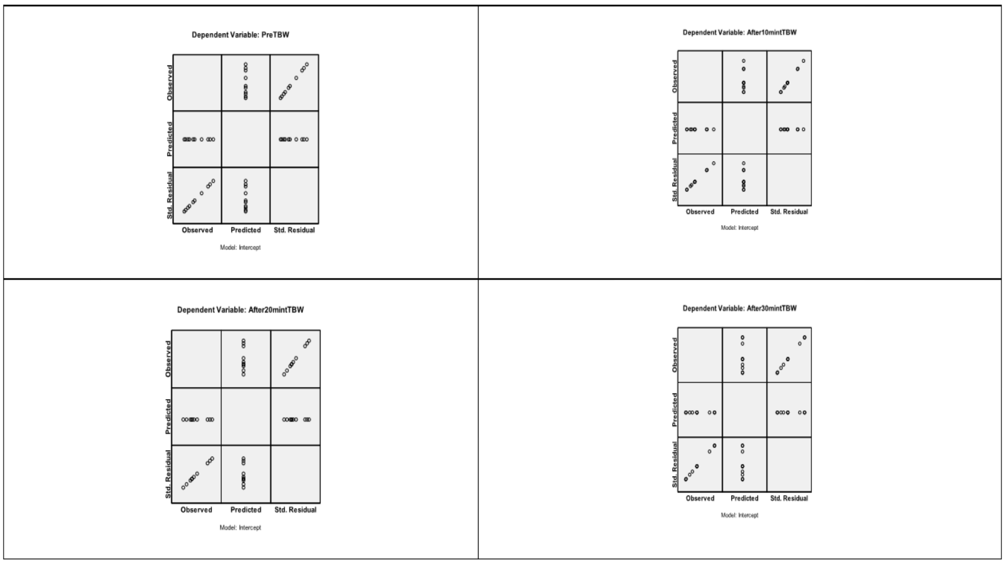

Figure No. 1: Intercept Plots of the Data of Total Body Water (TBW) during Pre-Test, after 10 Mint , after 20 Mints and after 30 Mints of Endurance Run Due to Fluid Intake Treatment.

Table 4: Mauchly's Test for the Assumptions of Sphericity of Fluctuation in Intra Cellular Water Mass (ICWM) of Track and Field Athletes

Within Subjects Effect	Mauchly's W	Approx. Chi-Square	Df	Sig.	Epsilon[a]		
					Greenhouse-Geisser	Huynh-Feldt	Lower-bound
Intra Cellular Water Mass	0.138	15.273	5	0.010	0.669	.862	0.333

Table 4 indicates that the value of Mauchley's test statistic was significant for the scores of Fluctuation in Intra-Cellular Water Mass (ICWM) of Track and Field Athletes, as the p-value (0.010) was < 0.05 at 5 % level of significance. So, in this case it can be asserted that the assumption of sphericity was violated. So, in this case the assumption of sphericity was considered to be violated and Greenhouse-Geisser was considered as the correction for the purpose of later analysis.

Table 5: Repeated Measure ANOVA of Fluctuation in Intra cellular water mass (ICWM) of Track and Field Athletes

Source		Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Intracellular Water Mass	**Greenhouse-Geisser**	169.153	3	84.248	12.500	.000	0.581
Error (Time)	**Greenhouse-Geisser**	121.790	2.008	6.740			

The results shown in the above table indicate that there was a significant difference in the Fluctuation in Intra-Cellular Water Mass (ICWM) of Track and Field Athletes, as the p-value (.000) was > 0.05 level of significance.

On the basis of the above table it may be concluded that 58.1% of variance of fluid intake treatment along with error attached is explained by the treatment itself in Pre Test (before the endurance training), Post-test first (After 10 mints of endurance run), Post-test second (after the After 20 mints of endurance run and after 30 mints of endurance run). Post-Hoc test was applied and pair-wise mean comparisons of the different time durations were computed and shown in table no.6

Table 6: Pairwise Comparison of Fluctuation in Intra Cellular Water Mass (ICWM) of Track and Field Athletes

(I) Intracellular WaterMass	(J) Intracellular WaterMass	Mean Difference (I-J)	Std. Error	Sig.[a]	95% Confidence Interval for Difference[a]	
					Lower Bound	Upper Bound
Pre	After 10Mints	-5.560*	0.993	0.002	-8.902	-2.218
	After 20Mints	-3.49	1.148	0.084	-7.353	0.373
	After 30Mints	-4.240*	1.045	0.017	-7.757	-0.723
After 10Mints	Pre	5.560*	0.993	0.002	2.218	8.902
	After 20Mints	2.070*	0.298	0	1.067	3.073
	After 30Mints	1.32	0.919	1	-1.773	4.413
After 20Mints	Pre	3.49	1.148	0.084	-0.373	7.353
	After 10Mints	-2.070*	0.298	0	-3.073	-1.067
	After 30Mints	-0.75	1.039	1	-4.247	2.747

In the above table, no.6 Bonferroni correction was applied for pairwise comparison and the results of pairwise comparison Fluctuation in Intracellular Water Mass (ICWM) of Track and Field Athletes reveals that a significant effect of fluid intake treatment was found after endurance run. The analysis shows that there was a significant difference in the Intra-Cellular Water Mass (ICWM) Pre-test and after 10 mints, and after 30 mints , after 10 and after 20 mints of endurance run due to fluid intake (treatment), as the p-value was 0.002 and 0.000 which is less than 0.05 at 5 %level of significance. Whereas, an Insignificant difference was found in the Intracellular Water Mass (ICWM) among pre test, after 20 mints and after 10 mints and after 30 mints of endurance run due to fluid intake (treatment), as the p-value was 0.084, 0.017, and 1.000 which is higher than 0.05 at 5% level of significance.

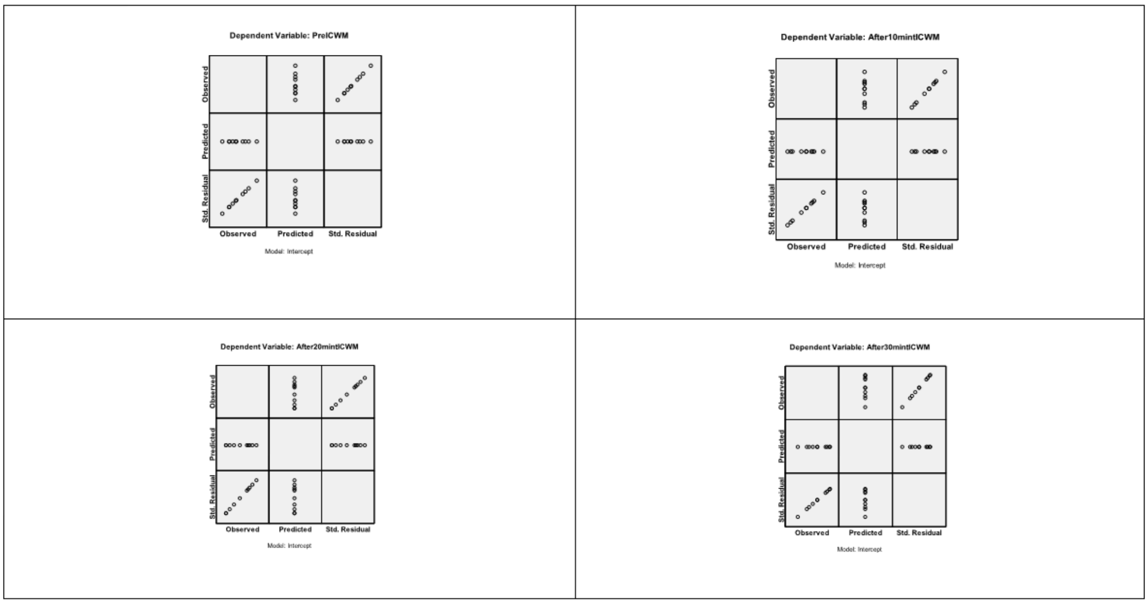

Figure No. 2: Intercept Plots of the Data of Intracellular Water Mass (ICWM) during Pre-test, after 10 Mint , after 20 Mints and after 30 Mints of Endurance Run due to Fluid Intake Treatment.

Table 7: Mauchly's Test for the Assumptions of Sphericity of Fluctuation in Extracellular Water Mass (ECWM) of Track and Field Athletes

Within Subjects Effect	Mauchly's W	Approx. Chi-Square	Df	Sig.	Epsilon[a]		
					Greenhouse-Geisser	Huynh-Feldt	Lower-bound

Table 7 indicates that the value of Mauchley's test statistic was insignificant for the scores of Fluctuation in Extra-Cellular Water Mass (ECWM) of Track and Field Athletes, as the p-value (0.396) was higher than 0.05 at 5 % level of significance. So, in this case it can be asserted that the assumption of sphericity was considered to be fulfilled. As Mauchly's test statistic was found insignificant in the above table, the researcher has employed one-way rANOVA to test the within-subject effects of Fluctuation in Extra-Cellular Water Mass (ECWM) of Track and Field Athletes. The result for one-way rANOVA is presented in table no.8

Table 8: Repeated Measure ANOVA of Fluctuation in Extracellular Water Mass (ECWM) of Track and Field Athletes

Source		Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Extracellular Water Mass	**Greenhouse-Geisser**	29.966	3	14.297	6.959	.003	0.436
Error (Time)		38.754	18.864	2.054			

The results shown in the above table indicate that there was a significant difference in the Fluctuation in Extra-Cellular Water Mass (ECWM) of Track and Field Athletes, as the p-value (.003) was < 0.05 level of significance. On the basis of the above table it may be concluded that 43.6% of variance of fluid intake treatment along with error attached is explained by the treatment itself in Pre Test (before the endurance training), Post-test first (After 10 mints of endurance run), Post-test second (after the After 20 mints of endurance run and after 30 mints of endurance run). Post-Hoc test was applied and pair-wise mean comparisons of the different time durations were computed and shown in table no .9

Table 9: Pairwise Comparison of Fluctuation in Extracellular Water Mass (ECWM) of Track and Field Athletes

(I) Extracellular WaterMass	(J) Extracellular WaterMass	Mean Difference (I-J)	Std. Error	Sig.[a]	95% Confidence Interval for Difference[a]	
					Lower Bound	Upper Bound
Pre	After 10Mints	-2.110*	0.404	0.003	-3.468	-0.752
	After 20Mints	-0.71	0.376	0.551	-1.976	0.556
	After 30Mints	-1.9	0.697	0.141	-4.246	0.446
After 10Mints	Pre	2.110*	0.404	0.003	0.752	3.468
	After 20Mints	1.4	0.461	0.084	-0.15	2.95
	After 30Mints	0.21	0.578	1	-1.733	2.153
After 20Mints	Pre	0.71	0.376	0.551	-0.556	1.976
	After 10Mints	-1.4	0.461	0.084	-2.95	0.15
	After 30Mints	-1.19	0.621	0.526	-3.279	0.899

In the above table no 9 Bonferroni correction was applied for pairwise comparison and the results of pairwise comparison Fluctuation in Extra-Cellular Water Mass (ECWM) of Track and Field Athletes reveals that a significant effect of fluid intake treatment was found after endurance run. The analysis shows that there was a significant difference in the Extracellular Water Mass (ECWM) Pre test and after 10 mints of endurance run due to fluid intake (treatment), as the p -value was 0.003 which is less than 0.05 at 5 %level of significance. Whereas, an Insignificant difference was found in the Extracellular Water Mass (ECWM) among pre test, after 20 mints and after 30 mints and vice versa of endurance run due to fluid intake (treatment), as the p-value was 0.551, 0.141, 0.084, 0.526 and 1.000 which is higher than 0.05 at 5% level of significance.

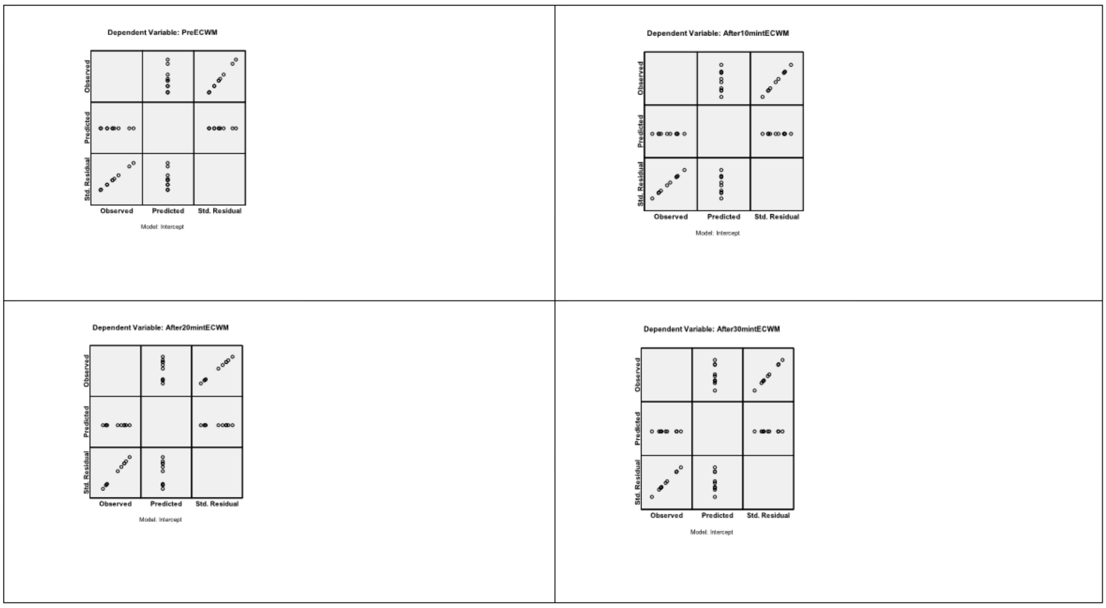

Figure No. 3: Intercept Plots of the data of Extracellular Water Mass (ECWM) during Pre-test, after 10 Mint , after 20 Mints and after 30 Mints of Endurance Run Due to Fluid Intake Treatment

Table 10: Mauchly's Test for the Assumptions of Sphericity of Fluctuation in Skeletal Muscle Mass (SMM) of Track and Field Athletes

Within Subjects Effect	Mauchly's W	Approx. Chi-Square	Df	Sig.	Epsilon[a]		
					Greenhouse-Geisser	Huynh-Feldt	Lower-bound
Extra Cellular Water Mass	0.136	15.398	5	0.009	0.485	.555	0.333

Table 10 indicates that the value of Mauchley's test was significant for the scores of Fluctuation in Skeletal Muscle Mass (SMM) of Track and Field Athletes, as the p-value (0.010) was < 0.05 at 5 % level of significance. So, in this case it can be asserted that the assumption of sphericity was violated.So, in this case the assumption of sphericity was considered to be violated and Greenhouse-Geisser was considered as the correction for the purpose of later analysis.

Table 11: Repeated Measure ANOVA of Fluctuation in in Skeletal Muscle Mass (SMM) of Track and Field Athletes

Source		Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
SMM	Greenhouse-Geisser	6.988	3	4.799	8.976	.006	0.499
Error (Time)		7.007	13.104	0.535			

The results shown in the above table indicate that there was a significant difference in the Fluctuation in Skeletal Muscle Mass (SMM) of Track and Field Athletes, as the p-value (.006) was <0.05 level of significance. On the basis of the above table it may be concluded that 49.9% of variance of fluid intake treatment along with error attached is explained by the treatment itself in Pre Test (before the endurance training), Post-test first (After 10 mints of endurance run), Post-test second (after the After 20 mints of endurance run and after 30 mints of endurance run). Post-Hoc test was applied and pair-wise mean comparisons of the different time durations were computed and shown in table no.12.

Table 12: Pairwise Comparison of Fluctuation in Skeletal Muscle Mass (SMM) of Track and Field Athletes

(I) SMM	(J) SMM	Mean Difference (I-J)	Std. Error	Sig.[a]	95% Confidence Interval for Difference[a]	
					Lower Bound	Upper Bound
Pre	After 10Mints	-.760*	0.15	0.004	-1.265	-0.255
	After 20Mints	-.480*	0.135	0.037	-0.934	-0.026
	After 30Mints	0.32	0.326	1	-0.776	1.416
After 10Mints	Pre	.760*	0.15	0.004	0.255	1.265
	After 20Mints	0.28	0.088	0.067	-0.016	0.576
	After 30Mints	1.080*	0.267	0.017	0.182	1.978
After 20Mints	Pre	.480*	0.135	0.037	0.026	0.934
	After 10Mints	-0.28	0.088	0.067	-0.576	0.016
	After 30Mints	0.8	0.292	0.138	-0.184	1.784

In the above table no.12 Bonferroni correction was applied for pairwise comparison and the results of pairwise comparison Fluctuation in Skeletal Muscle Mass (SMM) of Track and Field Athletes reveals that a significant effect of fluid intake treatment was found after endurance run. The analysis shows that there was a significant difference in the Skeletal Muscle Mass (SMM) Pre test and after 10 mints and after 20 mints and after 10 mints and 30 mints of endurance run due to fluid intake (treatment), as the p -value was 0.004, 0.037, 0.017 which is less than 0.05 at 5 %level of significance. Whereas, an Insignificant difference was found in the Skeletal Muscle Mass (SMM) among pre test, after 30 mints and after 10 mints and after 20 mints and after 30 mints of endurance run due to fluid intake (treatment), as the p-value was 1.000, 0.067, 0.138, which is higher than 0.05 at 5% level of significance.

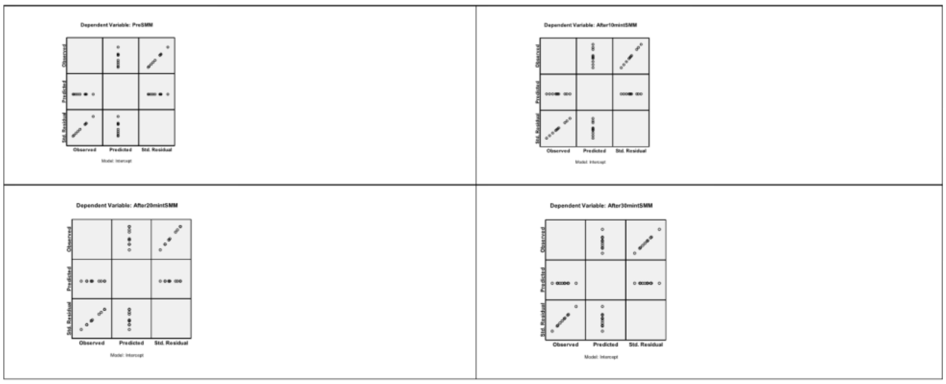

Figure No. 4: Intercept Plots of the Data of Skeletal Muscle Mass (SMM) during pre-test, after 10 Mint , after 20 Mints and after 30 Mints of Endurance Run Due to Fluid Intake Treatment.

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Table 13: Mauchly's Test for the Assumptions of Sphericity of Fluctuation in Percentage body fat (PBF) of Track and Field Athletes

					Greenhouse-Geisser	Huynh-Feldt	Lower-bound
PBF	0.035	25.855	5	0.000	0.411	.411	0.333

Table 13 indicates that the value of Mauchley's test statistic was significant for the scores of Fluctuation in Percentage Body Fat (PBF) of Track and Field Athletes, as the p-value (0.000) was < 0.05 at 5 % level of significance. So, in this case it can be asserted that the assumption of sphericity was violated. So, in this case the assumption of sphericity was considered to be violated and Greenhouse-Geisser was considered as the correction for the purpose of later analysis.

Table 14: Repeated Measure ANOVA of Fluctuation in Percentage Body Fat (PBF) of Track and Field Athletes

Source		Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
SMM	**Greenhouse-Geisser**	25.198	3	20.451	2.387	.148	0.610
Error (Time)		95.025	11.089	8.569			

The results shown in the above table indicate that there was an insignificant difference in the Fluctuation in Percentage Body Fat (PBF) of Track and Field Athletes, as the p-value (.148) was less than 0.05 level of significance. On the basis of the above table it may be concluded that 61% of variance of fluid intake treatment along with error attached is explained by the treatment itself in Pre Test (before the endurance training), Post-test first (After 10 mints of endurance run), Post-test second (after the After 20 mints of endurance run and after 30 mints of endurance run). Post-Hoc test was applied and pair-wise mean comparisons of the different time durations were computed and shown in table no.15.

Table 15: Pairwise Comparison of Fluctuation in Percentage body fat (PBF) of Track and Field Athletes

(I) SMM	(J) SMM	Mean Difference (I-J)	Std. Error	Sig.[a]	95% Confidence Interval for Difference[a]	
					Lower Bound	Upper Bound
Pre	After 10Mints	-2.080*	0.193	0	-2.728	-1.432
	After 20Mints	-0.87	0.381	0.29	-2.152	0.412
	After 30Mints	-1.654	1.111	1	-5.393	2.085
After 10Mints	Pre	2.080*	0.193	0	1.432	2.728
	After 20Mints	1.21	0.385	0.071	-0.085	2.505
	After 30Mints	0.426	1.152	1	-3.449	4.301
After 20Mints	Pre	0.87	0.381	0.29	-0.412	2.152
	After 10Mints	-1.21	0.385	0.071	-2.505	0.085
	After 30Mints	-0.784	1.154	1	-4.666	3.098

In the above table no.15 Bonferroni correction was applied for pairwise comparison and the results of pairwise comparison Fluctuation in Percentage Body Fat (PBF) of Track and Field Athletes reveals that a significant effect of fluid intake treatment was found after endurance run. The analysis shows that there was a significant difference in the Percentage Body Fat (PBF) Pre test and after 10 mints as the p value is .000 which is less than 0.05 at 5 % level of significance. Whereas, an Insignificant difference was found in the Percentage Body Fat (PBF) among pre test, after 20 mints and after

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30 mints and after 10 mints and after 20 mints and vice vera of endurance run due to fluid intake (treatment), as the p-value was .290, 1.000, 0.071, which is higher than 0.05 at 5% level of significance.

Figure No. 5: Intercept Plots of the Data of Percentage Body Fat (PBF) during pre-test, after 10 Mint , after 20 Mints and after 30 Mints of Endurance Run Due to Fluid Intake Treatment

DISCUSSION OF FINDING

The purpose of this study was to examine the Effect of Fluid Intake on the Total Body Water (TBW), Intracellular Water (ICW), Extracellular Water (ECW) level, Skeletal Muscle Mass (SMM) and Percentage Body Fat (PBF) of Track and Field Athletes. Ten track and field athletes were randomly selected to fulfill the purpose of the study. All the athletes were in the age group of 23-26 only. A combination of four drugs namely: Sodium chloride, potassium chloride, dextrose, and sodium citrate were given as the fluid intake during different durations of time at controlled condition and intensity of the endurance run. The selected variables were measured by using a Body Analyzer or Bioelectrical Impedance Frequencies. The obtained data were analyzed by applying Repeated measure Analysis of Variance (rANOVA) to identify the Effect of Fluid Intake at different Intervals and to analyze if there was an interaction effect or not. An α-value <0.05 was considered statistically significant. Results indicate that significant differences were found in the selected variables as 250 ml of fluid intake shows Fluctuation in Total Body Water (TBW) of Track and Field Athletes, as the p-value (.000) was < 0.05, also a significant difference in the Fluctuation in Intra-Cellular Water Mass (ICWM) of Track and Field Athletes, as the p-value (.000) was < 0.05, a significant difference in the Fluctuation in Extra-Cellular Water Mass (ECWM) of Track and Field Athletes, as the p-value (.003) was < 0.05, a significant difference in the Fluctuation in Skeletal Muscle Mass (SMM) of Track and Field Athletes, as the p-value (.006) was <0.05 and a significant for the scores of Fluctuation in Percentage Body Fat (PBF) of Track and Field Athletes, as the p-value (0.000) was < 0.05 at 5 % level of significance. The difference occurs may be due to the reason that The TBW is very important for the maintenance of normal metabolism, oxygen and nutrients supply to the cells and removal of waste matter, and imbalances of TBW significantly affect health, which are related to kidney disease, circulatory system diseases among others [1]. Exercise is known to cause a serious imbalance in the ICW and ECW because of a decreased plasma volume, increased body temperature, and increased blood osmotic pressure [20]. Therefore, it is necessary to prevent ICW and ECW imbalance and dehydration during exercise through the intake of appropriate fluids. According to the results of this study, the type of fluid consumed had a differential effect on the reduction of ICW and ECW between rest and immediately after exercise and in the recovery from exercise.

In a study by Nielsen et al., six adult male individuals were exposed to exercise-induced dehydration. The group was divided into groups ingesting control, glucose, NaCl, and KCl drinks, and the body components were analyzed at 2 hours after ingestion. The TBW, ICW, and ECW were significantly higher when a NaCl drink was ingested compared to the corresponding values in the control drink group, in line with the results of this study. In addition, a study by Maughan et al. examined eight adult male individuals who were exposed to dehydration with an equivalent of 2% BW loss. The group received glucose, sodium, potassium, or chloride drinks with no difference in the amount of weight loss.The fluid volume balance between Intracellular Water (ICW) and Extracellular Water (ECW) gradually changes with age and various medical conditions. Comprehension of these physiological changes would aid in decision-making related to body fluid assessments. To increase water content, adhere to a strength training program that promotes lean muscle mass and percentage body fat. Research suggests that for workouts consisting of at least 45 minutes of continuous exercise or high intensity workouts of any duration like running, aerobics, biking and intense weight training, a sports drink may be beneficial in delaying muscle fatigue by providing the body with additional energy.

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