



**THE FACTOR STRUCTURAL CHANGES AFTER
TRAINING ON SELECTED PHYSICAL AND
PHYSIOLOGICAL PARAMETERS OF MALE BEGINNERS
IN THE PHYSICAL EDUCATION PROFESSION**

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Abstract:

Different types of training programs are designed in the physical education curricular to improve the overall physical and physiological development of physical education beginners. The present study was conducted to assess the factor structural changes after training on physical and physiological parameters of male beginners in the physical education profession. The principal component method was selected for the primary solution of factor analysis. Physical education male students of first year BPE Centre for physical education, University of Calicut were elected as subjects. The variables selected for this study were speed, strength, endurance, agility and flexibility. The study shows significant improvement in almost all variables. There was considerable improvement in agility along with the speed. There was considerable improvement in abdominal strength rather than shoulder strength. There was a noticeable improvement in the cardio respiratory endurance and the general strength. There was significant change in the flexibility of the subjects. The study also indicates that the training was not sufficiently balanced so as to improve explosive strength for vertical jump, solder strength and arm strength.

Key Words: Physical, Physiological, Physical Education Profession.

Introduction:

Physical fitness has been one of the foremost goals of physical education. The medical doctors who contributed the early leadership in the profession were initially attracted to physical education because of their interest in physical fitness (Johnson and Nelson 1988). Physical education and training is an organised instruction in motor activities that contribute to the physical growth, health and body image of the individual. Today, physical education is a required part of most school curricula, and a number of colleges and universities offer degrees in this field. Physical education classes generally include formal exercises, fitness programs, sports and contests. It is very necessary to go for a complete fitness training, which takes care of all the aspects of making a fit body, beginning from making note about the right kind of diet and right kind of exercises, which suits the physical conditions of an individual's body. Conditioning is a regular exercise program done over an extended period of time. Training is usually defined as a systematic process of repetitive progressive exercise of work, involving the learning process acclimatization properly graded conditioning can positively affect both the soft and bony tissues of the body ultimately resulting in fitness. Training also helps in increasing the metabolism of the body, which means more muscles using more calories in the body, by burning more calories. Taking exercise not only helps one to maintain a strong and don't look from outside but also helps in keeping a sound mind. It also helps in reducing symptoms of menopause, cardiac diseases and keeps the level of cholesterol in control. And in all a tree gives the body much don't shape, which not only looks strong but is stronger than what it looks like (Hasslefos, 2006).

Materials and Methods:

For the purpose of the present study, thirty Physical Education male students of first year B.P.E, Center for Physical Education University of Calicut were selected as the subjects. The data pertaining to selected physical fitness variables such as speed, strength, endurance, agility flexibility etc. were collected by administering appropriate standard tests using correct measurement procedures. The purpose of the test was explained to the subjects. The investigator has requested for the full support and cooperation of the subjects, for the conduct of the test and then the data were collected. Descriptive analysis of mean, median, mode, standard error, standard deviation, Kurtosis, standard error of kurtosis, skewness, standard error of skewness, range, minimum score and maximum score have done. This have given an idea of the distribution of scores and features obtained from the data collected for the purpose of the this study was done on all the selected 12 variables namely One min Sit ups, Maximum Sit ups, Pull-ups, Standing Broad Jump, 4x10 mts Shuttle Run, Maximum Push-ups, Vertical jump,, 40 mts Run (Standing Start), 40 mts Run (Flying Start), 1600 mts Run, 12 min Run/Walk and Sit and Reach of the selected group of male beginners in Physical Education profession before and after their conditioning programme. Factor analysis (principal component analysis) was done to find out prominent factors comprising any open or all of the selected physical fitness variables among the selected group of male beginners in the physical education profession separately. The unloaded factors obtained were then rotated by varimax method to find the final solution.

Findings:

The findings of the study are detailed below.

Table 1: Descriptive Profile of Selected Physical and Physiological Parameters of Male Beginning in Physical Education Profession before Training

Variables	No.	Mean	Median	Mode	Std. Error	Std. Deviation	Kurtosis	SE. Kurtosis	Skewness	SE. Skewness	Variance	Minimum	Sum	Range	Maximum
One Minute Sit-ups	30	34.200	32.500	30.000	1.619	8.868	1.003	0.833	0.521	0.427	78.648	15.000	1026.000	43.000	58.000
Maximum Sit-ups	30	40.100	38.500	39.000	2.077	11.379	0.002	0.833	0.331	0.427	129.472	17.000	1203.000	49.000	66.000
Pull-ups	30	11.633	11.000	10.000	0.762	4.173	-0.519	0.833	0.445	0.427	17.413	5.000	349.000	16.000	21.000
Standing broad jump	30	2.403	2.410	2.400	0.031	0.170	2.272	0.833	-0.592	0.427	0.029	1.940	72.090	0.880	2.820
Shuttle Run	30	10.802	10.555	10.540	0.150	0.823	-0.735	0.833	0.549	0.427	0.678	9.600	324.050	2.900	12.500
Maximum Push-Ups	30	13.533	12.000	8.000	1.065	5.835	-0.142	0.833	0.738	0.427	34.051	5.000	406.000	23.000	28.000
Vertical Jump	30	46.667	46.500	45.000	0.995	5.448	3.186	0.833	1.034	0.427	29.678	37.000	14000.000	28.000	28.000
40 mts run (Standing start)	30	5.992	5.980	5.980	0.070	0.384	3.052	0.833	1.054	0.427	0.147	5.210	179.760	1.960	7.170
40 mts run (Flying start)	30	5.320	5.315	5.280	0.072	0.396	0.871	0.833	0.165	0.427	0.157	4.420	159.600	1.910	6.300
1600 mts. Run	30	6.607	6.380	6.250	0.121	0.665	5.146	0.833	1.802	0.427	0.442	5.530	198.200	3.520	9.050
12 min run/walk	30	2515.667	5487.50	2425.00	54.270	297.251	0.980	0.833	0.856	0.427	88358.161	2075.0	75470.000	1285.000	336.000
Sit and Reach	30	36.900	37.000	40.000	0.870	4.766	-0.397	0.833	0.339	0.427	22.714	25.000	1107.000	20.000	45.000

Table 2: Descriptive Profile of Selected Physical and Physiological Parameters of Male Beginning in Physical Education Profession after Training

Variables	No.	Mean	Median	Mode	Std. Error	Std. Deviation	Kurtosis	SE. Kurtosis	Skewness	SE. Skewness	Variance	Minimum	Sum	Range	Maximum
One Minutes Sit-ups	30	41.167	40.000	35.000	1.430	7.835	0.039	0.833	0.584	0.427	61.385	29.000	1235.000	31.000	60.000
Maximum Sit-ups	30	52.500	50.000	39.000	1.862	10.197	0.038	0.833	0.648	0.427	103.983	39.000	1575.000	40.000	79.000
Pull-ups	30	17.467	18.000	13.000	0.840	4.599	0.168	0.833	0.336	0.427	21.154	9.000	524.000	20.000	29.000
Standing broad jump	30	2.527	2.540	2.610	0.024	0.134	0.487	0.833	-0.111	0.427	0.018	2.260	75.820	0.590	2.850
Shuttle Run	30	10.469	10.295	9.720	0.138	0.756	-0.945	0.833	0.492	0.427	0.571	9.430	314.070	2.460	11.890
Maximum Push-Ups	30	32.367	30.000	25.000	1.433	7.850	-0.122	0.833	0.668	0.427	61.620	18.000	971.000	33.000	51.000
Vertical Jump	30	50.000	49.500	47.000	1.105	6.052	1.616	0.833	0.488	0.427	36.621	38.000	1500.000	30.000	68.000
40 mts run (Standing start)	30	5.763	5.785	5.710	0.066	0.360	1.870	0.833	-0.166	0.427	0.130	4.800	172.880	1.810	6.6210

40 mts run (Flying start)	30	5.011	4.985	4.890	0.067	-0.365	4.121	0.833	1.115	0.427	0.328	5.180	182.520	2.960	8.140
1600 mts.Run	30	6.084	6.175	60.260	0.105	0.573	4.169	0.833	1.218	0.427	0.328	5.180	182.520	2.960	8.140
12 min run/walk	30	2796.000	2730.000	2855.000	60.285	330.197	3.253	0.833	1.545	0.427	109030.000	2330.000	83880.000	1570.000	3900.000
Sit and Reach	30	40.967	42.000	27.000	0.699	3.828	-0.816	-0.833	0.202	0.427	14.654	33.000	1229.000	14.000	47.000

Table 4: Correlation Matrix on Selected Physical and Physiological Parameters of Male Beginners

Variables	One Minute's Sit-ups	Maximum Sit ups	Pull ups	Standing broad jump	Shuttle Run	Maximum Push-Ups	Vertical Jump	40 mts run (Standing start)	40 mts run (Flying start)	1600 mts.Run	12 min run/walk	Sit and Reach
One Minutes Sit-ups	1.0000											
Maximum Sit ups	0.9679	1.0000										
Pull ups	0.2434	0.3240	1.0000									
Standing broad jump	0.1028	0.1568	0.1074	1.0000								
Shuttle Run	-0.3161	-0.3996	0.3083	-0.5174	1.0000							
Maximum Push-Ups	0.2304	0.3170	0.4190	0.2158	-0.5212	1.0000						
Vertical Jump	0.307	0.968	0.1117	0.5969	-0.3370	0.2965	1.0000					
40 mts run (Standing start)	0.1949	0.1034	0.0190	-0.1798	0.5821	-0.2753	-0.3343	1.0000				
40 mts run (Flying start)	0.1540	0.440	0.0640	-0.1294	0.5059	-0.2444	-0.2276	0.8558	1.0000			
1600 mts.Run	-0.2309	-0.2874	-0.4022	-0.3547	0.3172	-0.3162	-0.2779	0.0753	0.3477	1.0000		
12 min run/walk	0.5276	0.5725	0.5283	0.1876	-0.4320	0.4238	0.0826	0.0769	-0.0885	-0.5096	1.0000	
Sit and Reach	-0.04444	-0.0208	0.0661	-0.0542	0.1466	0.0107	0.1036	-0.0150	-0.1456	-0.2924	0.0954	1.0000

Table 5: Principal Component Analysis of Male Beginners Physical Education Profession before Training (Un-Rotated Factor Loading)

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
EigenValue	3.89743	2.46096	1.29949	1.26003	1.02917
Total Variance Exp	32.5	20.5	10.8	10.5	8.6
Cumulative Variance Exp	32.5	53.0	63.8	74.3	82.9
One Minutes Sit-ups	0.57060	0.64467	0.09733	-0.13496	-0.45599
Maximum Sit ups	0.66768	0.5708	0.06448	-0.11136	-0.42670
Pull ups	0.53855	0.28733	-0.41316	0.17886	0.46433
Standing broad jump	0.52838	-0.25399	0.60640	-0.18521	0.29241
Shuttle Run	-0.81091	0.27746	0.10745	0.30560	0.04352
Maximum Push-Ups	0.67526	-0.06548	-0.16472	0.00426	0.17636
Vertical Jump	0.43884	-0.42633	0.64874	-0.06496	0.02139
40 mts run (Standing start)	-0.37166	0.78373	0.30430	0.16545	0.26378
40 mts run (Flying start)	-0.43341	0.70686	0.36056	-0.12248	0.22222
1600 mts.Run	-0.64266	0.01527	-0.12156	-0.56950	-0.18696
12 min run/walk	0.71525	0.41362	-0.13088	0.08275	0.17547
Sit and Reach	0.01149	-0.15467	0.18264	0.83183	-0.34627

Table 6: Rotated Factor Loading of Male Beginners in Physical Education Profession before Training (Varimax Solution)

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Communalities
EigenValue	3.89743	2.46096	1.29949	1.26003	1.02917	-
Total Variance Exp	32.5	20.5	10.8	10.5	8.6	-
% Variance Ex.p	32.5	53.0	63.8	74.3	82.9	-
One Minutes Sit-ups	0.08916	0.15903	0.97099	0.02722	-0.00081	0.97680
Maximum Sit ups	-0.00433	0.23760	0.95341	0.06896	0.01842	0.97056
Pull ups	-0.01285	0.87551	0.08381	-0.11271	-0.06695	0.79089
Standing broad jump	-0.05998	0.17615	0.04277	0.88810	-0.07784	0.83123
Shuttle Run	0.63366	-0.36546	-0.33172	-0.38774	0.21430	0.84140
Maximum Push-Ups	-0.33535	0.56829	0.18500	0.21738	-0.04028	0.51852
Vertical Jump	-0.20563	-0.06450	0.04441	0.85557	0.13949	0.79988
40 mts run (Standing start)	0.95525	0.04878	0.09360	-0.13242	0.02719	0.94192
40 mts run (Flying start)	0.89889	-0.13122	0.10365	-0.05160	-0.20799	0.88188
1600 mts.Run	0.08601	-0.61883	-0.11062	-0.32494	-0.52833	0.78731
12 min run/walk	0.01329	0.71422	0.46706	0.09419	-0.01087	0.73743
Sit and Reach	-0.04863	-0.07450	-0.01269	-0.01828	0.92782	0.86925

Table 7: Correlation Matrix on Selected Physical and Physiological Parameters of Male Beginners in Physical Education Profession After Training

Variables	One Minute s Sit-ups	Maximum Sit ups	Pull ups	Standing broad jump	Shuttle Run	Maximum Push-Ups	Vertical Jump	40 mts run (Standing start)	40 mts run (Flying start)	1600 mts.Run	12 min run/walk	Sit and Reach
One Minutes Sit-ups	1.0000											
Maximum Sit ups	0.9364	1.0000										
Pull ups	0.4877	0.4676	1.0000									
Standing broad jump	-0.1643	-0.1466	0.3423	1.0000								
Shuttle Run	0.1396	0.2030	-0.0521	-0.1193	1.0000							
Maximum Push-Ups	0.3623	0.4973	0.4507	-0.2230	0.330	1.0000						
Vertical Jump	0.1840	0.1241	0.1970	0.1345	-0.3766	0.0617	1.0000					
40 mts run (Standing start)	0.788	0.0271	-0.3589	-0.2337	0.3552	0.4290	0.3599	1.0000				
40 mts run (Flying start)	0.1144	0.791	-0.0849	-0.1040	0.5240	0.2910	0.3392	0.7493	1.0000			
1600 mts.run	-0.1323	-0.2063	-0.5746	-0.2428	0.2432	0.3831	0.1040	0.5698	0.5581	1.0000		
12 min run/walk	0.3864	0.5502	0.4076	0.1692	0.0051	0.4378	0.029	-0.0291	0.1642	0.5310	1.0000	
Sit and Reach	-0.0332	-0.1223	-0.0304	-0.0966	0.0059	0.0765	0.0149	0.1109	0.1851	0.1442	0.2223	1.0000

Table 8: Principal Component Analysis of Male Beginners in Physical Education Profession after Training (Un-Rotated Factor Loading)

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
Eigen Value	3.66483	2.86891	1.32215	1.17526	1.00699
Total Variance Exp	30.5	23.9	11.0	9.8	8.4
Cumulative Variance Ex.p	30.5	54.4	65.05	75.3	83.7
One Minutes Sit-ups	0.51260	0.69306	0.07555	0.37467	-0.15749
Maximum Sit ups	0.57484	0.72892	0.00185	0.21962	-0.17449
Pull ups	0.72087	0.24362	0.30173	-0.05568	0.38445
Standing broad jump	0.24286	-0.33378	0.77483	-0.30438	0.13869
Shuttle Run	-0.31840	0.65728	0.05902	-0.36263	0.07047
Maximum Push-Ups	0.60733	0.29840	-0.50614	-0.01993	0.21154
Vertical Jump	0.41119	-0.31116	0.45610	0.50664	-0.31943
40 mts run (Standing start)	-0.58892	0.70845	0.17793	-0.08496	0.00137

40 mts run (Flying start)	-0.59337	0.64758	0.32840	-0.02710	0.09275
1600 mts.Run	-0.77237	0.15006	0.07382	0.29468	-0.30852
12 min run/walk	0.69669	0.33781	0.09439	-0.28802	-0.13493
Sit and Reach	-0.26990	0.02831	0.05900	0.56972	0.71481

Table 9: Rotated Factor Loading of Male Beginners in Physical Education Profession after Training (Varimax Solution)

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Communalities
Eigen Value	3.66483	2.86891	1.32215	1.17526	1.00699	-
Total Variance Exp	30.5	23.9	11.0	9.8	8.4	-
% Variance Ex.p	30.5	23.9	11.0	9.8	8.4	-
One Minutes Sit-ups	0.08889	0.94107	0.11826	-0.07710	0.02306	0.91398
Maximum Sit ups	0.13326	0.91714	0.23801	-0.11790	-0.10489	0.94045
Pull ups	-0.03221	0.45869	0.66092	0.39313	0.13471	0.82094
Standing broad jump	-0.09279	-0.13126	0.16318	0.90820	-0.07321	0.88264
Shuttle Run	0.80724	0.07488	0.04065	-0.06616	-0.10032	0.67334
Maximum Push-Ups	-0.10938	0.35943	0.66439	-0.41999	-0.01614	0.75922
Vertical Jump	-0.62242	0.41548	-0.27470	0.44305	0.02943	0.83265
40 mts run (Standing start)	0.86964	0.13182	-0.31992	-0.06507	0.08588	0.88761
40 mts run (Flying start)	0.84397	0.11850	-0.33665	0.08699	0.20347	0.88863
1600 mts.Run	0.34366	-0.06151	-0.80656	-0.17516	0.11550	0.81645
12 min run/walk	0.01515	0.50216	0.50946	0.16801	-0.41158	0.70957
Sit and Reach	0.06148	-0.04183	-0.03249	-0.03127	0.95137	0.91266

Factor one of male beginners in the physical education profession before training was characterized by the four physical variables of the selected 12 variables namely 4x10 m shuttle run, vertical jump 40 m run (standing start) and 40 m run (flying start). Since the physical variables such as 40 m run (standing start) and 40 m run (flying start) are the heavily loaded items, these factors could be called as pre-training Speed factor. This factor accounts for 32.5 % of the total common factor accounted for by all the five factors. Factor two of male beginners in Physical Education profession before training was characterized by the four physical variables of the twelve variables namely pull-ups maximum push-ups, 1600 m run and 12 min run/walk since pull-ups has the heavily loaded item, this factor could be called as Pre-training Strength factor. This factor accounts for 20.5% of the total common factors accounted for by all the five factors. Factor three of male beginners in Physical Education profession before training was characterized by the four physical variables of the selected 12 variables namely pull-ups, maximum push-ups, 1600 m run and 12 min run/walk. Since 1600 meter run is the heavily loaded item this factor could be called as Post-training cardio respiratory endurance factor. This factor accounts for 11.0% of the total common factors accounted for by all the five factors. Factor four of male beginners in Physical Education profession before training was characterized by only one physical variable of the selected 12 variables namely standing broad jump is the only heavily loaded items this factor could be called as Post-training power factor. This factor accounts for 9.8 % of the total common factors accounted for by all the five factors. Factor five of male beginners in the physical education profession before training was characterized by only one physical variable of the selected 12 variables namely sit and reach. Since sit and reach is the only heavily loaded item, this factor could be called a Post-training flexibility factor. This factor accounts for 8.4 % of the total common factor accounted for by all the five factors.

Conclusions:

In male beginners in Physical Education profession before conditioning programme, the five prominent factor analysis were Pre-Training Speed factor, Pre-Training Strength factors, Pre-training Abdominal Strength factor, Pre-Training Power factor and Pre-Training Flexibility factor. The Pre-Training Speed factor is heavily loaded with variables namely 40 mts run (Standing start) and 40 mts run (Flying Start). The Pre-Training Strength factor is heavily loaded with variable pull ups. The Pre-Training Abdominal Strength factor is heavily loaded with variables like one minute sit ups and maximum sit ups. The Pre-Training Power factor is heavily loaded with variables namely standing broad jump and vertical jump and the Pre-Training Flexibility factor is heavily loaded with the variable sit and reach. In male beginners in the Physical Education profession after conditioning programme, the five prominent factors extracted after factors analysis were Post-Training Speed factor, Post-Training Abdominal Strength factor, Post-Training Cardio respiratory endurance factor, Post-Training Power factor and Post-Training Flexibility factor. The Post-Training Speed factor is heavily loaded with items namely 4x10mts shuttle run, 40mts run (standing start) and 40mts run (flying start). The Post-Training Abdominal Strength factor is heavily loaded with variables namely one minute sit ups and maximum sit ups. The Post-Training Cardio respiratory endurance factor is heavily loaded with variables namely pull ups, maximum pushups and 1600mts run. The Post-Training Power factor is heavily loaded with the variable standing broad jump and the Post-Training Flexibility factor is heavily loaded with the variable sit and reach.

References:

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2. Clark (1957) conducted a study to find out the relationship of strength and anthropometric measures to physical performance of 53 unselected, not disabled male students at the University of Oregon, involving trunk and leg.
3. Lewis (1960) conducted a study on the relationship of selected factors to the vertical Jump. The following factors were studied for their relationship to the vertical jump, calf and thigh girth, toe-heel, malleolus calcaneal and back heel foot length, height, weight, plantar and dorsal flexibility, ankle strength, and movement time.
4. Burley, Dobell and Farale (1961) conducted a study to determine the difference among seventh, eight and ninth grade girls in power, speed, flexibility, speed and flexibility and speed and certain anthropometric measurements.
5. Smith (1961) studied the relationship between explosive leg strength and performance in vertical jump. The leg strength of 10 college men was measured in a position designed to involve the power thrust of major muscle groups and in the vertical jump.
6. Sabol (1963) conducted a study of the relationship among anthropometric, Strength and performance measure of college women bowlers. The purpose of this study was to determine the validity of a subjective satiny of the ability to handle a given weight bowl as a criterion measure of bowling ability and to investigate the relationship among anthropometric strength and performance variables for each subject on height weight arm length, grip, pull, push three finger bowling group, velocity first ball averaged and games score.
7. Wells (1963) conducted a study to see whether any significant relationship instead between vertical jump, height and any of the following leg length body weight ratio, length of selected segments of the lower limbs, and the ankle-heel length/ metatarso-trailer length ratio.
8. Reid 1978) in his examined the relationship of flexibility strength and anthropometric measurements of lower link to the skating speed of hockey players..
9. Gooden(1979) conducted a relationship study on selected anthropometric measurement of leg and foot to speed and vertical jump of male collegiate track and field athletics Ps=(N=32) were assigned to five groups according to their respective events, sport sprinters, long sprinters middle distance running , distant runners and jumpers.
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