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Role of Fartlek Training on Selective Biochemical Variables and Health Related Physical Fitness in Young Recreational Adults

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ABSTRACT

Introduction: Physical inactivity is an important public health issue and a major concern related to many health-related disorders. The busy pace of modern life does not give sufficient time for the regular work out; Fartlek training can help the youth as it does not require any special equipment and can give health benefits with shorter time period compared to other aerobic exercise sessions.
Aim: To find the role of fartlek training on selective biochemical variables and health related physical fitness in young recreational adults.
Method: 66 participants [fartlek training Group (n=35) and control group (n=31)] who met the inclusion and exclusion criteria; completed the 6 weeks of study duration and pre and post outcome measures were assessed for further evaluation. Training sessions included warm up, 20 min. of training or self-paced walk followed by cool down.
Result: Statistical analysis was done using statistical package for social sciences version 20 (SPSS 20) and Microsoft Excel 2007. Between group analysis using unpaired t-test showed significant difference ($p<0.05$) for all outcome measures except for Waist hip ratio and diastolic blood pressure.
Conclusion: Fartlek training is statistically significantly effective in improving lipid levels, BMI, % body fat, cardiorespiratory fitness, muscular fitness and flexibility in young recreational adults.

Key Words: Fartlek Training, Lipid Level, Muscular Fitness, Cardiorespiratory Fitness, Body Composition

INTRODUCTION

Physical inactivity nowadays is considered as an important public health issue and a major concern related to many health-related disorders including cardiovascular diseases. Among all the preventive measures, physical activity and diet are considered as modifiable factors. Dietary modifications can help the individuals to maintain the healthy level of blood sugar and cholesterol levels to get the health benefits and prevent the development of metabolic disorders. While, Physical activity when done in proper way will promote health without any economic burden on the individual. According to the World Health Organization (WHO), in developing countries, almost half of the adult population does not accumulate enough physical activity

for health benefits[1]. Fitness is the wealth that money can't buy for anyone. Fitness is the overall feeling of well-being. It is the ability to meet the demands of the environment. Health related physical fitness (Includes- Body composition, muscular fitness, muscle flexibility and cardiorespiratory endurance) is required for all the individuals to perform the activities of daily living, leisure & recreational activities, work/job duties and/or other household activities and not merely for the athletes for the sports[2]. Among the many training methods, Fartlek (The Swedish word meaning "Speed Play"- introduced by Swedish Coach; Gosta Holmer) training is a method that blends continuous training with interval training. The variable intensity and continuous nature of the exercise places stress on both the aerobic and anaerobic systems. Fartlek differs from traditional interval training in that it is unstructured intensity and/or speed varies, as the person wishes. The busy pace of modern life does not give sufficient time for the regular work out sessions at Gymnasium; Fartlek training can help the youth here as it does not require any special equipment and can give health benefits with shorter time period compared to other aerobic exercise sessions[3,4].

There is need of the study that can help to add the literature regarding the different aspects of health benefits (including physical fitness and the level of cholesterols) of the fartlek training on non-athletic young individuals. The findings of this study can help physiotherapists, young individuals and different trainers to plan effective training sessions for the non-athletic young population for regular physical activity.

AIM OF THE STUDY

To find the role of Fartlek training on selective Biochemical Variables and Health related Physical Fitness in Young Recreational Adults.

METHOD

This experimental study started with taking ethics approval from BJ medical college (Ref. No. GSCIIESC/01/18) and CTRI registration (registration no. is: CTRI/2019/05/01909). Participants were recruited from verbal advertisement and mouth to mouth publicity. They were then recruited according to inclusion and exclusion criteria.

Inclusion Criteria:

- Age between 20-30 years
- Recreationally active male and Female
- Willing to participate
- Ready according to PAR –Q+
- Not on any medications

Exclusion Criteria:

- Having any cardio respiratory, musculoskeletal, neurological and/or medical conditions.
- Living a sedentary lifestyle
- Not co-operative
- Mentally ill or psychologically disturbed
- Illiterate and not able to understand PAR-Q+ and Borg scale

Purpose and nature of the study was explained to the participants. They were then given information sheet and consent form in their comfortable language to complete. Then demographic data was collected from all the participants. They were then randomly divided into two groups – Study group and control group. Training period was of 6 weeks and Participants were allowed to discontinue the training at any time duration. Total 66 participants' data were analysed after completion of 6 weeks of study. During the study period, all the participants were requested not to change their routine and not to change the diet program. Study and control group protocols included warm up, training and cool down phase. Warm up and cool down remained same for both the groups while training phase was different for study and control group:

Warm-up period (For both groups): (5-10 minutes) comprised of dynamic stretching of Hamstring, Quadriceps, piriformis and calf muscles followed by marching on place.

Training period for Study group: (20 minutes) included jog/run at borg intensity (RPE score) – 15-17 of 6-20 scale. In

between walk/jog Used as an active recovery. Participants were explained Borg scale thoroughly and as a part of fartlek training, they were asked to continue to keep moving till 20 minutes in from of run, jog or walk. They were asked to run to reach at borg PRE between 15-17 till they can; afterwards they need to go for active recovery in form of jog or walk till Borg PRE between 6-9 and again when they feel comfortable, they need to run at to reach at 15-17 of Borg PRE. This cycle was continued till 20 minutes. (Photograph 1)

Training period for control group: (20 minutes) included self-paced walking at their comfortable speed.

Cool down period (For both groups): (5-10 minutes) comprised of static stretching of Hamstring, Quadriceps, piriformis and calf muscles followed by ankle pump and breathing exercise.

All the outcome measures were taken from both the groups in the following sequence one/two day(s) before and after the training session[2,5]:

1) RESTING HR, RR AND BP (Systolic and Diastolic)
2) LIPID PROFILE TEST (Fasting- Total cholesterol, HDL, LDL and triglyceride)
3) BMI CALCULATION
4) WAIST AND HIP GIRTH
5) SKINFOLD MEASUREMENT (Photograph 2)
6) 12 MIN. COOPER WALK/RUN TEST
7) CURL UP TEST
8) SQUAT TEST
9) PUSH UP TEST
10) SIT AND REACH TEST (Photograph 3)

Flow chart is showing the summary of procedure.

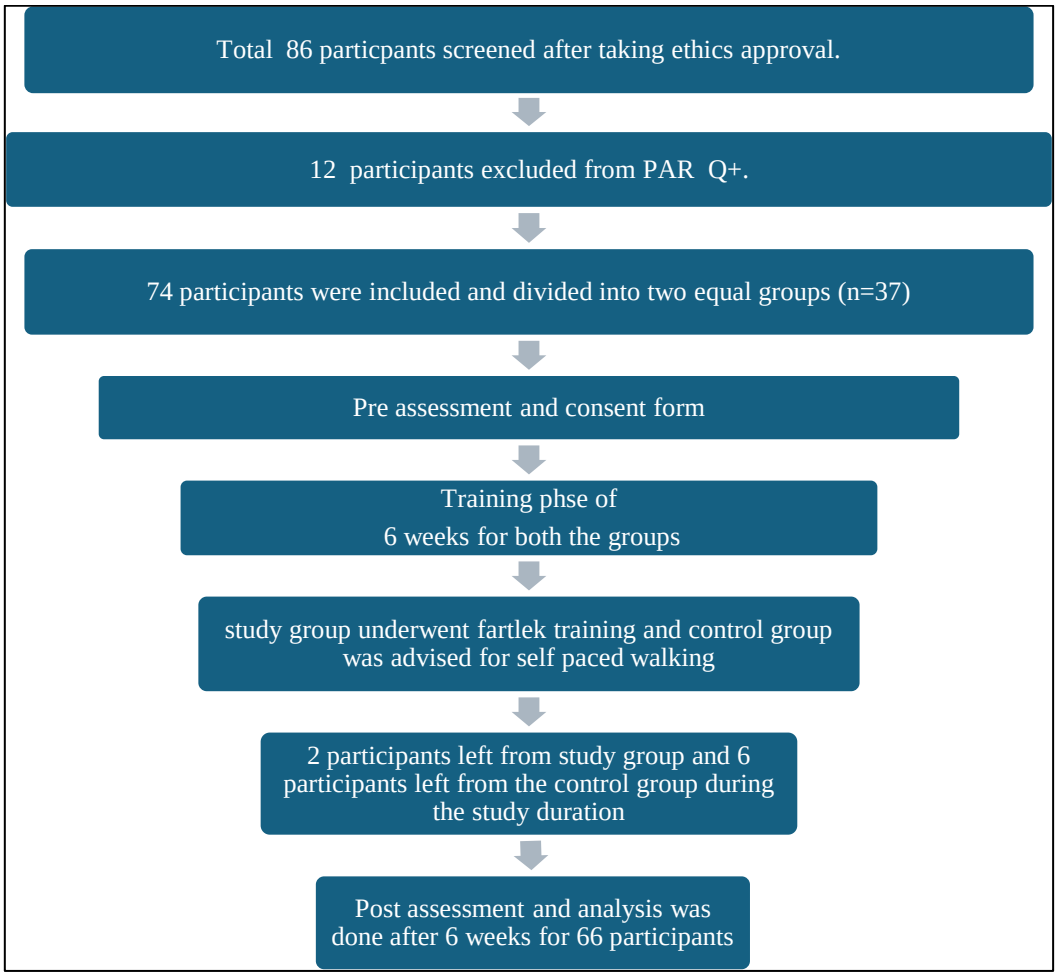
Photograph 1 Fartlek Training

Photograph 2: Skinfold Assessment

Photograph 3: Measurement of flexibility

RESULT

Statistical analysis was done using statistical package for social sciences version 20 (SPSS 20) and Microsoft Excel 2007. Total 66 participants completed 6 weeks of study. There was no statistically significant difference found at baseline data analysis prior to intervention. Paired t test was applied for within group analysis while unpaired t test was applied for between group analysis. Mean age for Fartlek training group (n=35) was 23.37±3.33 and for self-paced walking group (Control group) (n=31) was 23.87±3.14 years. Analysis is shown in the table:



summary of procedure

Table 1: Within group analysis for Fartlek training group

	PRE	**POST**	**t-value**	**p-value**
	Mean ± SD	**Mean ± SD**		
Weight (kg)	67.14 ± 14.52	65.03 ± 13.91	9.33	<0.05
BMI (kg/m^2)	25.59 ± 5.86	24.79 ± 5.66	9.53	<0.05
Waist Girth (cms)	81.17 ± 12.67	78.85 ±11.98	6.84	<0.05
Hip Girth (cms)	103.43 ± 13.49	100.59 ± 12.80	4.17	<0.05
Waist hip Girth Ratio	0.79 ± 0.07	0.78 ± 0.07	0.12	0.90
12 Min. Distance(m)	1255.44 ± 220.67	1406.37 ± 211.77	-10.60	<0.05
VO_2Max. (mlO_2/kg/min.)	16.78 ± 4.93	20.15 ± 4.73	-10.60	<0.05
Curl Ups in 1 min.	26.49 ± 4.75	33.11 ± 4.37	-14.29	<0.05
Squats in 1 min.	32.89 ± 6.82	40.34 ± 7.84	-10.51	<0.05
Push Ups in 1 min.	24.17 ± 9.89	29.34 ± 10.74	-7.57	<0.05
Sit & Reach (cms)	23.23 ± 9.17	27.23 ± 9.19	-10.52	<0.05
Sum of 3 (mm)	66.57 ± 18.91	61.11 ± 18.35	6.47	<0.05
% of Body Fat	25.83 ± 6.35	24.27 ± 6.74	6.35	<0.05
Total Cholesterol (mg/dl)	175.11 ± 57.51	135.31 ± 38.41	7.04	<0.05
Triglyceride (mg/dl)	87.31 ± 24.37	77.14 ± 19.01	4.23	<0.05
HDL (mg/dl)	49.37 ± 7.77	51.62 ± 8.29	-1.83	0.07
LDL (mg/dl)	108.28 ± 53.74	68.26 ± 36.87	7.92	<0.05
Resting Heart Rate(/min.)	77.11 ± 10.09	72.03 ± 8.21	8.76	<0.05
Resting Respiratory rate (/min.)	16.49 ± 2.36	14.46 ± 2.02	6.96	<0.05
Resting Systolic BP (mm hg)	114.20 ± 10.09	108.09 ± 10.55	7.14	<0.05
Resting Diastolic BP (mm hg)	76.20 ± 6.50	74.37 ± 6.07	4.13	<0.05

Table 2: Within group analysis for Self-paced walking group

	PRE	POST	t-value	p-value
	Mean ± SD	Mean ± SD		
Weight (kg)	58.28 ± 12.06	58.03 ± 12.07	2.37	<0.05
BMI (kg/m^2)	23.19 ± 5.12	23.10 ± 5.14	2.28	<0.05
Waist Girth (cms)	73.92 ± 11.62	73.74 ± 11.72	0.60	0.55
Hip Girth (cms)	93.97 ± 11.35	93.81 ± 10.85	0.23	0.82
Waist hip Girth Ratio	0.79 ± 0.08	0.79 ± 0.08	0.22	0.83
12 Min. Distance(m)	1229.16 ±123.09	1262.42 ± 129.62	-5.49	<0.05
VO_2Max. (mlO_2/kg/min.)	16.19 ± 2.75	16.94 ± 2.90	-5.49	<0.05
Curl Ups in 1 min.	24.71 ± 6.43	26.23 ± 6.18	-4.45	<0.05
Squats in 1 min.	33.13 ± 9.43	33.13 ± 9.93	0.00	1.00
Push Ups in 1 min.	25.13 ± 11.09	26.48 ± 10.90	-3.41	<0.05
Sit & Reach (cms)	21.32 ± 7.12	23.84 ± 6.58	-5.40	<0.05
Sum of 3 (mm)	51.23 ± 14.56	50.68 ± 14.22	0.89	0.38
% of Body Fat	21.26 ± 5.42	20.99 ± 5.36	0.89	0.38
Total Cholesterol (mg/dl)	167.77 ± 38.70	155.39 ± 35.35	2.24	<0.05
Triglyceride (mg/dl)	86.19 ± 33.74	85.74 ± 28.56	0.18	0.86
HDL (mg/dl)	51.42 ± 12.62	48.77 ± 11.01	1.92	0.06
LDL (mg/dl)	99.12 ± 33.25	89.46 ± 33.31	1.97	<0.05
Resting Heart Rate(/min.)	75.23 ± 6.80	71.94 ± 5.57	6.61	<0.05
Resting Respiratory rate (/min.)	15.42 ± 3.15	14.84 ± 2.11	2.01	<0.05
Resting Systolic BP (mm hg)	112.10 ± 6.79	109.68 ± 7.17	3.96	<0.05
Resting Diastolic BP (mm hg)	76.19 ± 7.01	75.16 ± 6.65	3.54	<0.05

Within group analysis showed significant difference for all the outcome measures except for waist hip girth ratio and HDL level in study group (table 1). Within group analysis when done for control group (table 2) showed significant difference in weight, BMI, 12 min. walk distance, Vo2 max, curl ups, push-ups, sit and reach test, total cholesterol level and LDL.

Table 3: Between Group analysis for the difference in outcome measures

	Fartlek training Group	Self-paced walking Group	t-value	p-value
	Mean ± SD	Mean ± SD		
Diff. Weight (kg)	-2.11 ± 1.34	-0.25 ± 0.59	-7.14	<0.05
Diff. BMI (kg/m^2)	-0.80 ± 0.49	-0.097 ± 0.24	-7.19	<0.05
Diff. Waist Girth (cm)	-2.32 ± 2.01	-0.18 ± 1.64	-4.70	<0.05
Diff. Hip Girth (cm)	-2.83 ± 4.02	-0.16 ± 3.95	-2.71	<0.05
Diff. Waist hip Girth Ratio	-0.0007 ± 0.03	-0.0014 ± 0.03	0.07	0.93
Diff.12 Min. Distance (m)	150.93 ± 84.23	33.26 ± 33.68	7.27	<0.05
Diff. VO_2 Max. (mlO_2/kg/min.)	3.37 ±1.88	0.74 ± 0.75	7.27	<0.05
Diff. Curl Ups in 1 min.	6.63 ± 2.74	1.52 ± 1.89	8.79	<0.05
Diff. Squats in 1 min.	7.46 ± 4.19	0.00 ± 3.33	7.92	<0.05
Diff. Push Ups in 1 min.	5.17 ± 4.04	1.35 ± 2.21	4.67	<0.05
Diff. Sit & Reach (cms)	4.00 ± 2.25	2.52 ± 2.59	2.49	<0.05
Diff. Sum of 3 (mm)	-5.46 ± 4.99	-0.55 ± 3.42	-4.59	<0.05
Diff. % of Body Fat	-1.56 ± 1.46	-0.17 ± 1.05	-4.41	<0.05
Diff. Total Cholesterol (mg/dl)	-39.80 ± 33.45	-12.39 ± 30.81	-3.44	<0.05
Diff. Triglyceride (mg/dl)	-10.17 ± 14.23	-0.45 ± 14.19	-2.77	<0.05
Diff. HDL (mg/dl)	2.257 ± 7.297	-2.65 ± 7.67	2.65	<0.05
Diff. LDL (mg/dl)	-40.02 ± 29.89	-9.65 ± 27.28	-4.29	<0.05
Diff. Resting Heart Rate (/min.)	-5.08 ± 3.43	-3.29 ± 2.77	-2.31	<0.05
Diff. Resting Respiratory rate (/min.)	2.03 ± 1.72	-0.58 ± 1.61	-3.51	<0.05
Diff. Resting Systolic BP (mmHg)	-6.11 ± 5.07	-2.61 ± 3.68	-3.17	<0.05
Diff. Resting Diastolic BP (mmHg)	-1.82 ± 2.62	-1.03 ± 1.62	-1.46	0.14

Between group analysis showed significant difference for all outcome measures except for Waist hip ratio and diastolic blood pressure.

DISCUSSION

The purpose of the present study was to find the effect of Fartlek training on lipid levels, BMI, % body fat, Cardiorespiratory fitness, muscular fitness (Muscle strength and endurance) and flexibility among young recreational adults. Total 66 participants completed the training either in form of fartlek (n =35) or self-paced walking exercises (n =31) for 6 weeks. All 66 participants completed the intervention and there were no adverse events found during study duration. All outcome measures were taken before and after completion of the training of 6 weeks.

Fartlek training has proven useful in improving lipid levels, BMI, % body fat in young adults except for HDL levels; which is not statistically significant but mean values showed improvement post fartlek training. This kind of work outs gives results in shorter periods of time because calories are even consumed after the completion of exercises. Regular exercise increases the lipoprotein lipase (LPL) gene expression and activity in skeletal muscles resulting in decreased plasma triglyceride content. A few studies have suggested that increase in HDL levels may be due to loss of body fat. Studies suggest that aerobic training requires 4-12 weeks to change blood lipid concentrations[6,7,8].

Fartlek training has proven useful in improving cardiorespiratory fitness, muscular fitness and flexibility in young adults. Intensity of an exercise should be to stimulate an increase in stroke volume and cardiac output and to enhance local circulation and aerobic metabolism in the appropriate muscle groups. The exercise period must be within the person's tolerance above the threshold level for adaptation to occur. Exercises have effects on almost all the systems of the body and these adaptations are reflected on improvement in Vo_2 max. During the active recovery phase of fartlek training, a portion of the muscular stores of ATP and the oxygen associated with myoglobin that were depleted during the work period are replenished by the aerobic system and increase in VO_2 max occurs. Improvement in aerobic fitness has led to improvement in muscular fitness in both the groups. However, no. of Squats has not improved significantly in control group. This may be due to the effect of leg muscles load which improves more with the running compared to walking[3,9,10].

Both the groups have shown significant improvement in resting heart rate, respiratory rate, systolic blood pressure and diastolic pressure that may be the result of chronic adaptations that occur with exercise training sessions.

Thus, both the groups were improved but fartlek training group had shown statistically significant difference compared to control group in all outcome measures. The variable intensity and continuous nature of the fartlek exercise places stress on both the aerobic and anaerobic systems.

During 4th week; Participants in the fartlek training group reported positive changes in their body and fitness levels like according to them they felt more energetic in doing their daily tasks; some of them noted that their sleeve sizes are getting changed due to training effects. These changes further motivated them to perform exercise sessions and because of variable intensity and flexibility of training they enjoyed the sessions.

The advantages of the fartlek training are that there is no specialized equipment is needed and is very flexible in nature as one can perform it as one wishes. Also, it can be performed at any place by individuals themselves. Training time was kept either in the morning between 7 am to 8 am or in the evening between 6:30 pm to 7:30 pm according to convenience of participants.

Limitation of the present study was that diet and life style was not taken into consideration; however, the participants

were told not to change their routine during the training period.

CONCLUSION

Fartlek training is statistically significantly effective in improving lipid levels, BMI, % body fat, cardiorespiratory fitness, muscular fitness and flexibility in young recreational adults.

Clinical Implication

Fartlek training can be a very useful alternative for young recreational individuals to maintain and improve their levels of fitness and lipid levels with short duration of exercise session which perfectly matches the requirement of busy pace of modern life.

Declaration by Authors

Ethical Approval: Approved

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Conflict of Interest: The authors declare no conflict of interest

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