

Body fat. In and out of the fitness center

Ioan Galea¹, Vasile Liviu Andrei², Adrian Gorea³, Florian Dobrin⁴

^{1,2} Research Center for Physical Activities, “Aurel Vlaicu”
University of Arad;

^{3,4} Students at “Aurel Vlaicu” University of Arad,

Correspondence: I. Galea, Research Center for Physical Activities - “Aurel Vlaicu” University of Arad, Romania.

E-mail: galea.ioan@gmail.com

Abstract

A relevant aspect of physical condition is represented by the adipose tissue; it is actually the goal of those who visit frequently the gym. **The purpose** of this current research is to pinpoint the importance and the role of the personal trainer regarding the efficiency of the services offered to clients in a gym. **Methods.** The research developed in two phases in two fitness centers; in the first phase the subjects (N=20), divided in two groups, the control group (C.GR, N=10, $M_{(y)}=28.8\pm 4.8y$, $M_{(h)}=1.66\pm 0.04m$, $M_{(w)}=64.2\pm 10.28kg$) and the experimental group (E.GR, N=10, $M_{(y)}=30.4\pm 5.8y$, $M_{(h)}=1.68\pm 0.08y$, $M_{(w)}=62.7\pm 8.52kg$) accomplished a number of 30 sessions. At C.GR they worked by the classical method and at E.GR they worked by the personal trainer method. Both groups were determined at the beginning of the research (I.T) and at the end of the research (F.T) the fat areas in three parts: belly(b), arm(a) and hip(h) as well as BMI. In the second phase, the subjects (N=10), divided in two groups, the control group (C.GR, N=5, $M_{(y)}=29.4\pm 8.2y$, $M_{(h)}=1.69\pm 0.15m$, $M_{(w)}=71\pm 21.4kg$) and the experimental group (E.GR, N=5, $M_{(y)}=30.8\pm 4.4y$, $M_{(h)}=1.71\pm 0.01m$, $M_{(w)}=83\pm 17.4kg$) attended a number of 30 sessions by the personal trainer method in the gym. Before the experiment started, each subject from E.GR was calculated the daily water intake (from liquids and from food). During

the first 15 sessions, the subjects belonging to this group voluntarily gave up to a quantity of approximately 500 ml water/ day (DWI), and during the next 15 sessions to a quantity of approximately 1000 ml water/ day. **Results.** Between the limitations of our research we can say that, the subjects who work by the personal trainer method have greater fat loss in relation to the subjects who work by classical methods. These losses are broader if associated with modifications of the daily diet, in the case of our research we talk about the daily intake of liquids.

Key words: personal trainer, body mass index, skin fold thickness, daily intake of water

Introduction

It is hard to imagine that an individual attends the gym without being preoccupied with the evolution of his physical condition, especially regarding the fat layer. This motivation is a reflex of the promotion of the 'thin individual' as an aesthetic model, by the contemporary society. On the other hand, the same society, permanently draws attention on the risk of the emergence of some diseases associated to physical inactivity and an unhealthy diet. The statistics⁹ furnished by the World Health Organization (WHO) are alarming: in 2008, approximately 38% of adults over 25 years have an increased level of cholesterol; approximately 39% of the adult population is obese (2014) and 23% is insufficiently physically active (2010). Specialists⁵ think that physical activity represents the most efficient and powerful way to promote a healthy life and to increase longevity amongst the population regardless of age or gender. Public health policy promotes 'health and nutrition instructors'^{7,6} for the deployment of a healthy life style. The program has as a goal the prevention of obesity and the cutback of chronic diseases⁴. There is a direct relation between obesity and cardiovascular diseases¹ but also between these and the physical inactivity² (sedentary life). Otherwise, diabetes types, cardiovascular diseases or cancer types are consequences of what we eat and how we spend are free time³. One of the solutions is attend-

ing gyms. In the current research we want to show that, positive results – in regards to the control of the fat layer – obtained as a result of physical activity **in** the gym, can be improved **outside** the gym, through the supervision of the diet. It is obvious that gyms represent a business and the quality of the services offered there depend mainly on the training level of the trainers^{11,12}. At some gyms classical methods are used to work with clients, while at other gyms they use the personal trainer method. Other gyms benefit from the support of diet specialists (the association of physical activity with diet improves the activity, the efficiency), or the client's diet is exterior to the gym.

Methods

Participants

30 subjects, clients of two gyms took part voluntarily in the research. The subjects were informed about the terms of the development of the research and they agreed in writing. In the first phase 20 subjects took part: 10 subjects in the control group (C.GR, N=10, $M_{(y)}=28.8\pm 4.8y$, $M_{(h)}=1.66\pm 0.04m$, $M_{(w)}=64.2\pm 10.28kg$) and 10 subjects in the experimental group (E.GR, N=10, $M_{(y)}=30.4\pm 5.8y$, $M_{(h)}=1.68\pm 0.08y$, $M_{(w)}=62.7\pm 8.52kg$). In the second phase 10 subjects attended: 5 subjects in the control group (C.GR, N=5, $M_{(y)}=29.4\pm 8.2y$, $M_{(h)}=1.69\pm 0.15m$, $M_{(w)}=71\pm 21.4kg$) and 5 subjects in the experimental group (E.GR, N=5, $M_{(y)}=30.8\pm 4.4y$, $M_{(h)}=1.71\pm 0.01m$, $M_{(w)}=83\pm 17.4kg$). The research developed on a period of 30 sessions (3 sessions/ week) for both teams. The research got the approval of the Research Centre for Physical Activities of Aurel Vlaicu University from Arad.

Experimental Design

In the first phase, a part of the subjects (C.GR) attended three sessions weekly by the classical method (First session: pectorals

(chest) + triceps; Second session: dorsals (back) + biceps; Third session: deltoids (shoulders) + abdomen) and the other part (E.GR) attended the same number of sessions weekly by the personal trainer method (First session: Hiit Training; Second session: Complete workout + Cardio; Third session: Workout Circuit Inferior Train + Cardio). At the beginning (I.T) and the end (F.T.) of the research, the subjects of the two teams, were determined their fat areas in three parts⁸: belly, arm, hip, as well as BMI. For measurements we used the following instruments: Medical Export waist meter (Italy, 2010), Phillips electronic scale (China, 2014), Kettler manual caliper (Germany, 2014). In the second phase, all subjects worked by the personal trainer method, but at E.GR the independent variable (the daily water intake, D.W.I.) belongs to the diet, so outside the gym and the dietician. We started with the following theoretical premises: water is a component of the daily diet; the quantity of water from our organism is relatively constant; most of the biochemical reactions(hydrolysis, oxidations, hydrations) take place in the presence of water(water also promotes the digestion); the decrease of the water quantity through nourishment determines the organism to reach out to mechanisms that causes it; the burnout of lipids through physical effort is one of these ways¹⁰. At the beginning (I.T) and the end (F.T) of the research, the subjects were determined their fat areas in three parts: belly, arms, hip, BMI, following the same protocol regarding the measurements. For the subjects in E.GR, the supervision of the liquid intake was done like this: each subject registered daily his intake of liquids (water, tea, coffee, juices) as well as the quantity and the type of eaten food. On the basis of these reports, they were calculated the daily water intake¹³ (D.W.I.). During the first 5 weeks, the E.GR subjects used approximately 500 ml water less daily to the ordinary use determined at the beginning of the research (water quantity meaning: liquids and nourishment percentage).

Statistics

The data in the chart represents the average of three consecutive measurements for belly, triceps and hip, both at the initial testing (IT) and the final testing (FT). We also calculated the average (M) and the standard deviation (SD) for graphical representations. We used the SPSS program.

Results

The obtained data is presented in charts 1,2,3,4. It is noticeable that, all 4 research groups are not unitary regarding the weight and the adipose tissue in the determined areas. This is a result of the fact that the groups were setup on the basis of volunteering, in this way, in the same group can be found different somatic types (the distribution of fat layer differs from one somatic type to another). In all 4 research groups can be found endomorphs, mesomorphs and ectomorphs. For instance: from GR.C (phase I) subject A.O. is endomorph while subject A.A. is ectomorph. The research groups contain both women and men and the percent of fat constitution differs: from men (3%) to women (12%)¹². Likewise, the daily water intake (from liquids and nourishment) represents an individual matter that concerns the basic metabolism of each person, culinary habits, accuracy of the daily rapport of the quantity of eaten food but also the accuracy of the determination of the water percent of each aliment. For example: a dose of soup was reported by a subject sometimes as 200ml and other times as 250ml.

Chart 1 The data of the control group (C.GR) for phase I

Nr. crt.	Name	Age (y)	Height (m)	Weight (kg)		Belly (mm)		Triceps (mm)		Hip (mm)		BMI	
				TI	TF	TI	TF	TI	TF	TI	TF	TI	TF
1	A.O.	38	1,75	90	88	28	26	22	20	26	26	29,41	28,75
2	AD.O.	32	1,7	64	63	24	22	20	20	22	20	22,14	21,79
3	M.G.	30	1,65	72	70	30	28	22	20	28	26	26,18	25,37
4	A.S.	27	1,61	63	62	26	26	18	18	24	24	24,32	23,93
5	C.N.	26	1,7	63	62	24	22	20	20	22	20	21,79	21,45
6	I.R.	27	1,62	55	54	32	30	16	16	28	26	20,99	20,61
7	L.H.	30	1,65	62	61	24	22	20	20	24	22	22,79	22,42
8	T.P.	24	1,6	58	59	18	20	16	18	18	18	22,65	23,04
9	D.C.	21	1,64	59	58	26	24	20	18	26	24	22,01	21,64
10	A.A.	33	1,71	56	57	16	18	14	14	14	16	19,17	19,52
M		28,80	1,66	64,20	63,40	25,78	23,80	18,80	18,40	23,20	22,20	23,15	22,85
SD		4,87	0,05	10,28	9,64	4,92	3,71	2,70	2,07	4,44	3,58	2,88	2,65

Chart 2 The data of the experimental group grupej (E.GR) for phase I

Nr. crt.	Name	Age (y)	Height (m)	Weight (kg)		Belly (mm)		Triceps (mm)		Hip (mm)		BMI	
				TI	TF	TI	TF	TI	TF	TI	TF	TI	TF
1	O.S.	30	1,7	62	58	20	16	22	18	20	16	21,45	20,06
2	C.B.	39	1,62	57	54	22	20	18	16	22	18	21,75	20,61
3	A.P.	38	1,6	60	57	24	20	20	16	22	20	23,43	22,26
4	C.R.	32	1,73	62	58	22	18	16	12	14	12	20,73	19,39
5	R.M.	27	1,62	55	53	16	14	14	12	12	12	20,99	20,22
6	D.I.	26	1,6	58	51	32	26	16	14	28	24	22,65	19,92
7	P.G.	28	1,8	84	81	18	16	20	18	20	18	25,92	25
8	O.D.	33	1,65	58	55	18	16	14	10	14	10	21,32	20,22
9	T.R.	32	1,72	61	59	24	20	18	16	22	18	20,67	20
10	D.T.	19	1,82	70	69	16	12	14	12	14	12	21,14	20,89
M				30,40	62,70	21,20	17,80	17,20	14,40	18,80	16,00	22,01	20,86
SD				5,87	8,53	4,83	3,94	2,86	2,80	5,09	4,42	1,63	1,65

Chart 3 The data of the control group (C.GR) for phase II

Nr. crt.	Name	Age (y)	Height (m)	Weight (Kg)		Belly(mm)		Triceps (mm)		Hip(mm)		BMI	
				TI	TF	TI	TF	TI	TF	TI	TF	TI	TF
1	D.E.	20	1,65	92	88	30	23	26	24	40	40	33,82	32,35
2	P.A	24	1,63	55	55	29	25	19	16	31	29	33,79	32,32
3	P.An.	41	1,62	60	60	25	24	20	20	30	33	20,70	20,70
4	T.I.	28	1,96	98	97	33	31	18	14	25	15	22,86	22,86
5	V.M.	34	1,61	54	54	29	25	18	18	38	38	25,51	25,25
	M	29,40	1,69	71,80	70,80	29,20	25,60	20,20	18,40	32,80	31,00	27,34	26,70
	SD	8,29	0,15	21,41	20,19	2,86	3,13	3,35	3,85	6,14	9,92	6,15	5,39

Chart 4 The data of the experimental group (E.GR) for phase II

Nr ert	Name	Age (y)	Height (m)	Weight (Kg)		Belly (mm)		Triceps (mm)		Hip (mm)		BMI		CAZ(ml)		
				TI	TF	TI	TF	TI	TF	TI	TF	TI	TF	TI	TF	E1
1	H.N.	29	1,71	105	99	33	31	33	21	53	40	35,95	33,86	4903,00	4043,00	3543,00
2	P.E	27	1,69	59	59	19	13	22	13	30	26	20,66	20,66	3245,00	2745,00	2245,00
3	P.O	37	1,70	90	82	35	27	20	17	43	31	31,14	28,37	2462,00	3762,00	3262,00
4	S.S.	35	1,71	74	75	30	27	25	18	32	29	25,31	25,65	3955,00	3455,00	2955,00
5	T.A	26	1,74	88	90	48	31	16	15	28	25	29,07	29,73	3670,00	3170,00	2670,00
	M	30,80	1,71	83,20	81,00	33,00	25,80	23,20	16,80	37,20	30,20	28,42	27,65	3647,00	3435,00	2935,00
	SD	4,40	0,02	17,43	15,22	10,42	7,43	6,38	3,03	10,57	5,97	5,80	4,91	899,83	505,80	505,80

Discussion

From the data obtained in the first phase of the research it is noticeable that, the subjects that worked by the personal trainer method lost more adipose tissue (in all 3 measured parts: belly, triceps, hip) in relation to the subjects who carried out a classical program at the gym. (fig.1)

The effects of the personal trainer method can be considered significant in the case when the average of the body mass index for the subjects of both research groups at the IT are normal. (BMI=18.5-24.9)⁸ in relation to category (untrained), age (28- 30 y) and sex (men and women): $M_{\text{BMI(C.G.R.IT)}}=23.14$ and $M_{\text{BMI(E.G.R.F.T)}}=22.00$. In other words, the target of the first phase was not aiming a great quantity of adipose tissue (fig. 2).

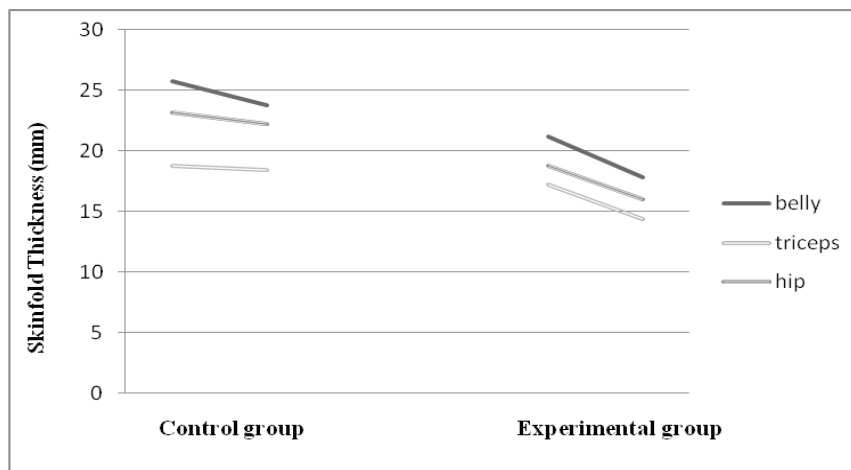


Fig. 1. The evolution of fat area in the first phase of the research

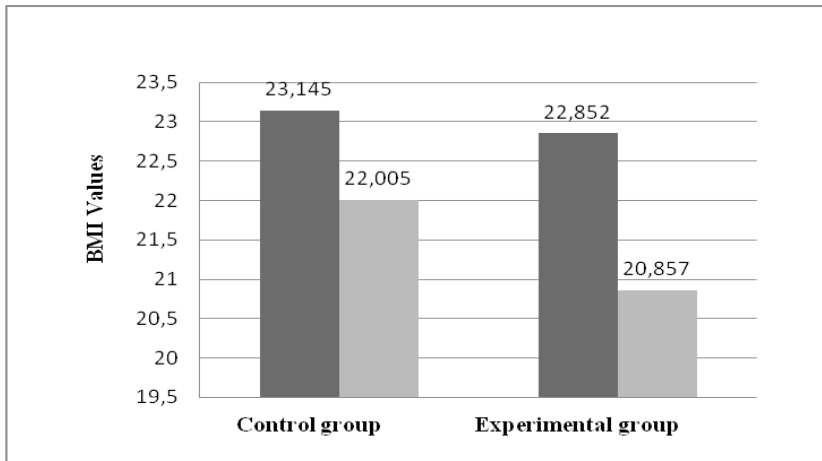


Fig.2 The evolution of the BMI average in the first phase of the research

From the data contained in charts 3 and 4 it is noticeable that, the volunteer subjects in the two research groups have a greater quantity of adipose tissue in relation to the subjects in the first research phase, a fact mirrored by the BMI which is characteristic for groups such as overweight (BMI=25–29.9)⁸ in relation to category (untrained), age (29-30 y) and sex (men and women): $M_{\text{BMI}(C.GR.IT)} = 27.34$ și $M_{\text{BMI}(E.GR.IT)} = 28.42$ (fig.3).

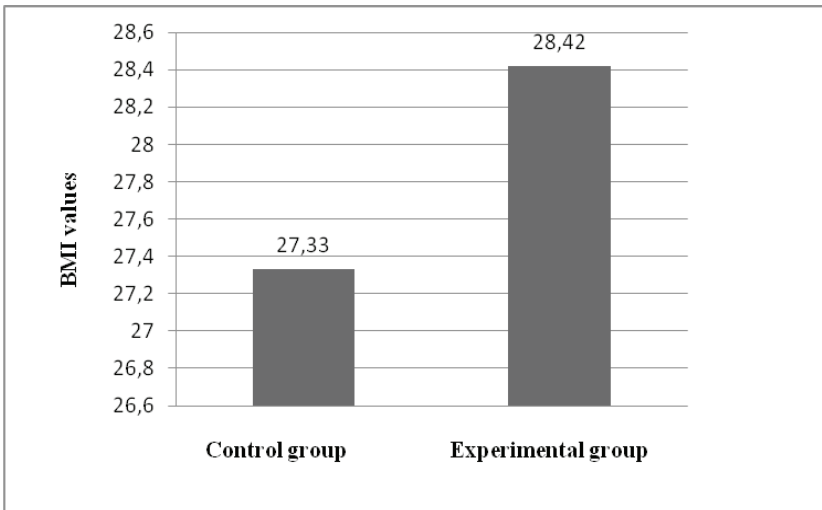


Fig.3 BMI average at IT for subjects from second phase

Basically, it is accepted the idea that, the concerted action of more factors contribute to the amplification of the effects. In the second phase of the research, at E.GR we introduced an additional variable besides the personal trainer method that is the daily water intake (DWI). This is external to the gym; supervision of the diet, generally, is the responsibility of the nutritionist and not the fitness trainer. Though, the supervision of DWI is difficult to track, between the limitations of our research, the results obtained by E.GR in relation to C.GR are better regarding the loss of adipose tissue (fig.4).

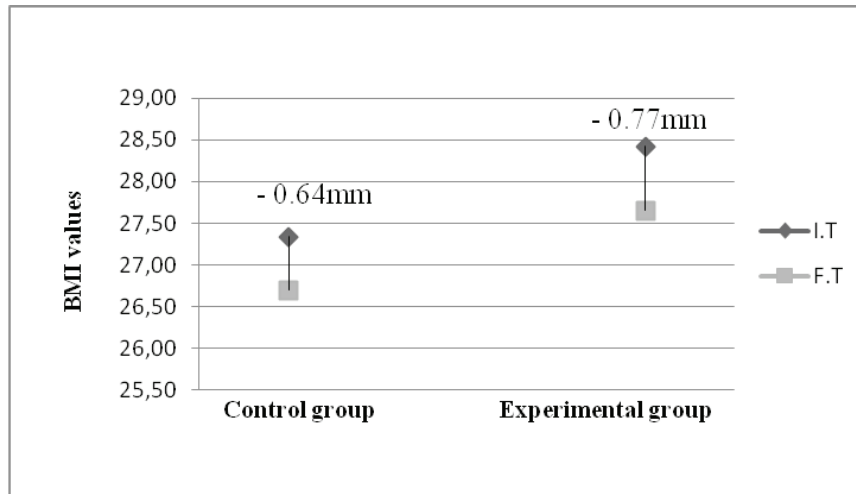


Fig.4 Improvement of BMI average in the second phase of the research

Conclusions

According to our research we can say that, the personal trainer method is more efficient than the classical method both in the case of women as well as men, regardless of the somatic type. Likewise, involving factors external to the gym in the supervision of the adipose tissue – in our case the daily water intake – the fat losses can be even greater. For the improvement of the services provided by the gyms, we recommend the presence of the nutritionist besides the fitness trainer.

Acknowledgments

The authors gratefully acknowledge the participants of the two studies for their enthusiasm and cooperation.

References

1. www.who.int/dietphysicalactivity/en/ (accesat 04.09.2015);
2. Julia Thurn , Emily Finne Mirko Brandes , Jens Bucksch *Validation of physical activity habit strength with subjective and objective criterion measures* Psychology of Sport and Exercise 15 (2014) 65-71
3. Powell, K. E., Paluch, A. E., & Blair, S. N. (2011). *Physical activity for health: what kind? How much? How intense? On top of what?* Annual Review of Public Health, 32, 349-364.
4. Anne R. Lindsay, MS; Nobuko Hongu, PhD, RD; Karen Spears, PhD, RD;
- Rafida Idris, PhD, MPH; Anthony Dyrek, MS; Melinda M. Manore, PhD, RD, CSSD, FACSM *Field Assessments for Obesity Prevention in Children and Adults: Physical Activity, Fitness, and Body Composition* Journal of Nutrition Education and Behavior. 2014;46:43-53.
5. James R. Morrow Jr, PhD, Jacob S. Tucker, MS, Allen W. Jackson, EdD, Scott B. Martin, PhD, Christy A. Greenleaf, PhD, Trent A. Petrie, PhD *Meeting Physical Activity Guidelines and Health-Related Fitness in Youth* American Journal of Preventive Medicine 2013;44(5):439–444)
6. Ali H. Mokdad, PhD; Earl S. Ford, MD, MPH; Barbara A. Bowman, PhD; William H. Dietz, MD, PhD; Frank Vinicor, MD, MPH; Virginia S. Bales, MPH; James S. Marks, MD, MPH *Prevalence of Obesity, Diabetes, and Obesity-Related Health Risk Factors, 2001* FREE, JAMA. 2003 Jan 1;289(1):76-9

7. Paul D. Loprinzi, Bradley J. Cardinal *Measuring Children's Physical Activity and Sedentary Behaviors, J Exerc Sci Fit* (2011), Vol 9, No 1: 15–23
8. Catharine Ward Thompson *Activity, exercise and the planning and design of outdoor spaces Journal of Environmental Psychology* 34 (2013) 79-96
9. Chiu W.Y , Lee Y.D , Lin T.Y *Performance Evaluation Criteria for Personal Trainers: An Analytical Hierarchy Process Approach, Social Behavior and Personality*.2010;38(7):895-905
10. Melton, Deana I; Dail, Teresa K; Katula, Jeffrey A; Mustian, Karen M, *The current state of personal training: managers' perspectives, Journal of strength and conditioning research*. 2010;24(11):3173-9
- 11 G. Gregory Haff, Charles Dumke (2012), *Laboratory Manual for Exercise Physiology*, Human Kinetics, Champaign, IL, USA
12. McArdle WD, Katch FI, and Katch VL (2007), *Exercise Physiology: Energy, Nutrition, and Human Performance*. Lippincott Williams & Wilkins, Baltimore, USA
13. www.idmclub.ro/continut-caloric.php (accesat 09.10.2015)