L'ATTIVITÀ FISICA COME "FARMACO": IL COUNSELLING MOTIVAZIONALE BREVE E LE POSSIBILI RISPOSTE PER I BISOGNI DEI DESTINATARI

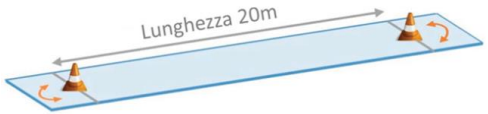
Attività Fisica, Movimento Umano e Salute.
L'attività Fisica Adattata nelle Malattie Croniche Non Trasmissibili.

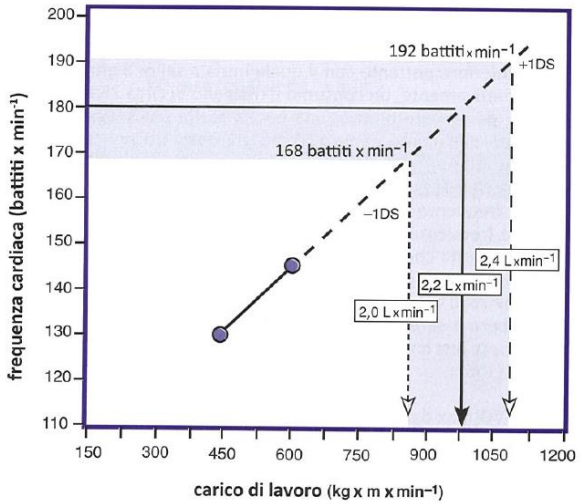
Prof. Claudio Orizio
Dipartimento Scienze Cliniche e Sperimentali
Università degli Studi di Brescia

UNIVERSITÀ DEGLI STUDI DI BRESCIA

DSCS Sez. Neuroscienze
CHINESIOLOGIA

test di camminata per 6 minuti (Six minutes walking test)



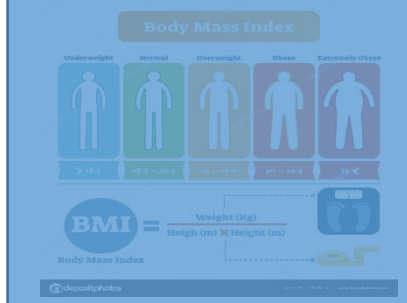


Test di flessibilità della colonna lombare (V-Sit and reach)

FITNESS CARDIOVASCOLARE
CAPACITA' AEROBICA

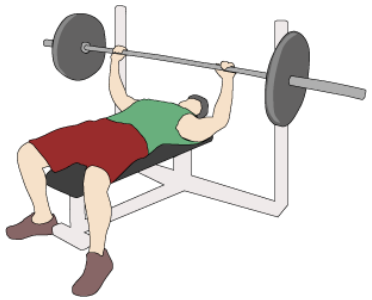
FLESSIBILITA' ARTICOLARE

PHYSICAL FITNESS



COMPOSIZIONE CORPOREA
MASSA MAGRA/MASSA GRASSA

FITNESS MUSCOLARE
FORZA-RESISTENZA



UNIVERSITÀ DEGLI STUDI DI BRESCIA

DSCS Sez. Neuroscienze
CHINESIOLOGIA

1 MET= 3,5 ml O_2 x 70 kg x 60 min= 14.7 l di O_2/ora

14.7 l di O_2 x 5 (Eq calorico ossigeno)= 73.5 kCal/ora

Exercise intensity	% $\dot{V}O_2$ peak	% HR max	RPE*	% 1-RM	METs	Example activities (METs)[42]
Light	37 to 40	57 to 63	9 to 11	30 to 49	2.0 to 2.9	Standing (2.0)
Moderate	46 to 63	64 to 76	12 to 13	50 to 69	3.0 to 5.9	Walking the dog (3.0) Walking for exercise (4.3) Mowing the lawn (5.5)
Vigorous	64 to 90	77 to 95	14 to 17	70 to 84	6.0 to 8.7	Jogging (7.0) Cycling (8.0)
Near-maximal to supra-maximal	91 or above	96 or above	18 or above	85 or above	8.8 or above	Stair climbing, fast pace (8.8)

*RPE (rating of perceived exertion)[43] is measured on a scale of 6 (no exertion at all) to 20 (maximal exertion). Instructions are provided and participant should be familiarised with these before exercise.
Abbreviations. METs = metabolic equivalent of task. % $\dot{V}O_2$ peak = percentage of peak oxygen consumption. % HR max = percentage maximal heart rate. % 1-RM = percentage of 1-repetition maximum.

Moderate-intensity Physical Activity (Approximately 3-6 METs)

Requires a moderate amount of effort and noticeably accelerates the heart rate.

Examples of moderate-intensity exercise include:

- Brisk walking
- Dancing
- Gardening
- Housework and domestic chores
- Traditional hunting and gathering
- Active involvement in games and sports with children / walking domestic animals
- General building tasks (e.g. roofing, thatching, painting)
- Carrying / moving moderate loads (<20kg)

Vigorous-intensity Physical Activity (Approximately >6 METs)

Requires a large amount of effort and causes rapid breathing and a substantial increase in heart rate.

Examples of vigorous-intensity exercise include:

- Running
- Walking / climbing briskly up a hill
- Fast cycling
- Aerobics
- Fast swimming
- Competitive sports and games (e.g. Traditional Games, Football, Volleyball, Hockey, Basketball)
- Heavy shovelling or digging ditches
- Carrying / moving heavy loads (>20kg)

Punti di arrivo.

Curare la transizione tra decondizionamento e pratica dell'attività fisica

UNIVERSITÀ DEGLI STUDI DI BRESCIA

DSCS Sez. Neuroscienze CHINESIOLOGIA

1. Adults aged 18–64 should do at least 150 minutes of moderate-intensity aerobic physical activity throughout the week or do at least 75 minutes of vigorous-intensity aerobic physical activity throughout the week or an equivalent combination of moderate- and vigorous-intensity activity.
2. Aerobic activity should be performed in bouts of at least 10 minutes duration.
3. For additional health benefits, adults should increase their moderate-intensity aerobic physical activity to 300 minutes per week, or engage in 150 minutes of vigorous-intensity aerobic physical activity per week, or an equivalent combination of moderate- and vigorous-intensity activity.
4. Muscle-strengthening activities should be done involving major muscle groups on 2 or more days a week.

World Health Organization

METABOLIC SYNDROME

The IDF consensus worldwide definition of the

METABOLIC SYNDROME

International Diabetes Federation

UNIVERSITÀ DEGLI STUDI DI BRESCIA

DSCS Sez. Neuroscienze

CHINESIOLOGIA

Table 1: The new International Diabetes Federation (IDF) definition

According to the new IDF definition, for a person to be defined as having the metabolic syndrome they must have:

Central obesity (defined as waist circumference* with ethnicity specific values)

plus any two of the following four factors:

Raised triglycerides	≥ 150 mg/dL (1.7 mmol/L) **or specific treatment for this lipid abnormality**
Reduced HDL cholesterol	< 40 mg/dL (1.03 mmol/L) in males < 50 mg/dL (1.29 mmol/L) in females **or specific treatment for this lipid abnormality**
Raised blood pressure	systolic BP ≥ 130 or diastolic BP ≥ 85 mm Hg **or treatment of previously diagnosed hypertension**
Raised fasting plasma glucose	(FPG) ≥ 100 mg/dL (5.6 mmol/L), **or previously diagnosed type 2 diabetes** If above 5.6 mmol/L or 100 mg/dL, OGTT is strongly recommended but is not necessary to define presence of the syndrome.

** If BMI is >30kg/m², central obesity can be assumed and waist circumference does not need to be measured.*

Table 2: Ethnic specific values for waist circumference

Country/Ethnic group		Waist circumference
Europids* In the USA, the ATP III values (102 cm male; 88 cm female) are likely to continue to be used for clinical purposes	Male	≥ 94 cm
	Female	≥ 80 cm
South Asians Based on a Chinese, Malay and Asian-Indian population	Male	≥ 90 cm
	Female	≥ 80 cm
Chinese	Male	≥ 90 cm
	Female	≥ 80 cm
Japanese**	Male	≥ 90 cm
	Female	≥ 80 cm
Ethnic South and Central Americans	Use South Asian recommendations until more specific data are available	
Sub-Saharan Africans	Use European data until more specific data are available	
Eastern Mediterranean and Middle East (Arab) populations	Use European data until more specific data are available	

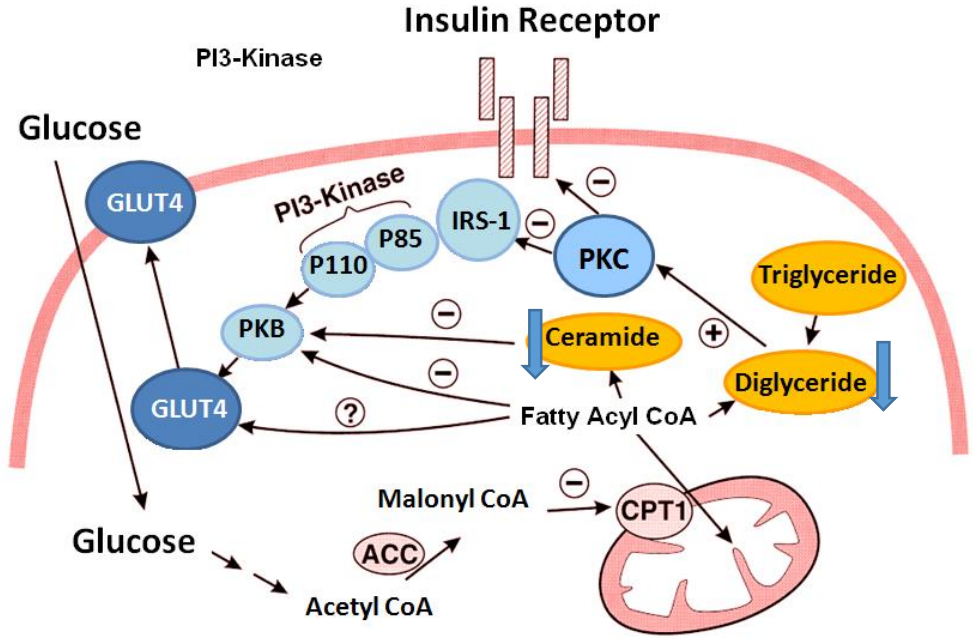
** In future epidemiological studies of populations of Europid origin, prevalence should be given using both European and North American cut-points to allow better comparisons.*

*** Originally different values were proposed for Japanese people but new data support the use of the values shown above.*

Esercizio

Aumento numero traspostatori di glucosio

Contributo alla riduzione della glicemia



Esercizio

Miglioramento della funzione mitocondriale con maggiore ossidazione degli acidi grassi liberi

Riduzione concentrazione intermedi del metabolismo dei grassi

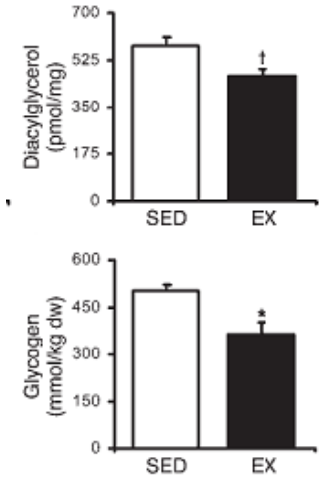
Contributo alla riduzione della RI

Potenziali interazioni tra lipidi e segnale dell'insulina. -, potenziali inibitori; + potenziali attivatori. ACC, acetil-CoA carbossilasi; PKC, proteina chinasi C. CPT, Carnitina-palmitoil transferasi I.

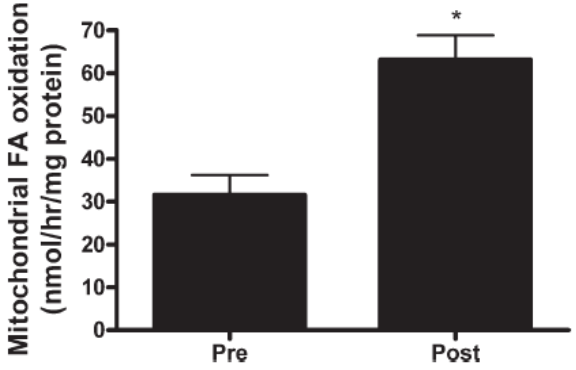
Kelley DE et al. 2000

UNIVERSITÀ DEGLI STUDI DI BRESCIA

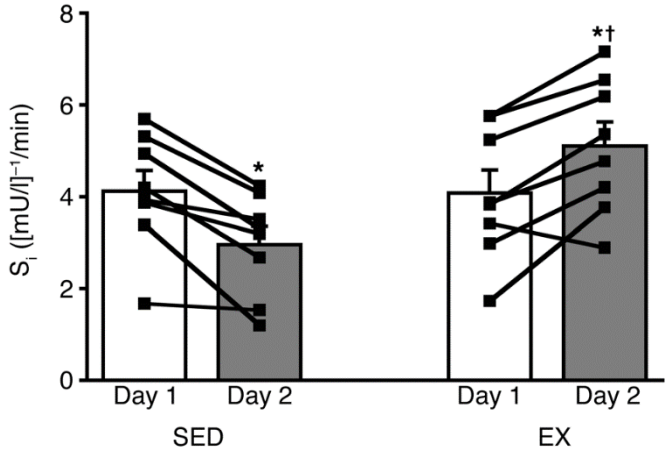
DSCS Sez. Neuroscienze CHINESIOLOGIA



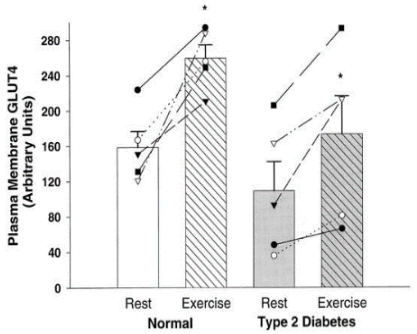
Esercizio fisico e accumulo di lipidi intramuscolari. Shenk 2007



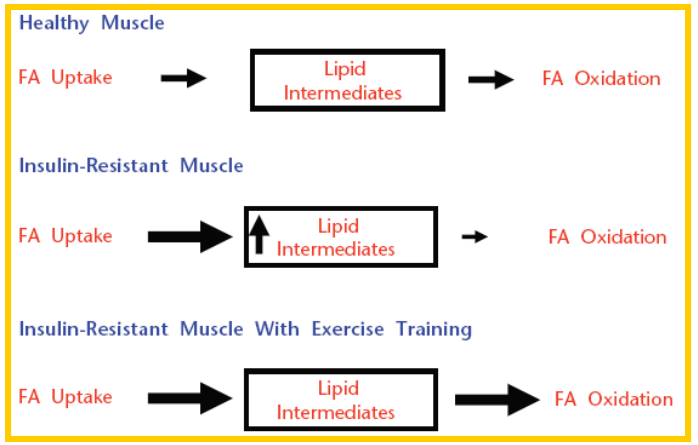
Effetto dell'allenamento sulla % di ossidazione di FA. Bruce et al. 2006



Una singola sessione di esercizio previene l'insulino-resistenza indotta dai lipidi Schenk et al. 2007



La determinazione dei livelli di GLUT4 sulla membrana plasmatica muscolare di soggetti con diabete di tipo 2 e soggetti sani di controllo studiata nello stato di riposo e dopo una sessione di esercizio ciclico.



Equilibrio tra uptake di FA e ossidazione degli FA nel muscolo scheletrico sano, mismatch nel muscolo insulino-resistente e possibile correzione indotta dall'esercizio fisico.

Effetti dell'attività aerobica

UNIVERSITÀ DEGLI STUDI DI BRESCIA

DSCS Sez. Neuroscienze CHINESIOLOGIA

Sulla base di quanto indicato appare evidente che la pratica regolare di attività fisica ha un ruolo importante nel controllo della sindrome metabolica

Schema per attività aerobica

Prescrizione: Intensità: 30-50% VO_{2max}; Durata: 90 - 240 minuti (dato che nei primi 20' si usa preferibilmente glicogeno).

Ricordiamoci che un individuo normopeso che cammina alla sua velocità prescelta utilizza circa il 35% del suo VO_{2max} . Questa è considerata un'attività allenante leggera e conveniente. Negli obesi camminare però può costituire una spesa anche oltre il 60% (a volte oltre il 90%)$VO_{2max.}$

La misura del VO_{2max} in ambiente clinico non è facile. Un'alternativa potrebbe essere la valutazione della FC dopo 4-6 minuti di cammino. Se questa è superiore ai 100 b/min l'esercizio è intorno al 50% VO_{2max} .

Allenamento di forza per il recupero di massa muscolare (Resistance training, RT)

Il muscolo scheletrico è il target metabolico principale per il metabolismo dei carboidrati e dei trigliceridi e un determinante cruciale del livello metabolico basale. Nel processo d'invecchiamento la riduzione della massa muscolare porta a: riduzione del metabolismo basale, della capacità ossidativa dei grassi, aumento dell'adiposità > up-take del glucosio insulino mediato nel muscolo ↓.

Quindi mantenere la massa tramite RT > aiuta a prevenire i fattori di rischio cardiovascolari associati con SM: obesità, dislipidemia e resistenza insulinica.

RT è efficace se sufficientemente intenso da produrre un aumento della massa magra (ricordiamo che un increment di 10 Kg di massa proteica > 100kcal/giorno di consumo energetico) > riduce il catabolismo proteico e il carico sulla funzione renale.

Resistenza insulinica ↓, uptake glucosio insulino mediato ↑, emoglobina glicosilata (HbA1c) ↓ (l'American Diabetes Association Standards of Medical Care in Diabetes ha aggiunto l'HbA1c = 6.5% come ulteriore criterio per la diagnosi clinica di dabete mellito)

Aumenta la quota di enzimi antiossidanti indotti dalla contrazione muscolare

Strasser, Siebert, Shobersberger *Resistance training in the treatment of the metabolic syndrome*. 2010, Sports Medicine 40(5): 397-415

Table II. Pooled estimates of effect size (95% confidence intervals [CIs]) expressed as weighted mean difference (WMD) for the effect of resistance training on glycaemic control (glycosylated haemoglobin [HbA_{1c}]), fat mass (FM), blood lipids (total cholesterol [CHOL], high-density lipoprotein cholesterol [HDL-C], low-density lipoprotein cholesterol [LDL-C], triglycerides [TG]) and systolic and diastolic blood pressure (SBP; DBP) in overweight/obese adults with type 2 diabetes mellitus

Risk factor	Effect size	95% CI	p-Value	I^2
HbA_{1c} (%)	−0.48	−0.76, −0.21	0.0005	87.1
FM (mg/dL)	−2.33	−4.71, 0.04	0.05	88.6
CHOL (mg/dL)	−7.75	−17.02, 1.51	0.10	90.8
HDL-C (mg/dL)	−0.68	−3.68, 2.31	0.66	82.0
LDL-C (mg/dL)	−7.72	−17.92, 2.48	0.14	92.2
TG (mg/dL)	−18.53	−38.43, 1.36	0.07	84.8
SBP (mg/dL)	−6.19	−11.38, −1.00	0.02	94.9
DBP (mg/dL)	0.86	−1.73, 3.45	0.51	94.4

I^2 = inconsistency.

Strasser, Siebert, Shobersberger *Resistance training in the treatment of the metabolic syndrome*. 2010, Sports Medicine 40(5): 397-415

UNIVERSITÀ DEGLI STUDI DI BRESCIA

Effetti dell'allenamento di forza

DSCS Sez. Neuroscienze CHINESIOLOGIA

Dose:

Anziani: esercizio per ogni gruppo muscolare = 1/2 serie di 8-12 ripetizioni con intensità > 60% 1RM; 2 sessioni a settimana.

Giovani: esercizio per ogni guppo muscolare= 2/3 serie di 10-15 ripetizioni al 40-80% 1RM; 2-3 sessioni a settimana.

Int.: 60-70% 1RM (moderata), 75-85% 1RM (elevata); vol: 4 sets per gruppo muscolare a sett; durata > 10 settimane

International Journal of Environmental Research and Public Health

MDPI

Article

Influence of Physical Activity on the Regulation of Disease of Elderly Persons with Metabolic Syndrome

Lucija Stetic [1], Ivan Belcic [1,*], Goran Sporis [1], Leon Stetic [2] and Nikola Starcevic [1]

[1] Faculty of Kinesiology, University of Zagreb, 10000 Zagreb, Croatia; lucija.stetic@gmail.com (L.S.); goran.sporis@kif.hr (G.S.); nikola.starcevic@kif.hr (N.S.)
[2] Sheffield Hallam University, Sheffield S1 1WB, UK; leonstetic@yahoo.com
* Correspondence: ivan.belcic@kif.hr

2.3. *Variable Sample*

Anthropometric and morphological parameters

- Body height (BH)
- Body weight (BW)
- Body Mass Index (BMI)
- Total amount of water (TW)

Cardiovascular and respiratory functions

- Maximum oxygen uptake (VO2max)
- Systolic blood pressure (RRs)
- Diastolic blood pressure (RRd)

Metabolic/hematological system

- Total cholesterol (CH)
- HDL cholesterol (HDL)
- LDL cholesterol (LDL)
- Blood glucose concentration (GB)

1 After initial measurements of morphological and anthropometric characteristics, the first experimental group was included in a 12-week training program in the form of a continuous cycling ergometer of moderate intensity (55% VO_2max). For the first four weeks, subjects underwent physical activity lasting a total of 35 min, from 5 to 8 weeks physical activity lasted 40 min, and from 9 to 12 weeks physical activity lasted 50 min. Throughout all 12 weeks the physical activity on the bicycle ergometer was under a load of 55% VO_2max.

2 Second experimental group was included in a strength physical activity program that also lasted 12 weeks. The program load was regulated by the number of repetitions depending on the period in which it is performed, so the subjects performed eight exercises which were performed from 1 to 4 weeks with 10 repetitions and a break of 1 min between exercises. From the 5th to the 8th week, the same exercises were performed for 12 repetitions with a break of 1.5 min between exercises, and from the 9th to the 12th week, the same exercises were performed for 15 repetitions with a break of 2 min between exercises. Exercises: squat without load, lying Superman, abs with bent legs, biceps curl with a stick (500 g), lying Superman (opposite arm/opposite leg), climbing to a height of 10 cm, lifting the contorted legs to the chest from lying down position, lifting on the toes.

3 The third was the control group which did not have organized physical activity, subjects only continued with their usual daily activities.

5. Conclusions

The program of continuous physical activity of moderate intensity has a positive effect on the regulation of the disease in the elderly with metabolic syndrome. In particular, this refers to a significant improvement in the final measures compared to the initial one in maximum oxygen uptake, systolic blood pressure, total cholesterol, HDL cholesterol, LDL cholesterol, and glucose concentration.

The experimental strength program has a better effect than a continuous physical activity program on disease regulation in the elderly with metabolic syndrome. The results showed that a statistically significant difference was found between initial and final testing in body weight, body mass index, total amount of water, maximum oxygen uptake, systolic blood pressure, total cholesterol, HDL cholesterol, LDL cholesterol, and blood glucose concentration.

The results of the research advise people suffering from metabolic syndrome, as well as the elderly, to engage in any form of physical activity to increase their health status and to raise quality and duration of their life. This can be achieved with continuous physical activity program with moderate intensity and especially programmed strength training, which has a more effective impact on disease regulation and overall health. Inactivity in people with metabolic syndrome leads to poorer health and a higher degree of disease, or to a deterioration in the values that describe the status of people with metabolic syndrome. Physical inactivity endangers the already existing stage of the disease and can have significant contraindications to the organism, even with fatal consequences.

UNIVERSITÀ DEGLI STUDI DI BRESCIA

DSCS Sez. Neuroscienze CHINESIOLOGIA

Anti-Inflammatory Effects of Exercise on Metabolic Syndrome Patients: A Systematic Review and Meta-Analysis

Biological Research for Nursing
2021, Vol. 23(2) 280-292
© The Author(s) 2020
Article reuse guidelines:
sagepub.com/journals-permissions
DOI: 10.1177/1099800420958068
journals.sagepub.com/home/brn
SAGE

Heidar Alizaei Yousefabadi, MSc[1], Arghavan Niyazi, MSc[2], Sahar Alaee, PhD[3], Mehrdad Fathi, PhD[4], and Gholam Rasul Mohammad Rahimi, PhD[5]

Conclusion

Our study suggests that exercise training regimens may help improve TNF-α, CRP, IL-8, and IL-10 levels in patients with MetS. For some variables, isolated aerobic exercise, and combined aerobic and resistance exercise appears to be optimal. Future research is needed to clarify the mechanisms underlying the effect of exercise training on this population's inflammatory markers.

UNIVERSITÀ DEGLI STUDI DI BRESCIA

DSCS Sez. Neuroscienze
CHINESIOLOGIA

Moderate intensity exercise. Individuals should target 150-300 minutes per week of moderate intensity aerobic exercise (such as brisk walking, cycling, swimming, jogging, dancing, and team sports). It is recommended that exercise should occur on at least three days per week, spread across the week. Exercise should be undertaken at a moderate intensity (55-69% HRmax or rating of perceived exertion 3-4/10).

Vigorous intensity exercise. 70-89% HRmax (or rating of perceived exertion 5-6/10) involving 75-150 minutes per week, or a combination of moderate and vigorous aerobic exercise may be considered where appropriate according to individual preferences and safety considerations.

Progressive high intensity resistance training is usually effective for improving persisting elevated blood pressure, blood glucose and blood lipid profile, whereas evidence suggests there is little benefit on visceral fat; the combination of aerobic exercise and progressive resistance training significantly reduces the risk of progression to type 2 diabetes. To complement aerobic exercise, two to three resistance training sessions each week can be undertaken, involving 2-4 sets of exercises at a moderate to vigorous effort equivalent to ~ 70-85% of 1 repetition maximum (1-RM), each for 8-12 repetitions. Examples of exercises that have been demonstrated to be effective and can be tailored to the individual are: squats, calf raises, lunges, leg press, chest press, seated row, shoulder press, biceps curl and triceps extension. People with MetS may also be at increased risk of falls, and regular resistance exercise can help to reduce falls occurring, and injury from falls if they do occur.

Table 1. Components of an exercise prescription for subjects with the metabolic syndrome

Component	Suggestion
Modality	*Aerobic endurance activities* (walking, running, bicycling, swimming, cross-country skiing); *Circuit-type resistance training* (low-intensity, high-volume)
Frequency	*Three to seven sessions* spaced throughout the week Both modalities should be represented
Intensity	*Moderate to strong* on Borg scale [163]
Duration	3–5 min warm-up 15–60 min at training intensity

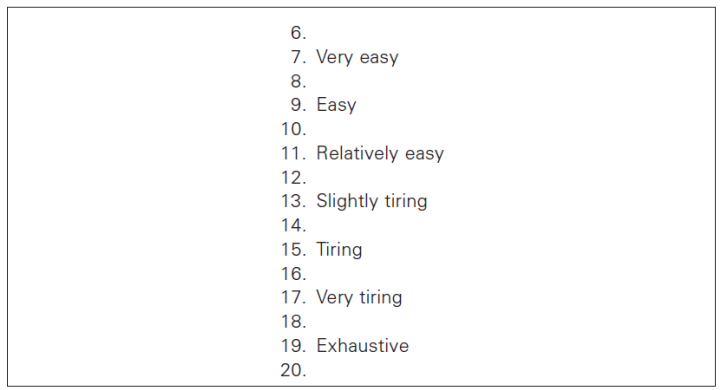


Figure 3 – *Borg scale of effort subjective perception*

* The Borg scale of effort subjective perception (fig. 3) is a useful tool for intensity monitoring in exercise programs, once it is associated with the response of the cardiac frequency, blood lactate, pulmonary ventilation and $\dot{V}O_{2max}$ to exercise.

UNIVERSITÀ DEGLI STUDI DI BRESCIA

DSCS Sez. Neuroscienze
CHINESIOLOGIA

BASE	INTERMEDIO	AVANZATO
CAMMINTA SVELTA 50 % VO_{2max} 75 minuti oppure **CAMMINATA IN MONTAGNA** 50 minuti	**CORSA LENTA** 65% VO_{2max} 30 minuti oppure **PEDALATA 25 km/h** 30 minuti	**HIIT** 1 minuto ALL OUT 4 minuti 50% VO_{2max} 4 RIPETIZIONI oppure **PEDALATA IN SALITA** 20 minuti

Attività aerobica da svolgere **3 volte a settimana**

UNIVERSITÀ DEGLI STUDI DI BRESCIA

DSCS Sez. Neuroscienze
CHINESIOLOGIA

BASE

CORPO LIBERO

- SQUAT
- PIEGAMENTI SU BRACCIA
- ADDOMINALI CRUNCH
- DORSALI A TERRA

30 secondi esercizio
60 secondi recupero
3 ripetizioni per esercizio

INTERMEDIO

LOW LOAD

- LEG PRESS
- BENCH PRESS
- ABDOMINAL CRUNCH
- LAT MACHINE

10 ripetizioni
4 serie - 60 secondi recupero
50% 1RM

AVANZATO

HIGH LOAD

- SQUAT CON BILANCERE
- PANCA PIANA
- PLANK 60 secondi
- TRAZIONI ALLA SBARRA

5 ripetizioni
3 serie - 120 secondi recupero
80% 1RM

Attività di rinforzo dei grandi gruppi muscolari

da svolgere **2 volte a settimana**

UNIVERSITÀ DEGLI STUDI DI BRESCIA

DSCS Sez. Neuroscienze
CHINESIOLOGIA

Diabete

Physical Activity/Exercise and Diabetes: A Position Statement of the American Diabetes Association

Diabetes Care 2016;39:2065–2079 | DOI: 10.2337/dc16-1728

Table 3—Exercise training recommendations: types of exercise, intensity, duration, frequency, and progression

	Aerobic	Resistance	Flexibility and Balance
Type of exercise	• Prolonged, rhythmic activities using large muscle groups (e.g., walking, cycling, and swimming) • May be done continuously or as HIIT	• Resistance machines, free weights, resistance bands, and/or body weight as resistance exercises	• Stretching: static, dynamic, and other stretching; yoga • Balance (for older adults): practice standing on one leg, exercises using balance equipment, lower-body and core resistance exercises, tai chi
Intensity	• Moderate to vigorous (subjectively experienced as "moderate" to "very hard")	• Moderate (e.g., 15 repetitions of an exercise that can be repeated no more than 15 times) to vigorous (e.g., 6–8 repetitions of an exercise that can be repeated no more than 6–8 times)	• Stretch to the point of tightness or slight discomfort • Balance exercises of light to moderate intensity
Duration	• At least 150 min/week at moderate to vigorous intensity for most adults with diabetes • For adults able to run steadily at 6 miles per h (9.7 km/h) for 25 min, 75 min/week of vigorous activity may provide similar cardioprotective and metabolic benefits	• At least 8–10 exercises with completion of 1–3 sets of 10–15 repetitions to near fatigue per set on every exercise early in training	• Hold static or do dynamic stretch for 10−30 s; 2−4 repetitions of each exercise • Balance training can be any duration
Frequency	• 3–7 days/week, with no more than 2 consecutive days without exercise	• A minimum of 2 nonconsecutive days/week, but preferably 3	• Flexibility: ≥2−3 days/week • Balance: ≥2−3 days/week
Progression	• A greater emphasis should be placed on vigorous intensity aerobic exercise if fitness is a primary goal of exercise and not contraindicated by complications • Both HIIT and continuous exercise training are appropriate activities for most individuals with diabetes	• Beginning training intensity should be moderate, involving 10−15 repetitions per set, with increases in weight or resistance undertaken with a lower number of repetitions (8−10) only after the target number of repetitions per set can consistently be exceeded • Increase in resistance can be followed by a greater number of sets and finally by increased training frequency	• Continue to work on flexibility and balance training, increasing duration and/or frequency to progress over time

UNIVERSITÀ DEGLI STUDI DI BRESCIA

DSCS Sez. Neuroscienze CHINESIOLOGIA

Physical Activity/Exercise and Diabetes: A Position Statement of the American Diabetes Association

Diabetes Care 2016;39:2065–2079 | DOI: 10.2337/dc16-1728

PHYSICAL ACTIVITY AND PREGNANCY WITH DIABETES

Recommendations

- Women with preexisting diabetes of any type should be advised to engage in regular physical activity prior to and during pregnancy. **C**
- Pregnant women with or at risk for gestational diabetes mellitus should be advised to engage in 20–30 min of moderate-intensity exercise on most or all days of the week. **B**

MINIMIZING EXERCISE-RELATED ADVERSE EVENTS IN PEOPLE WITH DIABETES

Recommendations

- Insulin regimen and carbohydrate intake changes should be used to prevent exercise-related hypoglycemia. Other strategies involve including short sprints, performing resistance exercise before aerobic exercise in the same session, and activity timing. **B**
- Risk of nocturnal hypoglycemia following physical activity may be mitigated with reductions in basal insulin doses, inclusion of bedtime snacks, and/or use of continuous glucose monitoring. **C**
- Exercise-induced hyperglycemia is more common in type 1 diabetes but may be modulated with insulin administration or a lower-intensity aerobic cooldown. Exercising with hyperglycemia and elevated blood ketones is not recommended. **C**
- Some medications besides insulin may increase the risks of exercise-related hypoglycemia and doses may need to be adjusted based on exercise training. **C**
- Older adults with diabetes or anyone with autonomic neuropathy, cardiovascular complications, or pulmonary disease should avoid exercising outdoors on very hot and/or humid days to prevent heat-related illnesses. **C**
- Exercise training should progress appropriately to minimize risk of injury. **C**

UNIVERSITÀ DEGLI STUDI DI BRESCIA

DSCS Sez. Neuroscienze CHINESIOLOGIA

Diabetes: Exercise Programming

Modes	Goals	Intensity/Frequency/ Duration	Time to goal
Aerobic			
Large muscle activities	▪ Increase aerobic capacity ▪ Increase time to exhaustion ▪ Increase work capacity ▪ Improve BP response to exercise ▪ Reduce cardiovascular risk factors	▪ 50-80% peak HR* ▪ 50-80% $\dot{V}O_{2peak}$* ▪ Monitor RPE** ▪ 4-7 sessions/week ▪ 20-60 min/session	4-6 months
Strength			
Free weights Weight machines Elastic tubing or bands	▪ Increase maximal number of reps ▪ Improve performance for patients interested in competition	▪ Low resistance, high repetitions for most clients ▪ High resistance OK for patients with well-controlled diabetes	4-6 months
Anaerobic			
High-intensity intervals	Only for athletes in good diabetic control	Same as for nondiabetic athletes	
Flexibility			
Stretching/yoga	▪ Maintain/increase ROM ▪ Improve gait	Limited data available; 2-3 sessions/week may suffice	4-6 months
Neuromuscular			
Yoga	▪ Improve balance ▪ Improve coordination		
Functional			
Activity-specific exercise	▪ Increase ADLs ▪ Increase vocational potential ▪ Increase physical self-confidence	Individualized to each client	

*Lower-intensity activity may be advisable if complications are present or if diabetes is of long duration. The majority of persons with type 2 diabetes will benefit from low- to moderate-intensity physical activity of 40-70% $\dot{V}O_{2max}$.

**RPE is especially useful in persons whose HR has been altered by autonomic neuropathy or medications.

UNIVERSITÀ DEGLI STUDI DI BRESCIA

DSCS Sez. Neuroscienze
CHINESIOLOGIA

A 47-year-old woman with hypertension, hyperlipidemia, obesity, and type 2 diabetes presented for weight loss and improvement in glycemic control. She had undergone a cardiac catheterization, which showed diffuse diabetic coronary artery disease, especially at the left anterior descending with a proximal 70% stenosis at the first diagonal, 80% ostial stenosis, and a 90% mid left anterior descending coronary stenosis. Subsequently she had undergone a percutaneous transluminal coronary angioplasty with stent placements at the proximal, mid, and distal left anterior descending coronary artery. She denied chest pain, shortness of breath, or nausea. Her past medical history was pertinent for bilateral fourth finger Dupuytren's contracture and adhesive capsulitis of the right shoulder.

S: "I'm here because they tell me I need to exercise."

O: Vitals

Height: 5 ft 5 in. (1.65 m)
Weight: 231 lb (105 kg)
BMI: 38.57 kg/m^2
HR: 66 contractions/min
BP: 130/76 mmHg
Obese female in no acute distress

Labs

Fasting glucose: 199 mg/dl
A1c: 10.2% (normal range: 3.8-6.3%)
Triglycerides: 222 mg/dl
Total cholesterol: 170 mg/dl
HDL: 41 mg/dl
LDL: 99 mg/dl

Graded Exercise Test (Modified Balke Protocol)

Peak $\dot{V}O_{2peak}$: 14.7 · kg^{-1} · min^{-1}
Peak RPE: 18/20
Peak HR: 122 contractions/min
Peak BP: 204/74 mmHg
ECG: Sinus rhythm at rest and throughout exercise and recovery
No dysrhythmias and no report of chest discomfort

Mode	Frequency	Duration	Intensity	Progression
Aerobic (recumbent bike, elliptical walker, rower)	3 sessions/week	10 min/apparatus	RPE 11-13/20 HR 94-105 contractions/min	Add 1 min/week up to 15 min/apparatus.
Strength (all major muscle groups)	3 sessions/week	2-3 sets of 10-15 reps	~40-50% 1RM	Increase to 18-20 reps, then to ~50-60% 1RM.
Flexibility (all major muscle groups)	Daily	Hold each stretch for 6-10 s	Maintain stretch below discomfort point	Increase to 20 s as tolerated. Add rotator cuff stretch.
Neuromuscular				
Functional				
Warm-up and cool-down	Before and after each session	5-10 min	Below talk test level RPE 7-9/20	

UNIV
DEGL
DI BR

DSCS Sez. Neuroscienze
CHINESIOLOGIA

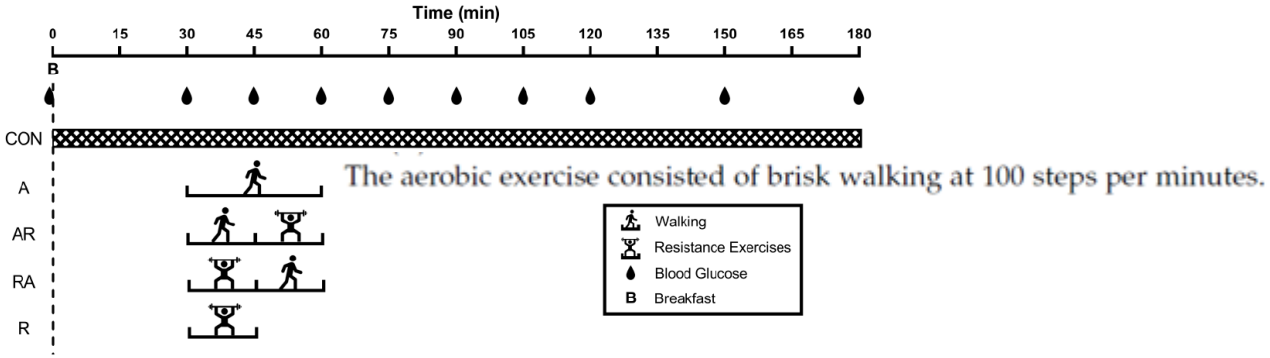


Figure 1. Graphic representation of the study design. Participants performed 30 min of walking (A), combined aerobic and resistance exercise (AR), combined resistance and aerobic exercise (RA), or 15 min of resistance exercise (R), starting 30 min after the beginning of the meal. A control (CON) condition was also performed.

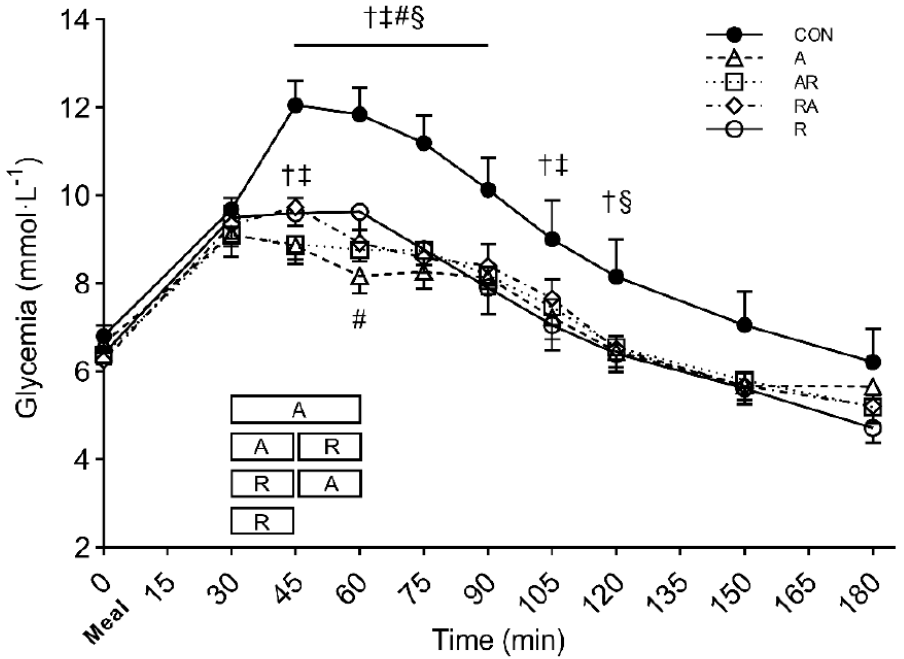


Figure 2. Glycemic time course of the five experimental conditions. Symbols: †, $P < 0.05$ vs. A; ‡, $P < 0.05$ vs. AR; #, $P < 0.05$ vs. RA; §, $P < 0.05$ vs. R. The boxes in the graphs illustrate the exercise bout and the arrows illustrate the meal. Values are reported as mean (±SEM).

nutrients MDPI

Brief Report

The Effect of Different Postprandial Exercise Types on Glucose Response to Breakfast in Individuals with Type 2 Diabetes

Alessio Bellini [1], Andrea Nicolò [1], Rocco Bulzomi [2], Ilenia Bazzucchi [1] and Massimo Sacchetti [1,*]

[1] Department of Movement, Human and Health Sciences, University of Rome "Foro Italico", Piazza Lauro De Bosis 6, 00135 Rome, Italy; alessiobellini1@gmail.com (A.B.); andrea.nicolo@yahoo.com (A.N.); ilenia.bazzucchi@uniroma4.it (I.B.)
[2] ASL RM 2, Centro di Diabetologia, Casa della Salute, Via Antistio 12, 00174 Rome, Italy; rocco.bulzomi@aslroma2.it
* Correspondence: massimo.sacchetti@uniroma4.it; Tel.: +39-06-3673-3281

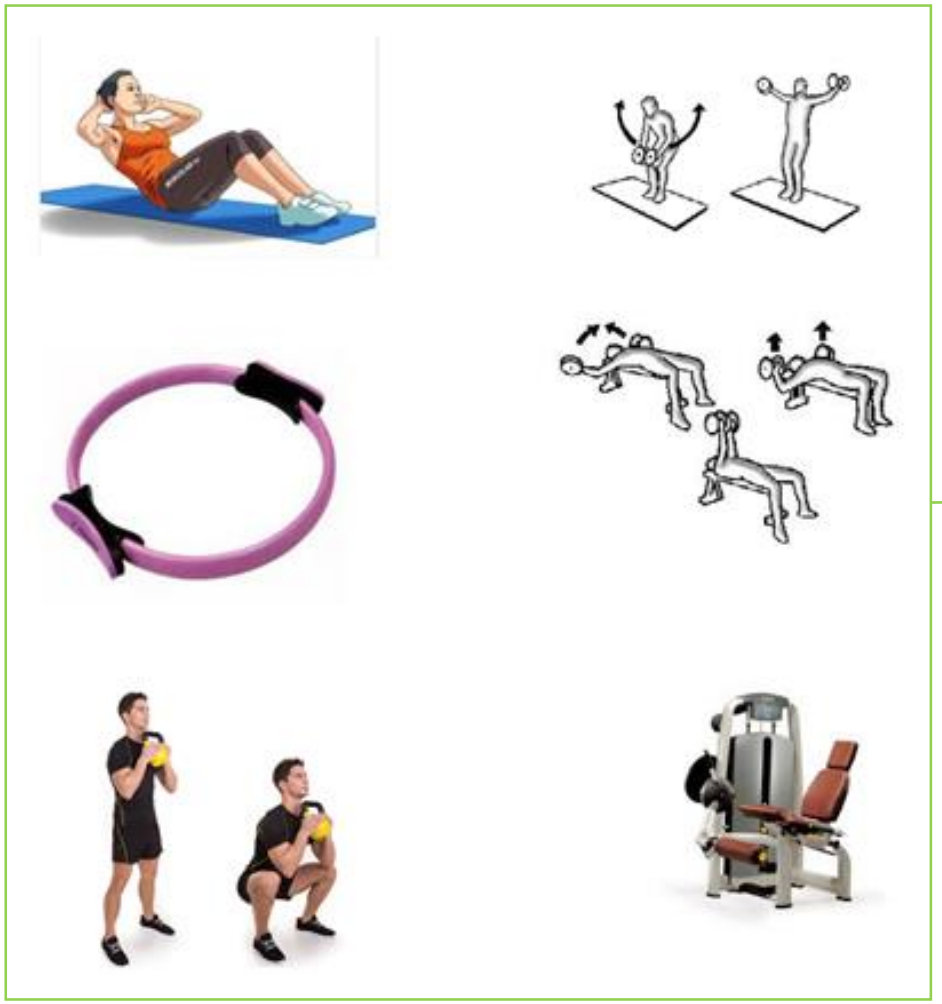
UNIVERSITÀ DEGLI STUDI DI BRESCIA

DSCS Sez. Neuroscienze CHINESIOLOGIA

Controllo Glicemia e Pressione Arteriosa prima di svolgere attività motoria

Attività di palestra combinata aerobica + RT al lunedì, mercoledì e venerdi

15' Cardio (cyclette, tapis-roulant, ellittica, vogatore)



Attività di forza

Attività Aerobica

15 min iniziali

15 min finali

L'allenamento prevede 3 schede/sedute settimanali che variano ogni mese

Al termine della seduta di allenamento sono sempre previsti esercizi di flessibilità

15' Cardio (cyclette, tapis-roulant, ellittica, vogatore)

Controllo Glicemia e Pressione Arteriosa dopo aver svolto attività motoria

DSCS Sez. Neuroscienze

CHINESIOLOGIA

Ipertensione

UNIVERSITÀ
DEGLI STUDI
DI BRESCIA

DSCS Sez. Neuroscienze
CHINESIOLOGIA

SCIENCE AND MEDICINE IN FOOTBALL, 2017
https://doi.org/10.1080/24733938.2017.1325966

Routledge
Taylor & Francis Group

ARTICLE

Check for updates

Effects of recreational football performed once a week (1 h per 12 weeks) on cardiovascular risk factors in middle-aged sedentary men

Marco Beato[a,b], Giuseppe Coratella[c], Federico Schena[b] and Franco M. Impellizzeri[d]

[a]Department of Science and Technology, University of Suffolk, Ipswich, UK; [b]Department of Neurological and Movement Sciences, University of Verona, Verona, Italy; [c]Department of Biomedical Sciences for Health, University of Milan, Milan, Italy; [d]Department of Research and Development, Schulthess Clinic, Zurich, Switzerland

Methods: Twenty-four participants (mean ± SDs; age 44.5 ± 4.7 years, weight 81.9 ± 10.4 kg, height 175.0 ± 7.3 cm) were randomized in a football group (FG = 10) and control group (CG = 14). FG performed supervised recreational football training (five-a-side futsal match) on 36 × 18.5 m synthetic indoor and outdoor field, 60 min per week over 12 weeks.

Table 1. Summary of physiological and anthropometrical data before and after 12 weeks of recreational football practice (FG, n = 10 and CG, n = 14).

	FG pre	FG post	CG pre	CG post
Age (years)	42.9 ± 4.2		45.6 ± 4.8	
Height (m)	175.1 ± 6.7		174.9 ± 7.9	
BW (kg)	82.1 ± 10.7	82.2 ± 11.2	81.8 ± 10.6	82.0 ± 10.5
Fat mass (%)	18.5 ± 3.8	18.3 ± 3.6	20.2 ± 3.4	20.7 ± 3.6
BMI	26.7 ± 2.8	26.8 ± 2.9	26.7 ± 2.6	26.8 ± 2.7
VO_{2max} (mL $O_2 \cdot kg^{-1} \cdot min^{-1}$)	43.2 ± 4.4	45.1 ± 4.6*	41.5 ± 3.1	41.1 ± 2.8
RER	1.12 ± 0.03	1.11 ± 0.02	1.12 ± 0.03	1.11 ± 0.03
MAS (km· h^{-1})	11.8 ± 1.3	12.5 ± 1.3*	11.5 ± 1.1	11.6 ± 1.3
HR_{max} (bpm)	178 ± 11	173 ± 12	176 ± 10	173 ± 13
RPE	8.0 ± 1.2	8.0 ± 0.8	8.1 ± 0.9	7.9 ± 0.7
SBP (mmHg)	132 ± 9	129 ± 9*	128 ± 14	130 ± 13
DBP (mmHg)	90 ± 7	88 ± 5	88 ± 9	89 ± 9
MBP (mmHg)	104 ± 7	101 ± 6*	101 ± 10	103 ± 10
HR_{rest} (bpm)	59 ± 9	57 ± 3	62 ± 6	62 ± 7

All data are presented in mean ± SDs.
* $P < 0.05$ pre compared to post.
BW: body weight; BMI: body mass index; RER: respiratory exchange ratio; HR_{max}: maximum heart rate; VO_{2max}: maximal aerobic power; MAS: maximal aerobic speed; RPE: rate of perceived exertion; SBP: systolic blood pressure; DBP: diastolic blood pressure; MBP: mean blood pressure.

Practical implications

Recreational football is an effective training modality to stimulate and improve cardiovascular fitness in healthy middle-aged men. This study shows the effect of 1 h recreational football session per week and suggests that a lower training volume than recommended by ACSM guidelines can give meaningful benefits. This study suggests that people with limited free time available for participating in training programs (common barrier to physical activity) can practice recreational football 1 h per week and still have some health benefits. However, these observed changes are less pronounced than in previous football studies with more frequent training and a higher training volume.

DSCS Sez. Neuroscienze
CHINESIOLOGIA

Scand J Med Sci Sports 2014: 24 (Suppl. 1): 36–42
doi: 10.1111/sms.12278

© 2014 John Wiley & Sons A/S.
Published by John Wiley & Sons Ltd

SCANDINAVIAN JOURNAL OF MEDICINE & SCIENCE IN SPORTS

Football training improves cardiovascular health profile in sedentary, premenopausal hypertensive women

M. Mohr[1,2,3], A. Lindenskov[4], P. M. Holm[5], H. P. Nielsen[6], J. Mortensen[7,8], P. Weihe[9], P. Krustrup[1,10]

Training: FTG performed 45 ± 1-h small-sided football training sessions during the 15-week intervention period (3 matches/week).

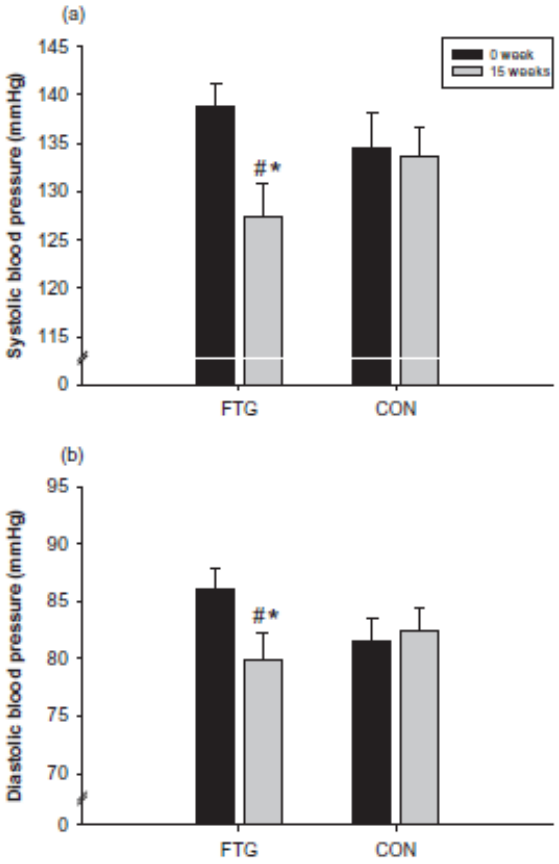


Fig. 1. Systolic and diastolic blood pressure for untrained, premenopausal, hypertensive women before and after 15 weeks of recreational football training comprising 3 × 1-h sessions per week (FTG) in comparison to an inactive control group (CON). Data are presented as means ± SEM. #Significant within-group differences. *Significant difference between FTG and CON.

Table 1b. Baseline blood, resting heart rate, and blood lipids for untrained premenopausal hypertensive women in the football training group (FTG) and the inactive control group (CON)

	SBP (mmHg)	DBP (mmHg)	MAP (mmHg)	RHR (bpm)	TPC (mmol/L)	HDL (mmol/L)	LDL (mmol/L)	Triglyceride (mmol/L)
FTG	139 ± 2	86 ± 2	104 ± 2	73 ± 2	5.8 ± 0.1	1.4 ± 0.1	3.6 ± 0.2	1.3 ± 0.1
CON	134 ± 4	82 ± 3	99 ± 2	77 ± 2	5.3 ± 0.2	1.4 ± 0.1	3.5 ± 0.2	1.0 ± 0.1

Data are means ± SE.
SBP, systolic blood pressure; DBP, diastolic blood pressure; MAP, mean arterial pressure; RHR, resting heart rate; TPC, total plasma cholesterol, plasma high-density lipoprotein (HDL)- and low-density lipoprotein (LDL)-cholesterol, as well as plasma triglyceride concentration.

Perspectives

The present study indicates that football training can be used as part of the non-pharmacological treatment of women with mild hypertension, even for those with no previous experience of football. The high training attendance and the surprisingly limited dropouts in the present study also demonstrates that recreational football is a health promoting activity with a great potential. In addition, the improved aerobic fitness may also result in an increase in the everyday life activity as it has become easier to cycle, walk the stairs, and to do shopping and gardening.

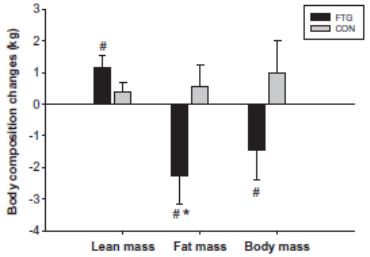


Fig. 2. Changes in body composition, including fat mass, lean body mass, and total body weight for untrained, premenopausal, hypertensive women after 15 weeks of recreational football training comprising 3 × 1-h sessions per week (FTG) in comparison to an inactive control group (CON). Data are presented as means ± SEM. #Significant within-group differences. *Significant difference between FTG and CON.

UNIVERSITÀ DEGLI STUDI DI BRESCIA

DSCS Sez. Neuroscienze
CHINESIOLOGIA

Graves et al. BMC Public Health (2015) 15:1145
DOI 10.1186/s12889-015-2469-8

BMC Public Health

RESEARCH ARTICLE Open Access

Evaluation of sit-stand workstations in an office setting: a randomised controlled trial

Lee E. F. Graves[1,2*], Rebecca C. Murphy[1], Sam O. Shepherd[1], Josephine Cabot[1] and Nicola D. Hopkins[1]

Table 3 Cardiometabolic and musculoskeletal outcomes with adjusted between-group differences and quantitative and qualitative inferences[a]

	Intervention		Control		Adjusted change 0 to 8 week (95 % CI)[b]	Probability (%) the true effect is beneficial / trivial / harmful	Qualitative inference
	Baseline	8 week	Baseline	8 week			
Vascular ($n = 24$ I, 19 C)							
FMD (%)	5.98 (2.32)	7.13 (2.42)	5.88 (2.29)	6.13 (2.64)	0.97 (−0.55 to 2.50)	75/22/3	Benefit likely
cIMT (mm)	0.62 (0.07)	0.61 (0.07)	0.58 (0.08)	0.57 (0.08)	0.00 (−0.03 to 0.02)	13/84/3	Likely trivial
Systolic BP (mmHg)	119.1 (13.8)	117.1 (12.5)	117.9 (12.1)	117.3 (9.0)	−1.6 (−7.0 to 3.7)	22/71/7	Unclear
Diastolic BP (mmHg)	73.5 (7.6)	68.9 (8.5)	71.8 (10.7)	70.5 (9.5)	−2.5 (−7.2 to 2.2)	62/35/3	Benefit possible
Blood ($n = 20$ I, 17 C)							
Glucose (mmol/L)	5.30 (0.79)	4.59 (0.84)	4.85 (0.62)	4.49 (0.55)	−0.09 (−0.56 to 0.39)	37/49/14	Unclear
Triglycerides (mmol/L)	1.65 (0.70)	1.61 (0.74)	1.61 (0.64)	1.65 (0.73)	0.11 (−0.23 to 0.45)	6/55/39	Unclear
Cholesterol (mmol/L)	4.45 (0.98)	3.79 (1.05)	3.94 (0.86)	3.78 (0.74)	−0.40 (−0.79 to −0.003)*	82/18/0	Benefit likely
Musculoskeletal discomfort/pain[c] ($n = 25$ I, 21 C)							
Lower back	2.5 (2.2)	1.8 (2.0)	2.0 (2.0)	1.7 (1.8)	−0.2 (−1.0 to 0.7)	35/50/15	Unclear
Upper back	1.9 (2.3)	1.1 (1.7)	1.2 (1.5)	1.6 (2.3)	−0.9 (−1.9 to 0.2)	83/16/1	Benefit likely
Neck and shoulder	2.6 (2.5)	1.9 (2.4)	2.1 (2.0)	2.2 (2.4)	−0.6 (−1.5 to 0.2)	63/36/1	Benefit possible

I intervention group, *C* control group, *FMD* flow-mediated dilation, *cIMT* carotid intima-media thickness, *BP* blood pressure
[a]Baseline and 8-weeks values are unadjusted mean (SD)
[b]Change scores and 95 % CIs are the differences between groups (relative to control) after adjustment by ANCOVA for the baseline value. Triglycerides ANCOVA additionally adjusted for marital status, time at current workplace and job category
[c]Values denote the severity of discomfort or pain from 0 (No discomfort) to 10 (Extremely uncomfortable)
*Significant ($p = 0.049$)

UNIVERSITÀ DEGLI STUDI DI BRESCIA
DSCS Sez. Neuroscienze CHINESIOLOGIA

1923

Mosquito

1950

Obiettivo dello studio:

E’ possibile raggiungere le raccomandazioni minime di attività fisica dell’OMS tramite l’utilizzo quotidiano della bici a pedalata assistita?

UNIVERSITÀ DEGLI STUDI DI BRESCIA

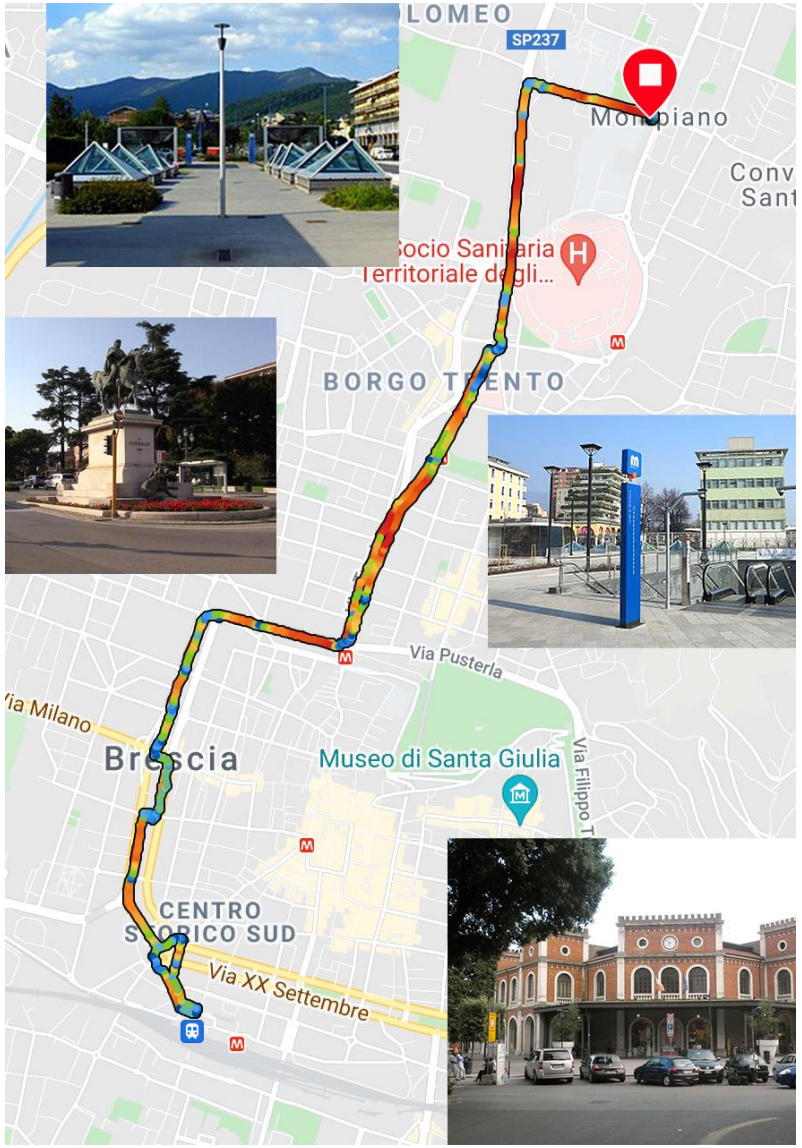
DSCS Sez. Neuroscienze CHINESIOLOGIA

Materiali e Metodi:

procedimento percorso

urbano

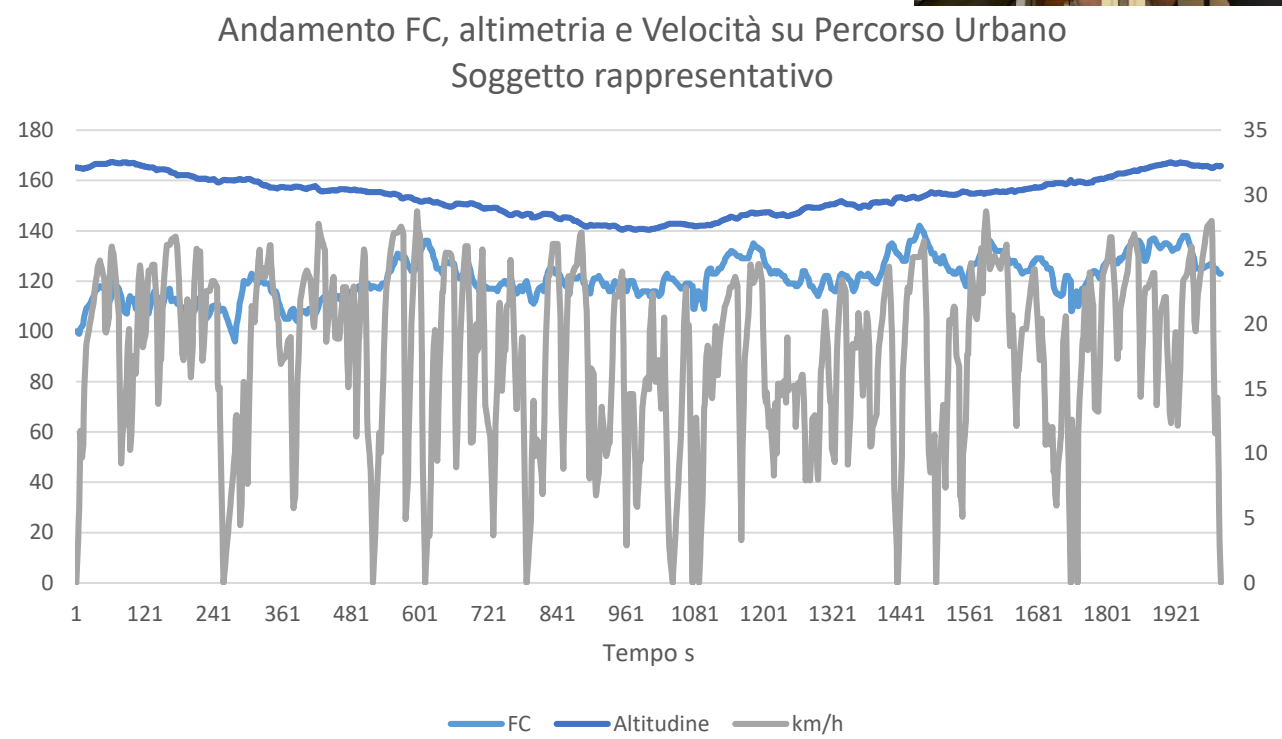
- Andata e ritorno sul percorso visibile nella figura a fianco monitorando FC, velocità, altimetria e kilometraggio.
- Velocità ”self-paced”
- Successivamente dati sono stati scaricati dall’applicazione GarminConnect su PC

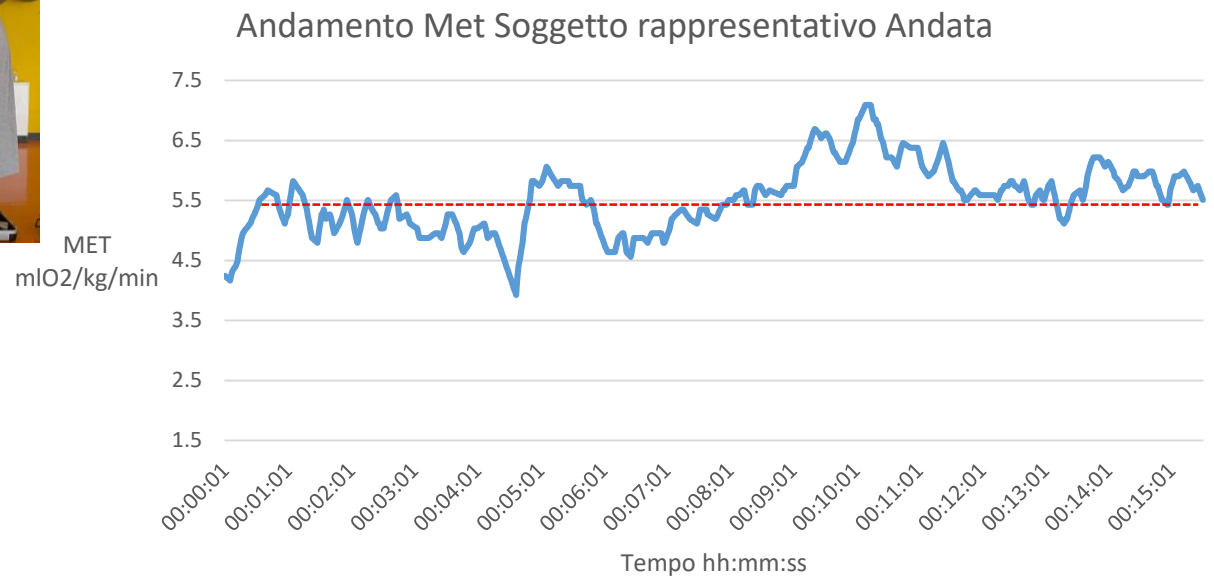


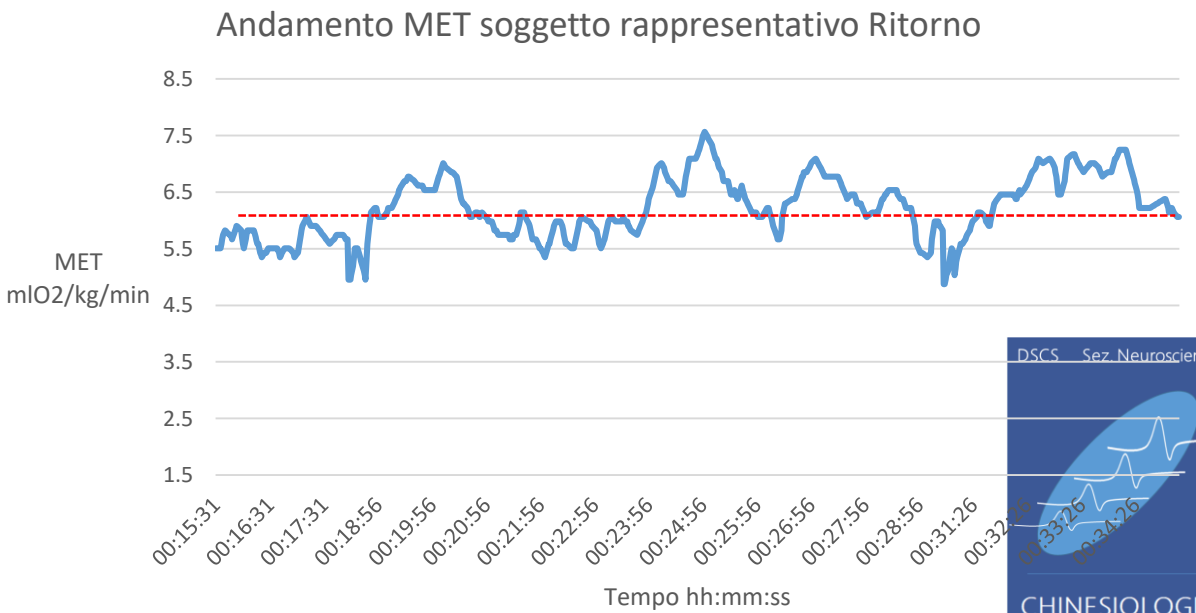
UNIVERSITÀ DEGLI STUDI DI BRESCIA

DSCS Sez. Neuroscienze
CHINESIOLOGIA

Definizione in laboratorio della relazione FC/MET

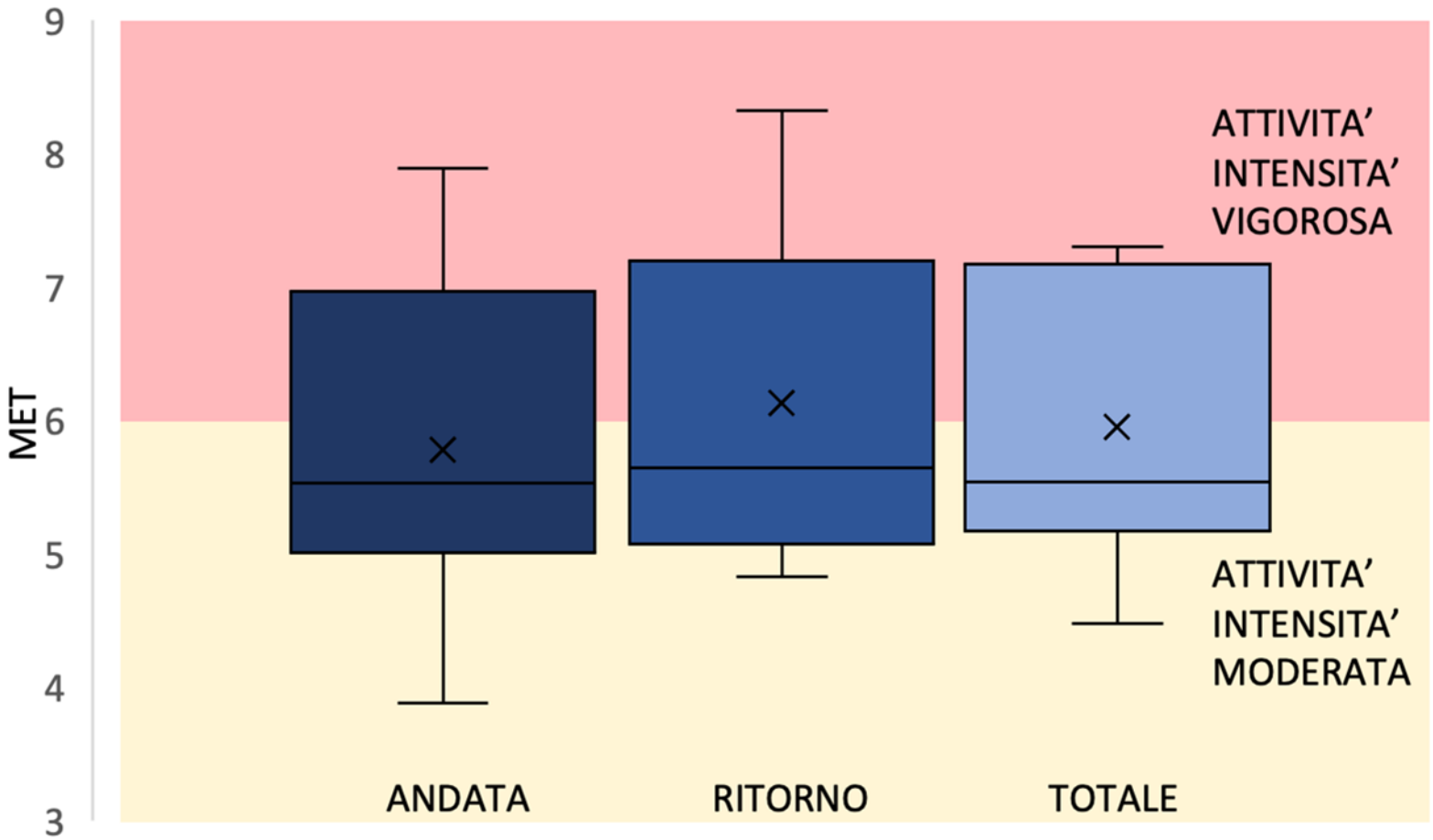






UNIVERSITÀ DEGLI STUDI DI BRESCIA

DSCS Sez. Neuroscienze
CHINESIOLOGIA



UNIVERSITÀ DEGLI STUDI DI BRESCIA

DSCS Sez. Neuroscienze
CHINESIOLOGIA

Anche l’uso delle biciclette con pedalata assistita consente di soddisfare nella vita quotidiana le raccomandazioni di esercizio fisico dell’OMS

Grazie per l'attenzione

UNIVERSITÀ
DEGLI STUDI
DI BRESCIA

DSCS Sez. Neuroscienze
CHINESIOLOGIA