Exercising in times of COVID-19: what do experts recommend doing within four walls?

Miguel Ángel Rodríguez Irene Crespo Hugo Olmedillas

PIL: 51885-5857(20)30141-9
DOI: https://doi.org/doi:10.1016/j.rec.2020.04.001
Reference: REC 10273
To appear in: Revista Española de Cardiología (English Edition)

Received Date: 2 April 2020
Accepted Date: 3 April 2020

Please cite this article as: Rodriguez M, Crespo I, Olmedillas H, Exercising in times of COVID-19: what do experts recommend doing within four walls?, Revista Española de Cardiología (English Edition) (2020), doi: https://doi.org/10.1016/j.rec.2020.04.001

This is a PDF file of an article that has undergone enhancements after acceptance, such as the addition of a cover page and metadata, and formatting for readability, but it is not yet the definitive version of record. This version will undergo additional copyediting, typesetting and review before it is published in its final form, but we are providing this version to give early visibility of the article. Please note that, during the production process, errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

© 2020 Published by Elsevier.
Exercising in times of COVID-19: what do experts recommend doing within four walls?

Ejercitarse en tiempos del COVID-19: ¿qué recomiendan hacer los expertos entre cuatro paredes?

Miguel Ángel RODRÍGUEZ,⁴ Irene CRESPO,⁴b and Hugo OLIMEDILLAS⁴c,⊥

⁴ Departamento de Biología Funcional, Universidad de Oviedo, Oviedo, Asturias, Spain
⁴ Instituto de Biomedicina, Universidad de León, León, Spain
⁴ Instituto de Investigación Sanitaria del Principado de Asturias (ISPA), Oviedo, Asturias, Spain

⊥ Corresponding author: Departamento de Biología Funcional, Universidad de Oviedo, Campus del Cristo B, Julián Clavería s/n, 33006 Oviedo, Spain.

E-mail address: olmedillashugo@uniovi.es (H. Olmedillas).

Since its emergence in Wuhan (China) at the end of December 2019, the coronavirus disease 2019 (COVID-19) has spread rapidly around the world. On January 30, 2020, the World Health Organization (WHO) declared it as public health emergency of international concern and in less than 2 months, on March 11, classified it as a pandemic.¹² In early April, more than 950 000 cases were confirmed, with more than 48 000 deaths worldwide.³

Although China is managing to slow the incidence of new infections through extremely disciplined measures, European countries such as Italy and Spain, and most recently the United States, have been overwhelmed by the current emergency. Thus, many countries have declared indefinite quarantines aiming to decrease the infection rate and avoid overloading health systems. Lockdown is considered the best option to protect health, but in particularly vulnerable people (those aged ≥ 65 years, and those with serious heart conditions, chronic lung disease, diabetes, obesity, and chronic kidney and liver disease), sedentary behaviors have a strong impact. Therefore, it is important to preserve lifestyles and particularly the practice of physical exercise.

There is irrefutable evidence of the beneficial role of physical exercise in disease prevention, as an adjuvant treatment in chronic diseases, and in psychological wellbeing. Furthermore, exercise could also have a protective effect on the immune system, whose optimal status is crucial to respond
adequately to the threat of COVID-19. This is especially important in chronically ill patients, who are the most affected by “the enemy”. However, this point is unresolved and further research is needed to clarify whether any type of exercise (volume, intensity) increases susceptibility to infection. Maintaining physical activity levels is key to addressing sedentary behavior as well as to mitigating the psychological impact of quarantine, since sedentariness has a well known detrimental effect on cardiovascular function. In view of the current lockdown, it has become necessary to modify and adapt regular exercise programs from outdoor to home conditions, taking advantage of both the space and material available. It is of the utmost importance to follow the recommendations of scientific societies, health institutions and experts. However, there are still doubts on the most suitable characteristics of the exercise to be taken, such as type, frequency, duration, volume, and intensity.

For a long time, 10 000 steps/d have been established as the minimum amount necessary for a person to be considered “physically active”, with a slightly lower number for elderly and chronically ill patients (7000-10 000) and higher digits for children and adolescents (> 11 000-13 000, approximately). Recently, this threshold has been questioned and a lower mortality rate has been found in older women who walked 4400 steps/d, obtaining the maximum benefits at 7500 steps/d. Moreover, the role of intensity seems to be decisive in achieving these recommendations, and the number of steps can be reduced if cadence is increased at certain times of the day (≥ 100 steps/min) or if the activity is vigorous. In parallel, the physical activity guidelines for Americans, published by the United States Department of Health and Human Services, advises at least of 150 to 300 min/wk of moderate-intensity, or 75 to 150 min/wk of vigorous-intensity aerobic physical activity for healthy adults, with a minimum of 2 muscle-strengthening sessions per week. Specifically, children and adolescents are encouraged to do > 60 minutes of moderate-to-vigorous activity per day, while elderly persons and those with chronic diseases should perform multicomponent programs including aerobic, strengthening, flexibility, and balance exercises. However, since 1 in 4 adults worldwide do not meet the minimum recommendations, and the current lockdown makes it even more difficult, a new approach is required to achieve a level of healthy physical exercise.
We agree completely with the statement that, in terms of cardiovascular health, “something is better than nothing”\textsuperscript{,11} Nonetheless, we intend to establish more precise knowledge about the most beneficial exercise guidelines, bearing in mind the individual demands of each person and the particular situation of the quarantine. In this regard, Jiménez-Pavón et al.\textsuperscript{12} have performed an exhaustive critical analysis of the most appropriate recommendations for exercise, especially those targeting the elderly. The authors have brilliantly suggested adjusting the international guidelines on physical activity to the current situation. In this way, they propose increasing exercise frequency from 5 to 5-7 days per week, the amount of aerobic exercise from 150-300 to 200-400 min/wk, incorporating more strength training, balance and coordination routines, and controlling the intensity, which should be moderate to avoid detrimental effects. Based on these ideas, we analyzed the exercise guidelines created specifically by several of the most renowned health care institutions, both internationally and nationally (Spain). Table 1 summarizes the main recommendations of each of these institutions\textsuperscript{13-18}.

Overall, all the entities provide the same general recommendations, which is to remain active at home, take short active breaks, and avoid excessive sedentary periods. Following these recommendations, the organizations show some examples of exercises that can be done at home, including both aerobic and strength training. As shown in table 1, the American Heart Association (AHA) suggests a weight and cardio combined circuit training program. In addition to this, the AHA, the WHO, the Spanish Society of Cardiology/Spanish Heart Foundation (Sociedad Española de Cardiología/Fundación Española de Corazón, SEC/FEC), and the Spanish Society of Sports Medicine (Sociedad Española de Medicina del Deporte, SEMED) include stretching exercises among their protocols; SEMED also includes respiratory exercises, while AHA and SEC/FEC recommend activities to improve balance. Nevertheless, none of the institutions make specific recommendations on series and repetitions, intensity or frequency, and most of them advise using online classes or mobile apps.

Portable health gadgets have ensured that it has never been easier for users without prior knowledge to quantify and monitor exercise routines. However, due to the wide range of platforms dedicated to
the promotion of physical exercise, it is necessary to consult information channels developed by scientific societies, clinicians and sports health professionals to achieve optimal cardiovascular and skeletal muscle fitness, within the limits allowed by the quarantine.

In conclusion, the most representative institutions in terms of physical exercise and health have created spaces and recommendations to encourage people to continue to be physically active during the lockdown. The population should perform multicomponent full-body programs including aerobic, strengthening, balance, and stretching exercises. Furthermore, cognitive tasks are strongly recommended in the elderly to preserve cognitive ability and brain activity.

CONFLICTS OF INTEREST

The authors declare no potential conflicts of interest with respect to the research, authorship and/or publication of this article.

REFERENCES

1. World Health Organization. Statement on the second meeting of the International Health Regulations (2005) Emergency Committee regarding the outbreak of novel coronavirus (2019-nCoV). Available at: https://www.who.int/news-room/detail/30-01-2020-statement-on-the-second-meeting-of-the-international-health-regulations-(2005)-emergency-committee-regarding-the-outbreak-of-novel-coronavirus-(2019-ncov). Accessed 3 Apr 2020.

2. World Health Organization. WHO Director-General’s opening remarks at the media briefing on COVID-19 - 11 March 2020. Available at: https://www.who.int/dg/speeches/detail/who-director-general-s-opening-remarks-at-the-media-briefing-on-covid-19---11-march-2020. Accessed 3 Apr 2020.

3. Eficients. Coronavirus statistics | Live update | World, Italy, France, Germany, UK, Spain, Switzerland, South Korea, USA. Available at: https://www.eficients.com/coronavirus-statistics/. Accessed 30 Mar 2020.

4. Li G, Fan Y, Lai Y, et al. Coronavirus infections and immune responses. J Med Virol. 2020;92:424–432.
5. Ballesta García I, Rubio Arias JÁ, Ramos Campo DJ, Martínez González-Moro I, Carrasco Poyatos M. High-intensity Interval Training Dosage for Heart Failure and Coronary Artery Disease Cardiac Rehabilitation. A Systematic Review and Meta-analysis. Rev Esp Cardiol. 2019;72:233-243.

6. Simpson RJ, Krüger K, Walsh NP, et al. Can Exercise Affect Immune Function to Increase Susceptibility to Infection? Exerc Immunol Rev. 2020;26:8–22.

7. Brooks SK, Webster RK, Smith LE, et al. The psychological impact of quarantine and how to reduce it: rapid review of the evidence. Lancet. 2020;395:912–920.

8. Tudor-Locke C, Bassett DR. How Many Steps/Day Are Enough? Preliminary Pedometer Indices for Public Health. Sport Med. 2004;34:1–8.

9. Lee IM, Shiroma EJ, Kamada M, Bassett DR, Matthews CE, Buring JE. Association of Step Volume and Intensity with All-Cause Mortality in Older Women. JAMA Intern Med. 2019;179:1105–1112.

10. Piercy KL, Troiano RP, Ballard RM, et al. The physical activity guidelines for Americans. JAMA. 2018;320:2020–2028.

11. Zhu W. If you are physically fit, you will live a longer and healthier life: An interview with Dr. Steven N. Blair. J Sport Heal Sci. 2019;8:524–526.

12. Jiménez-Pavón D, Carbonell-Baeza A, Lavie CJ. Physical exercise as therapy to fight against the mental and physical consequences of COVID-19 quarantine: Special focus in older people. Prog Cardiovasc Dis. 2020. https://doi.org/10.1016/j.pcad.2020.03.009.

13. American College of Sports Medicine. Exercise is Medicine. Available at: https://www.exerciseismedicine.org/support_page.php/stories/?b=892. Accessed 3 Apr 2020.

14. American Heart Association. Create a Circuit Home Workout Infographic. Available at: https://www.heart.org/en/healthy-living/fitness/getting-active/create-a-circuit-home-workout. Accessed 3 Apr 2020.
15. Consejo General de la Educación Física y Deportiva. Recomendaciones para seguir manteniendo estilos de vida activos durante el estado de alarma. Available at: https://www.consejo-colef.es/recomendaciones-covid19?pgid=k7wxb5zp-0da10423-65aa-4fe2-8abb-a50c56a5ad42. Accessed 3 Apr 2020.

16. Fundación Española del Corazón. Pautas para hacer ejercicio en casa durante la situación de emergencia por el coronavirus. Available at: https://fundaciondelcorazon.com/blog-impulso-vital/3513-pautas-para-hacer-ejercicio-en-casa-durante-la-situacion-de-emergencia-por-el-coronavirus.html. Accessed 3 Apr 2020.

17. Sociedad Española de Medicina del Deporte, Agencia de Protección de la Salud en el Deporte, Consejo General de Colegios Oficiales de Médicos de España. Recomendaciones de la Sociedad Española de Medicina del Deporte, de la Agencia de Protección de la Salud en el Deporte y del Consejo General de Colegios Oficiales de Médicos de España en relación con el entrenamiento de deportistas en el estado de alarma decretado en España. http://www.femede.es/documentos/Recomendaciones_enfermedad_cronica-01.pdf. Accessed 3 Apr 2020.

18. World Health Organization. Stay physically active during self-quarantine. http://www.euro.who.int/en/health-topics/health-emergencies/coronavirus-covid-19/novel-coronavirus-2019-ncov-technical-guidance/stay-physically-active-during-self-quarantine. Accessed 3 Apr 2020.
Table 1. Summary of the exercise recommendations by the main health care institutions

| Institution | Walking | Strength | Yoga |
|-------------|---------|----------|------|
| ACSM13      | Walk briskly around the house, or up and down the stairs (10-15 min x 2-3 times/d) | Strength workout app (eg, 7-min workout) | Yoga |
|             | Dance   | Do a strength training video |      |
|             | Jump ropes | Strength training around the house (eg, squats from a sturdy chair, push-ups against a wall, lunges) |      |
|             | Do an exercise video | Cardio machines (if available) |      |

| Institution | Additional Exercises | Additional Exercises | Additional Exercises |
|-------------|----------------------|----------------------|----------------------|
| AHA14       | ▪ Jumping jacks       | ▪ Plank and side plank | ▪ Stretching exercises |
|             | ▪ Jumping ropes       | ▪ Push-ups            | ▪ Balance exercises   |
|             | ▪ Jogging/marching in place | ▪ Sit-ups or crunches |      |
|             | ▪ Stair climbing or step-ups | ▪ Hip-lift or bridge position |      |
|             | ▪ High knees          | ▪ Triceps dips on a chair |      |
|             | ▪ Mountain climbers   | ▪ Lunges              |      |
|             | ▪ Star jumps          | ▪ Squats or chair position |      |
|             | ▪ Burpees             | ▪ Wall sits            |      |
|             | ▪ Circuit Training    | ▪ Weightlifting exercises (body weight) | ▪ Balance and coordination exercises |
|             | (alternate cardio and strength exercises; 2-3 x 30 sec short bursts) | ▪ Weightlifting exercises (eg, dumbbells, bottles, packages) | ▪ Stretching exercises (eg, yoga) |
|             | ▪ Active breaks       | ▪ Resistance band exercises, or clothes, belt, etc. | ▪ Balance exercises |
|             | ▪ Walk around the house | ▪ Run down the hall, crawl on all fours, side jumps |
|             | ▪ Active videogames   | ▪ Aerobic             |      |
|             | ▪ Online routines     | ▪ Dance               |      |
|             |                      | ▪ Cardio machines (if available) |      |
|             |                      | ▪ Run down the hall, crawl on all fours, side jumps |      |

| Institution | Additional Exercises | Additional Exercises | Additional Exercises |
|-------------|----------------------|----------------------|----------------------|
| COLEF15     | ▪ Active breaks      | ▪ Weightlifting exercises (body weight) | ▪ Stretching exercises (eg, yoga) |
|             | ▪ Walk around the house | ▪ Resistance band exercises, or clothes, belt, etc. | ▪ Balance exercises |
|             | ▪ Active videogames  | ▪ Run down the hall, crawl on all fours, side jumps |      |
|             | ▪ Online routines    | ▪ Aerobic             |      |
|             |                      | ▪ Dance               |      |
|             |                      | ▪ Cardio machines (if available) |      |
|             |                      | ▪ Run down the hall, crawl on all fours, side jumps |      |

| Institution | Additional Exercises | Additional Exercises | Additional Exercises |
|-------------|----------------------|----------------------|----------------------|
| SEC/FEC16   | ▪ Active breaks      | ▪ Weightlifting exercises (eg, dumbbells, bottles, packages) | ▪ Stretching exercises |
|             | ▪ Walk around the house | ▪ Resistance band exercises, or clothes, belt, etc. | ▪ Respiratory exercises |
|             | ▪ Active videogames  | ▪ Run down the hall, crawl on all fours, side jumps |      |
|             | ▪ Online routines    | ▪ Aerobic             |      |
|             |                      | ▪ Dance               |      |
|             |                      | ▪ Cardio machines (if available) |      |
|             |                      | ▪ Run down the hall, crawl on all fours, side jumps |      |

<InlineShape1>
| World Health Organization | • Walk around the house  
• Dance  
• Do an online exercise class  
• Knee to elbow  
• Side knee lifts | • Plank  
• Back extensions  
• Squat  
• Superman  
• Bridge  
• Chair dips | • Stretching exercises |

ACSM, American College of Sports Medicine; AHA, American Heart Association; CGCOM, Consejo General de Colegios Oficiales de Médicos; COLEF, Consejo General de la Educación Física y Deportiva; ESSA, Exercise & Sport Sciences Australia; SEC, Sociedad Española de Cardiología; SEMED, Sociedad Española de Medicina del Deporte; WHO, World Health Organization.