



Effect of a home-based exercise training program on anthropometric characteristics and exercise performance during Covid-19 quarantine in young high-level kayak athletes

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Abstract

Purpose The Covid-19 restriction exposed most athletes to insufficient training stimuli leading to detraining. This study investigated whether a home-based exercise training program could preserve body composition and exercise performance in young high-level kayak athletes during Covid-19 restriction.

Methods Seventeen healthy young high-level kayak athletes (10 males and 7 females), aged 14.7 ± 1 yrs, participated in this study. A 7-week home-based training program was followed during Covid-19 restriction. Baseline measurements were assessed 4 weeks before Covid-19 pandemic and ended on 4 May 2020. Body composition, flexibility, isometric muscle trunk strength (Biodex), anaerobic power (30-s all-out trial), and aerobic capacity (4-min maximal test) were evaluated. Personal daily loads and wellness details were collected with AthleteMonitoring.com software.

Results Home-based exercise training program was effective to improve flexibility ($9.20 \pm 2.85\%$) and lean body mass ($3.96 \pm 0.89\%$), to maintain muscle strength, anaerobic power, body mass, and body fat percentage but insufficient to maintain aerobic capacity ($-8.96 \pm 2.49\%$).

Conclusion The findings of the present study potentially highlight the importance of the implementation of such a program to minimize the detraining effect on young athletes during periods of movement restriction caused by pandemics.

Keywords Home-based exercise · Covid-19 · Athletes · Body composition · Physical fitness · Aerobic capacity

Abbreviations

ANOVA Analysis of variance

BMI Body mass index

F/E ratio Ratio of flexion/extension peak torque

HR Heart rate

MPO Mean power output

RER Respiratory exchange ratio

RPTE Relative extension peak torque

RPTF Relative flexion peak torque

$\dot{V}O_{2max}$ Maximum oxygen consumption

WHO World Health Organization

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Introduction

Human coronavirus SARS-CoV-2 (Covid-19 disease) is considered a serious infection that was first notified in December 2019, in Wuhan, China, and since then, was rapidly transmitted and affected the nations all over the world [1]. In Greece, Covid-19 disease was confirmed on 26 February 2020 and the government implemented national lockdown for 43 days, from 23 March 2020 to 4 May 2020, following the World Health Organization (WHO) recommendations to mitigate the virus propagation. Concerning athletes and sports, this

national restriction and social distancing suggest that the organized exercise training was suddenly stopped, and all national competitions were interrupted or/and canceled.

During Covid-19 restriction, a great number of athletes exercised alone and emphasised on physical well-being and health maintenance instead of athlete specificity due to lack of equipment and facilities [2, 3]. Consequently, important training characteristics such as intensity, duration, frequency, and mode have been reported to be reduced [2–9]. It is well known that inappropriate exercise training stimulus leads to reversibility of training adaptations in athletes and physically active individuals [4–6]. Indeed, Covid-19 restriction has been demonstrated to negatively affect aerobic capacity (i.e., reduction of maximal oxygen consumption), muscle strength, muscle mass, body fat, and exercise performance in different sports, i.e., basketball [10, 11], soccer [12, 13], handball [10, 13–15], and cycling [16]. Furthermore, physical inactivity and home isolation increase mental health issues including stress, depression, anxiety, fear, confusion, irritability, and boredom, impact the quality of sleep, modify wellness habits, and promote sedentary behavior*** such as sleep deficiency, longer sitting periods, and poor diet [17–20].

Several strategies have been used to comply with Covid-19 lockdown restrictions such as a home-based exercise training program [2, 5, 12, 15, 16, 21, 22]. These programs aimed to promote appropriate training load to maintain or/and enhance physical fitness and technical properties [2, 12–16, 21]. Home-based training programs have been observed that when follows the quantity and quality of exercise that American College of Sports Medicine is recommended [23] seem to be effective to preserve physical fitness and health in adults, whereas may be not enough to support the physical condition of highly trained individuals during long movement restrictions. However, there is a lack of information regardings the effectiveness of home-based training programs to preserve fitness level in high-level Kayak athletes during the Covid-19 restriction. To our knowledge, only one previous study has investigated the physical activity, quality of sleep, and sitting time in Kayak and Canoe athletes during Covid-19 restriction [6], whereas no studies have explored the effect of a supervised home-based exercise training program to prevent detrimental effects on body composition, general fitness, and exercise performance in young high-level kayak athletes during Covid-19 restriction in Greece. Accordingly, the aim of this study was to investigate whether a home-based exercise training program was effective to preserve body composition, aerobic capacity, and exercise performance in young high-level kayak athletes. We hypothesized that the implementation of a home-based exercise training program would minimize the detraining effect on young athletes during Covid-19 pandemics.

Methods

Participants

Seventeen healthy young high-level Kayak athletes (10 males and 7 females), aged 14.7 ± 1 yrs, volunteered to participate in this study. All participants were finalists in the recent age-group Greek Championship and members of the long-term athletic development program of the National Canoe-Kayak Federation. Anthropometric characteristics are shown in Table 1. All procedures were in accordance with the Declaration of Helsinki and approved by the local Medical School University's Ethical Committee (SESC/No 7/25–6-2020), while parental consent forms were obtained after a detailed written description of the procedures, possible risks, and benefits, previously sent to their parents.

Experimental design

Athletes were admitted to a home-based exercise training program consisting of moderate to heavy intensity intermittent exercise, lasting for approximately 7 consecutive weeks (43 days). Prior to and upon completion of the home-based exercise program, athletes were assessed for anthropometric characteristics, body composition, flexibility, handgrip strength, isometric muscle trunk strength, anaerobic power, and aerobic capacity. All athletes were familiarized with the exercise testing procedures as they regularly performed it according to the long-term athlete development program. Especially, all athletes did the evaluations 4 weeks before the initiation of Covid-19 restriction. These data were used

Table 1 Anthropometric characteristics and body composition of kayak athletes prior and after a home-based exercise training program during Covid-19 restriction

	Participants (n = 17)	
	Pre-covid	Post-exercise
Age, yrs	14.7 ± 1	
Height, cm	167 ± 9	169 ± 8*
Body mass, kg	60.77 ± 13.87	62.31 ± 12.67
Arm Span, cm	174.1 ± 11.29	175.5 ± 10.55
BMI kg·m ²	21.57 ± 3.24	21.63 ± 2.97
LBM, kg	45.48 ± 9.97	47.10 ± 9.50*
Fat, %	22.32 ± 6.04	22.57 ± 6.65
SUM 9, mm	109.18 ± 37.02	110.32 ± 32.77

Values are mean ± SD

BMI body mass index, *LBM* lean body mass, *SUM* sum of the nine skinfolds

*Significant difference between prior and after a home-based exercise training program $p < 0.01$

as baseline values. Participants repeated the same exercise tests during the 1st week afterwards the Covid-19 restriction is lifted following the Health Ministry's guidelines. All assessments were carried out at the same time of the day for each athlete.

Home-based exercise training program

Athletes were instructed to attend and execute an online home-based exercise training program according to their age and physical level for a cumulative period of 45 min·day⁻¹, 3 days·week⁻¹ for approximately 7 consecutive weeks (43 days). A typical training program consisted of whole-body warm-up followed by moderate to heavy intensity interval exercise of aerobic fitness, muscle strength (elastic bands, light barbells, suspension bands), stretching functional training, and cool down. Especially, athletes performed 4–6 sets of interval aerobic exercise program (60–80% HR_{max}) consisting of 8–10 exercises involving large muscle groups (i.e., jumping jacks, burpees, running in place, alternative knees up, squat jumps, jumping rope, arm circles, trunk rotations, lunges, mountain climbers), lasting 30 s per exercise, with 10-s rest intervals between exercise and 1 min between sets. Muscle strength exercise was performed in a circuit approach with soft weights (i.e., elastic bands, barbells, suspension bands) and body weight. Athletes performed 2–4 sets with 8–12 repetitions at moderate intensity (RPE:12–16) in each major muscle group (i.e., reverse flies, front raises, standing or upright rows, overhead band pull, biceps curls, shoulder abductions, external-internal rotators, shoulder extension, overhead squats, leg extensions, calf flexions). Exercise intensity was expressed as a percentage of maximal heart rate recorded during the exercise (HR_{max}: 60–80%) and monitored using the rate of perceived exertion through 20-Borg's scale (RPE:12–16). All exercise sessions were conducted under the supervision of university scientists and coaches. The aim of this home-based exercise training program was to maintain the physical condition of athletes during Covid-19 restriction. Furthermore, psychological, nutritional, medical, and health advice has been provided to the participants and their parents via well-organized online lectures one time·week⁻¹. All participants were self-reported to the AthleteMonitoring.com software to track their daily training load and wellness variables (i.e., sleep habits, incidents of injuries, or/and illness) [24]. AthleteMonitoring.com software offers a wide range of capabilities to securely manage medical, training, performance, and administrative data into an easy-to-use platform, allowing athletes to optimize their health and performance, manage workload and recovery, minimize risk or injury, manage medical records, optimize return to competitions, streamline performance and fitness progress tracking, and

facilitates and improve communication between athletes, coaches, medical teams and administration.

Measurements

Assessment of anthropometric characteristics and body composition

Stature height and body mass were measured using a stadiometer (SECA 213 Stadiometer, Germany) and a calibrated digital scale (SECA 770, Germany) to the nearest 0.5 cm and 0.1 kg, respectively. Arm span was assessed using a flexible tape at the level of the extended hands of the participants. Body mass index (BMI) was calculated from the participant's height and weight as follows: BMI = Body mass/Stature height² (kg/m²). Body composition was evaluated according to the skinfold thickness method at the chest, triceps, biceps, abdominal, subscapular, iliac crest, axilla, thigh, and calf using gender-specific equation development by Jackson and Pollock [25, 26] to determine body density, body fat, and lean body mass. The intraclass correlation coefficients (ICCs) from our laboratory are 0.93 (95% confidence interval [CI] 0.89–0.97) for body fat and 0.98 (95% CI 0.95–0.99; $p < 0.0001$; $n = 10$) for LBM, respectively.

Exercise performance assessment

Assessment of maximum isometric trunk flexion and extension strength

After a 10-min standardized whole-body warm-up, the participants, first, performed the isometric trunk flexion and extension maximum strength evaluations, using a Biodex 4 (Model 2000, Multi-joint System 4 Pro, Biodex Corporation, Shirley, NY, USA) isokinetic dynamometer. The procedures of muscle trunk strength evaluation have been described in detail in a previous study [27]. Briefly, participants seated in the dual position back extension/flexion attachment (830–450 Attachment, Back Dual Position Ex/Flex, Biodex Corporation, Shirley, NY, USA), with their hip angle at 90°, their trunk upright, thighs parallel to the ground, and their arms crossed over the chest and stabilized using the Biodex's Velcro straps. Afterward, the participants performed a familiarization session, which consisted of 3 submaximal isometric trunk flexion and extension repetitions. After a 10-min rest period, the maximum isometric trunk flexion and extension strength were assessed by 3 maximal intensity efforts of 4-s duration with 2*min recovery between each effort, in a counterbalanced order. Participants were verbally encouraged to maximally activate their muscle trunk throughout each exercise bout. The highest value of the three maximal

efforts according to the highest peak torque was recorded for each trial (flexion and extension). Relative flexion (RPTF) and extension (RPTE) peak torques were expressed according to participants' body mass, while the ratio of flexion/extension peak torque (F/E ratio) was calculated as well.

Assessment of anaerobic power

After at least 10 min of resting followed by a 10-min standardized incremental warm-up, a 30-s all-out effort on an air-braked kayak ergometer (Kayak Pro Compact Ergometer, USA) was performed. Drag factors were set at 44 for boys and 35 for girls. Maximal covered distance, average stroke rate, and peak power output were evaluated.

Assessment of maximum oxygen consumption ($\dot{V}O_{2max}$)

After at least 30-min of recovery from a 30-s all-out trial, participants performed a 4-min maximal exercise test to voluntary exhaustion on the same kayak ergometer (Kayak Pro Compact Ergometer, USA) to determine $\dot{V}O_{2max}$. The resistance level on the Kayak Pro Compact Ergometer machine flywheel was set at '1' for all participants and drag factor corresponded to 44 for boys and 35 for girls. Maximal covered distance, average stroke rate and mean power output during 4-min trial were evaluated. Heart rate (HR) was continuously monitored by telemetry (Sport Tester™, Polar, Kempele, Finland). Gas exchange and ventilatory variables were recorded continuously breath by breath via a portable open-circuit spirometry (K5, COSMED, Italy). Especially, the K5 portable unit was placed and secured on the participant's back before testing with an anatomic harness. $\dot{V}O_{2max}$ was considered as the highest mean value recorded during the last 10 s of the 4-min all-out trial as suggested previously [28] when at least two of the following criteria were satisfied: (1) heart rate ± 10 beats·min⁻¹ of the aged-predicted maximum, (2) respiratory exchange ratio (RER) ≥ 1.0 and (3) rate of perceived exertion greater than 19 according to the 6–20 scale Borg's scales [29]. The ICC for $\dot{V}O_{2max}$ was 0.87 (95% CI 0.81–0.94; $n = 7$).

Assessment of handgrip strength and flexibility

Maximum isometric upper body muscle strength was measured via handgrip strength test using a portable hydraulic dynamometer (Jamar 5030J1, Horsham, USA). Participants performed three maximal intensity isometric contractions (3 s) for each hand with 1 min rest between trials with their forearm at a 90° in standing position. The best performance of each hand was recorded [30]. The ICC for handgrip test was 0.93 ($p < 0.001$). Evaluation of low back and hamstring flexibility was performed with the sit and reach test as it

has previously described [30]. Two trials were performed, and the best trial was recorded. The ICCs for the flexibility was 0.91.

Statistical analysis

Shapiro–Wilks and Kolmogorov–Smirnov tests were used for assessing data normality. No violations of normality distribution were found ($p > 0.05$). Paired t -test was used to evaluate possible differences in anthropometric characteristics and exercise performance between pre and post home-based exercise training (IBM SPSS Statistics 26). Data throughout the text and tables are reported as mean and standard deviation (\pm SD). Data in all figures are presented as means and standard error of measurement (\pm SEM) rather than SD for clarity of illustration. The level of statistical significance was set at $p \leq 0.05$.

Results

Anthropometric characteristics

Anthropometric characteristics of the participants are shown in Table 1. Following a home-based exercise training program, as expected, significant differences were found in stature height ($p = 0.001$). Lean body mass ($p < 0.01$) was increased significantly from the baseline values, whereas body mass ($p = 0.052$), body mass index ($p = 0.785$), body fat ($p = 0.720$), and sum of the nine skinfolds ($p = 0.787$) were similar before and after a home-based exercise training program.

Exercise performance

All participants fulfilled the criteria of maximal exertion. Following a home-based exercise training program, there was a significant reduction ($p = 0.023$) in relative extension peak torque ($-10.60 \pm 4.19\%$), whereas no significant differences were found in relative flexion peak torque ($p = 0.0295$) and F/E ratio ($p = 0.083$) (Table 2). However, handgrip strength and flexibility were significantly improved by $9.20 \pm 2.85\%$ and $14.33 \pm 6.89\%$, respectively, following a home-based exercise training program (Table 2).

Regarding aerobic capacity, $\dot{V}O_{2max}$ significantly deteriorated ($p = 0.002$) following a home-based exercise training program (Fig. 1). The magnitude of $\dot{V}O_{2max}$ reduction was $8.96 \pm 2.49\%$. In addition, no significant changes in HR_{max} (pre-Covid19: 194 ± 7.46 beats·min⁻¹ and post-exercise: 192 ± 7.98 beats·min⁻¹, $p = 0.325$) and RER_{max} (pre-Covid19: 1.10 ± 0.05 and post-exercise: 1.10 ± 0.06 , $p = 0.403$) were found following a home-based exercise training program. The MPO and covered distance during

Table 2 Flexibility, handgrip strength, and maximum isometric trunk flexion and extension strength of kayak athletes prior and after a home-based exercise training program during Covid-19 restriction

	Participants ($n=17$)	
	Pre-covid	Post-exercise
Flexibility, cm	34.10 ± 7.30	$35.84 \pm 6.25^*$
Handgrip, kg	38.88 ± 16.74	41.61 ± 15.23
RPTF, $\text{Nw} \cdot \text{kg}^{-2}$	2.05 ± 0.51	1.97 ± 0.46
RPTE, $\text{Nw} \cdot \text{kg}^{-2}$	4.05 ± 0.82	$3.68 \pm 0.83^*$
F/E ratio	51.94 ± 9.25	56.36 ± 14.67

Values are mean \pm SD

RPTF relative flexion peak torque, RPTE relative extension peak torque, F/E ratio ratio of flexion–extension peak torque

*Significant difference between prior and after a home-based exercise training program $p < 0.01$

4 min maximal trial were similar before and after a home-based exercise training program, whereas stroke rate was significantly decreased ($p = 0.005$) following a home-based exercise training program (Fig. 1).

Following a home-based exercise training program, covered distance and stroke rate during 30-s all-out trial were significantly increased ($p = 0.022$) and decreased ($p = 0.004$),

respectively, whereas MPO was similar before and after a home-based exercise training program (Fig. 2).

Post home-based exercise training program, flexibility ($p = 0.007$) and handgrip strength ($p = 0.046$) were significantly improved following a home-based exercise training program (Table 2). Finally, wellness such as fatigue, health, sleep quantity and quality, soreness, and stress were not significantly changed ($p = 0.111$ – 0.529 , $\eta^2 = 0.198$ – 0.367) during Covid-19 restriction.

Discussion

We investigated whether a supervised home-based exercise training program would provide sufficient training stimulus to counteract the detraining effect due to periods of movement restriction caused by Covid-19 pandemic. The main findings of this study indicated that the home-based exercise training program improved flexibility and lean body mass, and maintained muscle strength, anaerobic capacity, body weight, and body fat percentage, whereas it appeared to be insufficient to preserve aerobic capacity. To our knowledge, this is the first study to explore the effects of a home-based exercise training program lasting 7 weeks during Covid-19

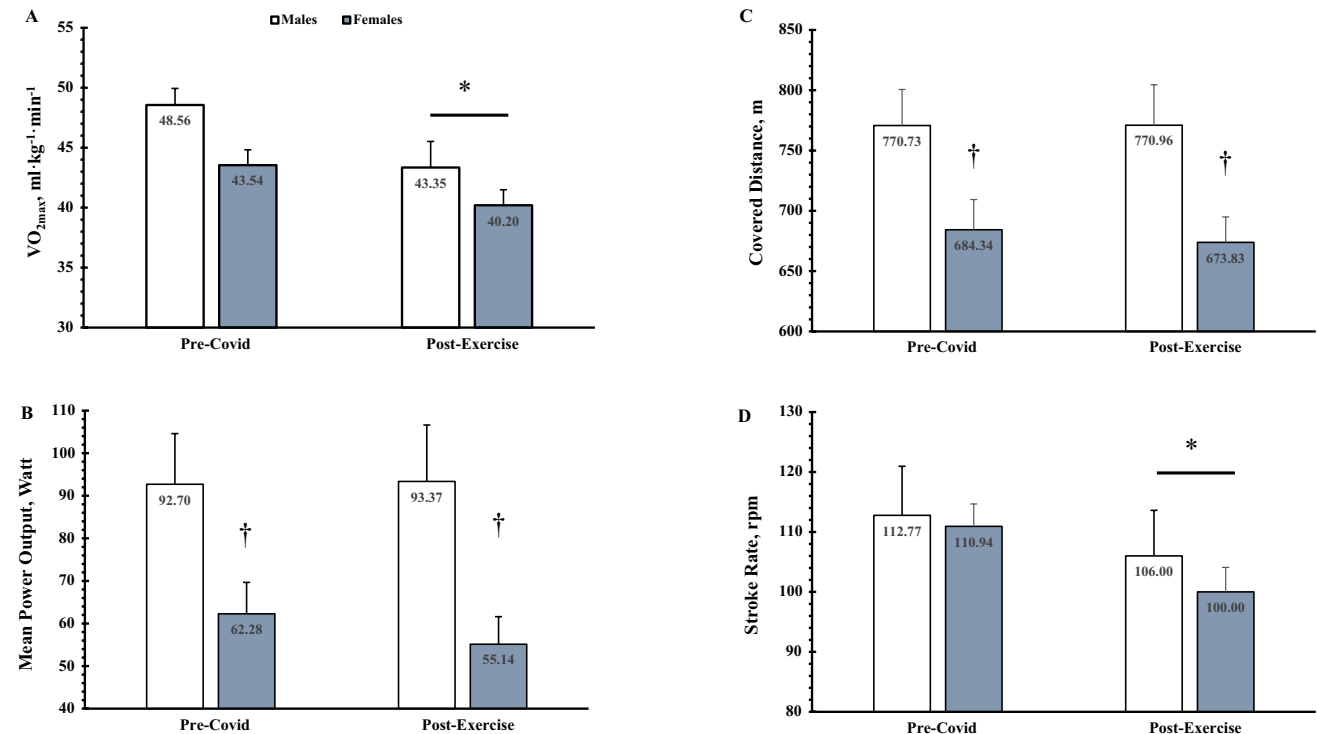


Fig. 1 Maximal oxygen consumption (A), mean power output (B), covered distance (C), and stroke rate (D) during 4-min maximal exercise test in Kayak athletes prior and after a home-based exercise

training program during Covid-19 restriction. *Significant difference between prior and after a home-based exercise training program $p < 0.01$

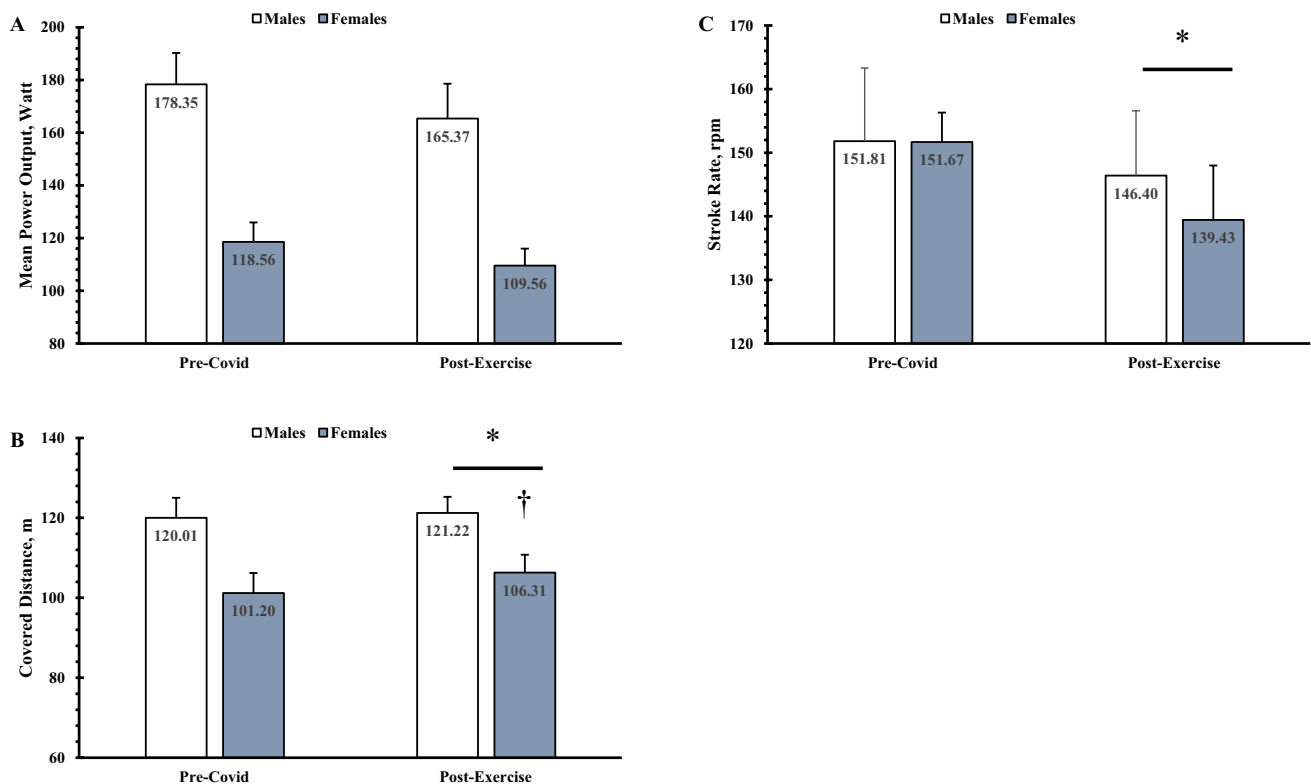


Fig. 2 Mean power output (**B**), covered distance (**C**), and stroke rate (**D**) during 30-s all-out effort in Kayak athletes prior and after a home-based exercise training program during Covid-19 restriction.

*Significant difference between prior and after a home-based exercise training program $p < 0.01$

restriction on body composition and exercise performance in high-level kayak athletes.

Covid-19 restriction has totally changed the daily training routines of most athletes worldwide. Indeed, training quantity (i.e., average duration of training session and overall training time), volume, and intensity have been found to decrease (15–34%) during Covid-19 restriction in high-level or/and elite athletes [6, 16, 31]. Consequently, athletes were not exposed to appropriate training loads leading to partial or complete reversal of training adaptations known as detraining effect. It is well known that body composition, cardiorespiratory fitness, muscle strength, and exercise performance deteriorate during periods of insufficient training stimulus [10, 11, 22]. The magnitude of physiological and athletic performance reduction depends on time of training reduction or cessation and the initial level of athletes' physical fitness.

Muscle stretching training is beneficial to develop and improve flexibility, range of motion of the joints, and exercise performance as well as may reduce the injury incidents in healthy active individuals [32, 33]. Physical inactivity or/and training cessation has been shown to decrease flexibility of the major muscle groups and limit the range of motion in major joints (hip, trunk, shoulder, and spine) by 7–30% in

healthy individuals [10]. In the current study, the flexibility of the lower back and hamstrings was significantly improved ($9.20 \pm 2.85\%$) following the home-based exercise training program during Covid-19 restriction in high-level kayak athletes (Table 2) in consistent with previous studies [34, 35]. It is suggested that this mode of exercise should be planned and included in the exercise program of Kayak athletes to enhance the physical fitness component of flexibility.

The insufficient training stimulus, the reduction in the amount of physical activity in combination with social distancing and home isolation resulting from the Covid-19 quarantine promotes sedentary behavior and impaired nutritional habits [9, 17, 36]. Therefore, these could lead to a positive energy balance and negatively affect athletes' body mass and body composition [17, 22, 37, 38]. Previous investigations reported significant increases in body mass, body fat, and a decrease in resting metabolic rate following ~42 days of training cessation in athletes [38, 39]. In this study, no significant differences were found in body weight, body mass index, and body fat percentage, whereas lean body mass was significantly increased following the home-based training program during Covid-19 restriction in high-level kayak athletes (Table 1). Previous studies that investigated the effect of remote-home training during Covid-19

restriction on body composition in a variety of athletes of different sports reported that body composition is well preserved [21, 40]. In the current study, the lean body mass improvement may be the result of intense maturation events of the participants [41]. Unfortunately, the maturation status of the participants was not able to be measured.

In the present study, we found that muscle strength and anaerobic capacity were preserved during Covid-19 restriction. In particular, handgrip strength (Table 2), maximal isometric trunk flexion strength (Table 2), MPO, and covered distance during 30-s all-out trial (Fig. 2) were similar pre and post-the home-based exercise training program. The above findings are in line with previous studies that reported preservation of maximal muscular force production strength as assessed through maximal partial squat strength one repetition (1RM) and 15 m sprint performance following a 12-week prescribed home-based and group-based training during the Covid-19 restriction in football players [31]. Furthermore, muscle strength endurance as assessed via push-ups was improved following an 8-week high-intensity interval Tabata training during the Covid-19 restriction in handball players [34]. It seems that body-weight bearing and light-weight exercises are an effective way to preserve or/and enhance muscle strength in pandemic-induced restriction.

Regarding aerobic capacity, as assessed through $\dot{V}O_{2max}$ has been reported to decrease by 6–20% during long term, greater than 4 weeks, insufficient training stimulus [11]. In the current study, the home-based moderate to heavy intensity interval training program consisting of aerobic, muscle strength, and stretching exercises was insufficient to preserve $\dot{V}O_{2max}$. Indeed, the average $\dot{V}O_{2max}$ reduction was $8.96 \pm 2.49\%$, consistent with that reported in previous studies during Covid-19 restriction [12, 16, 42] and post-season detraining period [43, 44]. It seems that a supervised home-based exercise training program during the Covid-19 restriction was an insufficient stimulus to maintain aerobic capacity in high-level kayak athletes. Similarly, Font et al. [21] reported that a 9-week structured home-based training program consisted of muscle strength and endurance training was inadequate to preserve aerobic capacity as assessed through a 20-m shuttle run test in high-level handball players [21]. It is worth mentioning that exercise performance during 4-min maximal exercise did not decrease during lockdown. In particular, MPO and covered distance were similar following the home-based exercise training program (Fig. 1). It is probably to expect a rapid recovery of the initial level of athletes' physical fitness (pre-Covid-induced restrictions) with the return to regular training conditions.

A special methodological concern is that this study should be considered descriptive as used a one-group pre- post-test design without a control group. Thus, this study report changes in body composition and exercise

performance over the 7-week home-based exercise training program during the Covid-19 restriction. Unfortunately, causality inference is not feasible with this experimental design. In addition, the exercise intensity of the home-based training program was moderate to heavy as athletes neither were appropriately prepared nor had suitable equipment at home that allow them to exercise at higher intensities due to the unpredictable nature of the Covid-19 pandemic. However, the aim of this study was to investigate whether a moderate to heavy intensity home-based exercise training program would preserve body composition, aerobic capacity, and exercise performance in young high-level kayak athletes. Finally, this study was conducted on young, high-level kayak athletes. Thus, these results may not necessarily apply to athletes with different characteristics.

In conclusion, flexibility of the lower back and hamstrings and lean body mass were improved, whereas body mass, body fat (%), general muscle strength, and maximal performance in 30 s all-out effort were preserved in high-level kayak athletes during a 7-week supervised home-based exercise training program during the Covid-19 restriction. However, the training stimulus was insufficient to maintain the aerobic capacity of high-level Kayak athletes. It seems that training intensity maintenance is the determinant to preserve training-induced physiological and performance adaptation.

It is critical that athletes maintain their strength and anaerobic fitness levels after the pandemic time, which will be regarded as a comparable procedure to the transition period. Our findings may emphasize the necessity of implementing such programs to reduce the detraining effect on young athletes during periods of activity limitation. However, particular in-water training at an appropriate intensity proves to be an essential contribution to preserving aerobic capacity in elite water polo players, during restricted training periods.

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Declarations

Conflict of interest The authors have no conflicts of interest to declare that are relevant to the content of this article.

Ethical approval All procedures were in accordance with the Declaration of Helsinki and approved by the local Medical School University's Ethical Committee (SESC/No 7/25–6-2020).

Consent to participate Parental consent forms were obtained after a detailed written description of the procedures, possible risks, and benefits, previously sent to their parents.

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