Impact of Remote Training on Body Composition, Cardiopulmonary, Strength, Power, and Kinematic in Professional Male Soccer Players During Pandemic Times

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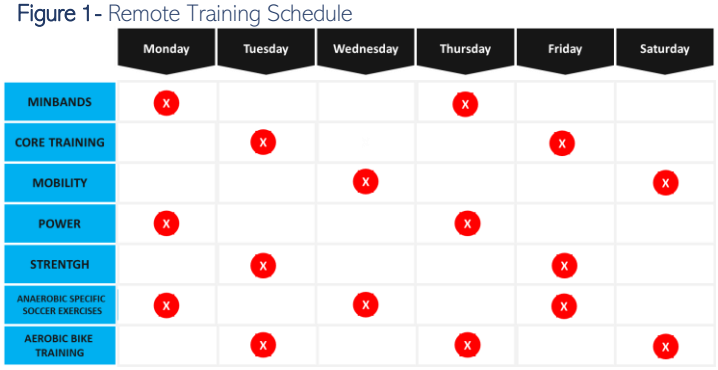
Background: With competitions suspended and training facilities closed, following the social distancing imposed by the SARS-CoV-2 pandemic, sports staffs had to create strategies to maintain athletes' fitness.

Objectives: This study examined the fitness differences in the preseason and after 5 weeks of remote training (RT-Figure 1) on male professional soccer players.

Material and Methods: Twelve athletes (age=25.3±5.1 years old) were enrolled after performing cardiopulmonary exercise-test (CPET), body composition (BC), countermovement-jump (CMJ), isokinetic strength tests (IST), eccentric hamstring strength (EHS), adduction maximal voluntary isometric contractions (AMVIC) and kinematic analysis (KT). Paired t-test explored differences between variables and effect size (ES) was calculated by Hedge´s g.

Figure 1- Remote Training Schedule



Results: A very small effect on ES was found for BC and CPET values. IST showed an increase on left (g=1.52; %Δ=-28.93) and right (g=1.47; %Δ=30.12) leg concentric extension but not on leg curl tests. EHS increased on left (g=0.78; %Δ=20.3) and on right (g= 0.81; %Δ= 14.1) legs. AMVIC reduced on left (g= -0.70; %Δ=-12.97) and right ((g=-0.69; %Δ=-12.44) sides. Despite no difference on CMJ height, both concentric (g=1.07; %Δ=17.15) and eccentric peak power (g= 1.42; %Δ=36.84) have increased. On KT, significant changes on single leg squat left knee flexion (g=0.89; %Δ=11.13) and left (g=0.6; %Δ=46.15) and right knee varus (g=0.97; %Δ=122.22), bilateral squat trunk flexion (g=0.83; %Δ=12.53) and overhead squat left knee flexion (g=0.71; %Δ=5.59) were observed.

Table 1- Summary results for all fitness test comparison between PSC and PRTC

	Mean ± SD*				
Fitness Tests	*PSC*	*PRTC*	p values	Efect size (95%CI)	% change
Boddy Composition					
Weigth (kg)	77.8±9.1	78.5±9.1	0.1	-0.07(-0.16 to 0.01)	0.9%
Muscle mass(Kg)	38.4±4.5	38.3±5.1	0.764	0.02(-0.1 to 0.14)	-0.26%
Fat mass(Kg)	10.9±2.4	11.7±2.4	0.058	0.33(-0.01 to 0.67)	7.34%
% Muscle mass	49.3±1.5	48.7±2	0.057	-0.34(-0.69 to 0.02)	-1.22%
% Fat mass	14±2.5	13.9±2.5	0.097	-0.04(-0.09 to 0.01)	-0.72%
Cardiopulmonary					
pVO_2(L/min)	3.64±0.4	3.57±0.4	0.265	0.2(0.48 to -0.09)	-1.92%
pVO_2 (ml/Kg/min)	45.6±4.9	45.5±2.9	0.848	-0.04(-0.42 to 0.35)	-0.22%
pHR (bpm)	174.7±11.9	174.1±9.6	0.848	-0.05(-0.6 to 0.49)	-0.34%
pPO(W)	304.4±31.2	289.3±36.3	0.002	-0.57(-1.17 to 0.06)	-4.84%
VO2@VT1 (L/min)	2±0.3	2±0.4	0.533	0.12(-0.27 to 0.52)	0,0%
HR@VT1(bpm)	124.3±17.2	129.4±17.4	0.196	0.26(0.18 to -0.69)	4.1%
PO@VT1(W)	141.1±20.9	150.3±31.5	0.203	0.34(-0.18 to 0.85)	6.52%
VO2@VT2(L/min)	2.7±0.4	2.7±0.4	0.341	0.21(-0.21 to 0.61)	0.1%
HR@VT2(bpm)	153.1±14.2	153.1±14.9	1	0(-0.63 to 0.63)	0.1%
PO@VT2(W)	212.4±29.5	213.5±32.4	0.875	0.02(-0.34 to 0.38)	0.52%
Strength and power					
KEL(N)	381.2±71.8	491.5±72.6	<0.001	1.52(0.78 to 2.25)	28.93%
KER(N)	390.8±68	508.5±95.5	0.003	1.47(0.76 to 2.16)	30.12%
KFL(N)	313.4±52.1	314.5±50.9	0.856	0.02(-0.19 to 0.23)	0.35%
KFR(N)	320±44.1	330.6±44.3	0.3	0.23(-0.2 to 0.64)	3.31%
EHS-L (N)	339.7±98	410.9±84.1	0.003	0.78(0.21 to 1.33)	20.96%
EHS-R (N)	364.9±71.8	416.5±56.3	0.009	0.81(0.18 to 1.41)	14.14%
AMVIC-L (N)	411.8±74.2	358.4±76.2	0.003	-0.7(-1.12 to -0.27)	-12.97%
AMVIC-R (N)	403.5±70.4	353.3±74.5	0.004	-0.69(-1.11 to -0.25)	-12.44%
CMJ(cm)	39.8±5.1	41.8±5.2	0.258	0.39(-0.28 to 1.04)	5.03%
CPP(W/kg)	47.8±9	56±6	0.001	1.07(0.43 to 1.69)	17.15%
EPP (W/kg)	19±4.5	26±5.3	0.002	1.42(0.58 to 2.23)	36.84%
Kinematics					
SLS - FLK(°)	97.9±11.7	108.8±12.8	0.019	0.89(0.17 to 1.58)	11.13%
SLS-ValgoLK(°)	-5.4±7.8	-13.8±19.5	0.204	-0.57(-1.37 to 0.26)	155.56%
SLS-VarusLK(°)	20.8±12	30.4±19.1	0.037	0.6(0.06 to 1.12)	46.15%
SLS - FRK(°)	99.2±15.1	109.3±15.3	0.063	0.66(-0.01 to 1.31)	10.18%
SLS-ValgoRK(°)	-11.3±8.5	-18.1±26.6	0.304	-0.34(-0.95 to 0.27)	60.18%
SLS-VarusRK(°)	15.3±10.3	34±25.3	0.035	0.97(0.1 to 1.8)	122.22%
BSq-FLK(°)	113.8±12.2	115.6±11.4	0.588	0.15(-0.37 to 0.67)	1.58%
BSq-FRK(°)	116±10.8	115.3±11.3	0.816	-0.09(-0.58 to 0.4)	-0.6%
BSq-TF(°)	39.1±6.5	44±5.3	0.021	0.83(0.15 to 1.48)	12.53%
OVD-FLK(°)	112.7±8.9	119.4±11	0.019	0.71(0.14 to 1.26)	5.59%
OVD-FRK(°)	112±8.6	117.4±17.3	0.257	0.4(-0.27 to 1.05)	4.82%
OVD-TF(°)	36.8±7	35.5±3.6	0.432	-0.23(-0.73 to 0.27)	-3.53%

Conclusion

Five weeks of RT promoted significant changes in several muscles' strength and power, as well as joint movement but not on BC and cardiopulmonary fitness. Studies like this will render as a wellspring to refine RT among elite athletes.