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ABSTRACT

COVID-19 caused by the coronavirus SARS-CoV-2, became a worldwide pandemic in 2019. To prevent risks from SARS-CoV-2 infection during major competitions, athletes could get the COVID-19 vaccine. However, many athletes are hesitant to receive the COVID-19 vaccination because they are concerned that vaccinosis symptoms might affect their exercise performance.

The goal of this study was to measure the impact of anti-COVID-19 vaccination on anaerobic lactic and alactic power. Therefore, 36 young healthy subjects between 18 to 35 years old referred to the laboratory before and in a period of 5 to 21 days after anti-COVID-19 vaccination (mRNA Pfizer or Moderna) first or second dose. All subjects performed blood sampling and an all-out 30s ergo-cycle anaerobic Wingate test with continuous power output calculation. During the traditional Wingate test, the subject must pedal as fast as possible for 30 seconds against a resistance calculated on the basis of his body-weight.

Vaccination has increased the activated partial thromboplastin time, actin factor sensitive ratio, thrombin time, lymphocytes and LDH. Wingate test performance showed no significant changes before and after vaccine in average power, maximum power and fatigue index.

Recent COVID-19 vaccination stimulates blood clotting and elevates circulating LDH. Therefore, the vaccine disrupts hemostasis, increases immune response and tissue damage. However, those subclinical effects does not affect anaerobic pathways and allow to maintain muscular anaerobic lactic and alactic performance.

INTRODUCTION

COVID-19, a common infectious illness, inducing severe acute respiratory syndrome caused by the coronavirus SARS-CoV-2, became worldwide pandemic in 2019. Covid-19 vaccination has been proposed to prevent risks from SARS-CoV-2, including for athletes during major competitions (1,2). However, many athletes are hesitant to receive the COVID-19 vaccination because they are concerned that vaccinosis symptoms might affect their exercise performance (3).

AIM OF THE STUDY

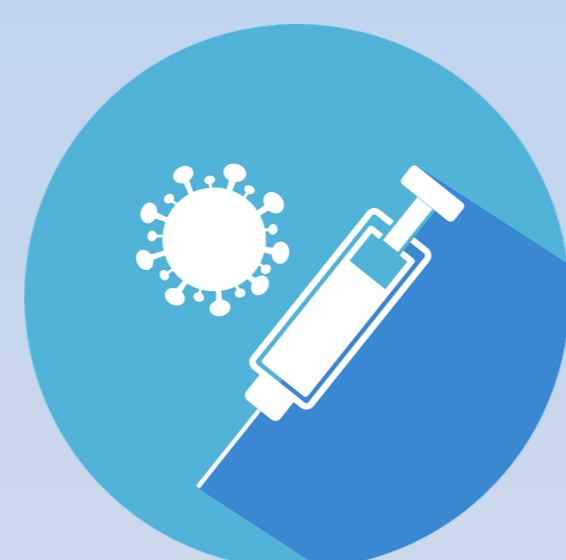
The goal of the present study is to measure the impact of anti-COVID-19 vaccination on health indicators and maximal anaerobic lactic and alactic performance, measured with a Wingate test.

METHODS

A sample of 36 young healthy subjects, between 18 to 35 years old, referred to the laboratory on 2 occasions; before and in a period of 7 to 21 days after anti-COVID-19 vaccination (mRNA Pfizer or Moderna) first or second dose injection.

During each visit, all subjects underwent ;

- Health questionnaire
- Fasting blood sampling
- Wingate Test



The Wingate test is an all-out 30s ergo-cycle test with continuous power output calculation. After 5 min of unloaded pedaling warm-up, the subject pedaled as fast as possible for 30 seconds against resistance, calculated on the basis of his body-weight. Power output was recorded continuously during the exercise.

RESULTS

One subject has to be excluded because presenting deep-vein thrombosis.

Blood sampling results are displayed in Table 1.

	BASELINE	POST-VACCINATION
APTT Actin FS, s	25.0 ± 1.4	25.6 ± 1.9*
Actin FS ratio	1.07 ± 0.06	1.09 ± 0.08*
PT, %	88 ± 11	88 ± 1
PT seconds, s	11.2 ± 0.50	11.2 ± 0.51
Thrombin time, s	16.2 ± 0.6	16.4 ± 0.7*
Fibrinogen coagulation, mg/dL	246 ± 60	243 ± 52
D-dimers, ng/ml	328 ± 11	220 ± 13
Leukocytes, x10 ³ /mm ³	6.0 ± 1.2	6.1 ± 0.9
Red blood cells, x10 ⁶ /mm ³	4.90 ± 0.55	4.86 ± 0.51
Platelets, x10 ³ /mm ³	241 ± 51	244 ± 50
CRP, mg/L	1.04 ± 1.82	1.25 ± 1.57
LDH, U/L	156 ± 42	171 ± 30*
Creatine kinase, U/L	115 ± 51	153 ± 107

Table 1. Blood sampling characteristics of subjects

Abbreviations: APTT actin FS: activated partial thromboplastin clotting time actin, Actin FS ratio: , PT: prothrombin time, CRP: C-reactive protein, LDH: lactate dehydrogenase

* p<0.05 baseline vs post-vaccination

Vaccination increased the activated partial thromboplastin time, actin factor sensitive ratio, thrombin time and lactate deshydrogenase.

Wingate test performance (table 2) showed no significant changes before and after vaccination.

	BASELINE	POST-VACCINATION
Maximal anaerobic Power, Watt	594 ± 150	616 ± 146
Mean anaerobic Power, Watt	491 ± 118	489 ± 11
Fatigue Index, %	43 ± 10	44 ± 9

Table 2. Anaerobic power output during a Wingate test

CONCLUSIONS

Recent COVID-19 vaccination stimulates blood clotting and elevates circulating LDH suggesting hemostasis disruption and tissue damage. However, those subclinical effects does not affect anaerobic pathways and allow to maintain muscular anaerobic lactic and alactic performance.

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