RBCE
Revista Brasileira de Ciências do Esporte

ORIGINAL ARTICLE

Physical performance of military personnel before and during the Covid-19 pandemic

Desempenho físico de militares antes e durante a pandemia Covid-19

Desempeño físico de militares antes y durante la pandemia Covid-19

Jéssica Alves do Amaral[a], Ana Maria Pujol Vieira dos Santos[b]*

Keywords:
Physical exercise;
Functional physical performance;
Military;
COVID-19.

ABSTRACT
This investigation aimed to compare the level of physical performance of the military of the 3rd Military Police Battalion before and during the COVID-19 pandemic. The participants were 82 military personnel (76 men) who were submitted to the Physical Fitness Test (PFT) in November 2019 and repeated it in September 2020. The 12-minute and VO_2max tests were selected for cardiorespiratory evaluation and push-ups and sit-up tests to assess localized muscle resistance. The results showed a decrease in the performance of these soldiers, both in cardiorespiratory variables and in localized muscular resistance ($p \leq 0.05$). The pandemic may have negatively influenced the physical performance of the military.

Palavras-chave:
Exercício físico;
Desempenho físico funcional;
Militares;
COVID-19.

RESUMO
O objetivo desta investigação foi comparar o nível de desempenho físico dos militares do 3º Batalhão de Polícia do Exército antes e durante a pandemia COVID-19. Os participantes foram 82 militares (76 homens) que foram submetidos ao Teste de Avaliação Física (TAF) em novembro de 2019 e setembro de 2020. Os testes de 12 minutos e VO_2máx foram selecionados para avaliação cardiorrespiratória e flexão de braço e abdominais para avaliar a resistência muscular localizada. Os resultados mostraram uma diminuição no desempenho desses militares, tanto nas variáveis cardiorrespiratórias quanto na resistência muscular localizada ($p \leq 0,05$). A pandemia pode ter influenciado negativamente o desempenho físico dos militares.

Palabras clave:
Ejercicio físico;
Rendimiento físico funcional;
Militar;
COVID-19.

RESUMEN
El propósito de esta investigación fue comparar el nivel de desempeño físico de los soldados del 3er Batallón de Policía del Ejército antes y durante la pandemia de COVID-19. Los participantes fueron 82 militares (76 hombres) que se sometieron a la Prueba de Evaluación Física (PEF) en noviembre de 2019 y septiembre de 2020. Se seleccionaron las pruebas de 12 minutos y VO2max para evaluación cardiorrespiratoria y flexión de brazo y abdomen para evaluar la resistencia muscular localizada. Los resultados mostraron una disminución en el desempeño de estos soldados, tanto en las variables cardiorrespiratorias como en la resistencia muscular localizada ($p \leq 0.05$). La pandemia puede haber influido negativamente en el desempeño físico de los militares.

[a]Universidade Luterana do Brasil. Curso de Educação Física. Canoas, RS, Brasil.
[b]Universidade Luterana do Brasil. Programa de Pós-Graduação em Promoção da Saúde, Desenvolvimento Humano e Sociedade. Canoas, RS, Brasil.

***Corresponding author:**
Ana Maria Pujol Vieira dos Santos
E-mail: anapujol@ulbra.br

Received 2 March 2021; accepted 12 July 2021.
DOI: https://doi.org/10.1590/rbce.43.e003221

INTRODUCTION

The Armed Forces are permanent and regular State institutions, designed to defend the homeland, constitutional powers, and Law and Order organized based on hierarchy and discipline (Brasil, 1988). Health and physical condition are fundamental elements in the Armed Forces. A soldier must be able to develop his work in very diverse scenarios, in difficult conditions, which requires great versatility (Brasil, 2015). Thus, military service requires that its members are in the ideal physical condition to carry out tasks. Military Physical Training (MPT) is a method of preparation, stimulation, and evaluation system for military personnel to take care of their physical preparation, to improve health and fitness for the performance of their duties. MPT is considered mandatory for all military personnel considered fit for active service. It is characterized by its daily practice to obtain better conditioning. The Physical Performance Basic Standard (PPBS) is the minimum condition that must be maintained by all active service personnel. It is the responsibility of the commander of the military organization to demand and create conditions so that all his subordinates meet this standard of performance. The verification of physical performance, the Physical Fitness Test (PFT) is performed three times a year, in order to verify whether the PPBS has been achieved and/or maintained and to allow for the conceptualization (attribution of mention) of the Individual Physical Performance (Brasil, 2015).

However, in December 2019, a new coronavirus, called SARS CoV-2, was identified in Wuhan (China) and caused COVID-19, being disseminated and transmitted person to person. This disease presents a clinical picture that varies from asymptomatic infections to severe ones. One of the most effective measures to prevent contagion and the proliferation of the disease was social isolation, which consists of removing contact with other people (Brasil, 2020). Thus, the isolation of social interaction brought a sudden change to the regular development of physical exercises for the entire population, including the 3rd Military Police Battalion. Consequently, there was a cessation in their training routine along with a substantial cutting of their physical daily activities. Before social isolation, the military had two hours within their working hours to do physical exercises (MPT), in order to maintain physical performance and prepare for PFT. With the beginning of the pandemic in March 2020, as a measure to restrict agglomerations, PFT was suspended, along with the prohibition on doing any physical training inside the military barracks.

The interruption or reduction of physical training, whether in its volume, intensity, or frequency or in its association, may imply detraining, which affects performance by decreasing physiological capacities (Fleck and Kraemer, 2006). The question of this research was whether due to these restrictions imposed by social distancing, these soldiers presented differences in physical performance. Thus, the objective of this study was to compare the level of physical performance of military personnel from the 3rd Military Police Battalion of the State of Rio Grande do Sul before and during the social isolation caused by the pandemic of COVID-19.

METHOD

This was a cross-sectional, analytical study, which used retrospective data to assess physical fitness before the COVID-19 pandemic among military personnel.

Data were collected in the first PFT carried out during the pandemic, in September 2020 at the 3rd Military Police Battalion, 24 weeks after the beginning of the social distancing decreed in March. This test was optional for the military. To compare physical performance before and during the pandemic, the database with the results of the 3rd PFT of 2019 (held in November, the last one carried out before the pandemic) was provided with the authorization of the Battalion Commander.

The 3rd Military Police Battalion is composed of approximately 800 soldiers, distributed in six companies. The sample was selected for convenience and three companies participated. The inclusion criterion adopted was to be over 18 years old, to be in the Armed Forces for at least one year and has participated in the last PFT of 2019; military personnel who suffered some type of musculoskeletal injury in the last 12 months and above 49 years old, were excluded from the sample. The age limit was established, since military personnel over 49 years old, according to the PFT regulations, do not perform push-ups tests. In November 2019, 365 soldiers fulfilled the inclusion/exclusion criteria and of these, 82 repeated it in September 2020, constituting the sample of this research.

The PFT comprises 4 tests, the 12-minute test, pull-up bar, push-ups, and sit-up tests, but in this study, the pull-up bar was excluded, as it is performed only by men. The maximum oxygen consumption was calculated using the formula VO_2max (ml.kg-1.min-1) = D -504/45 (D = distance traveled in meters). The test conduction is under the responsibility of a commission formed of an officer degree in Physical Education at the Military School and a medical officer following the rules established in the army (Brasil, 2008).

The tests were analyzed according to the conceptualization of the individual physical performance pattern of each military, expressed by the following mentions: E (excellent), VG (very good), B (good), R (regular), and I (insufficient) provided for in the Guideline for Military Physical Training of the Army and its Evaluation (Brasil, 2008). To achieve the PPBS, the military should have at least reached the regular mention in the tests (Brasil, 2015).

This study collected data from the PFT carried out in September 2020. At this time, before starting the tests, the military participants were informed and invited to participate in the research. All participants signed the Informed Consent Form. The project was approved by the Ethics Committee of ULBRA/Canoas, according to criteria established by resolution 466/12 of the National Health Council, CAAE 36656920.3.0000.5349.

The results of the continuous variables were expressed by measures of position (mean and median) and dispersion (standard deviation, minimum, maximum, quartiles), and the results of categorical variables were expressed through frequency analyses. The normality

of quantitative variables was verified by Kolmogorov Smirnov's statistical test. To perform the comparison between the categories of the tests before and during the pandemic, the Fisher's Exact Test was used according to the assumptions of the test. To compare the mean of the test results before and during the pandemic, the t-test was used for paired samples respecting the assumptions of the tests. Data analysis was performed with the SPSS 23.0 program and for all tests, a p-value < 0.05, was considered significant.

RESULTS

Eighty-two military personnel from the 3rd Military Police Battalion, who performed the PFT in 2019 and 2020, were analyzed. Regarding the rank and graduations participated: two majors, four first lieutenants, four-second lieutenants, two sub lieutenants, three first sergeants, four-second sergeants, 24 third sergeants, 12 corporals, and 27 privates. The average age of the participants was 25.57 years (± 7.49). Physical performance comparing the years 2019 and 2020 showed a decrease in all tests, showing statistically significant differences (Table 1).

When the results were categorized according to the individual physical performance pattern, we observed that during the social distance period, concerned to the final mentions, there was a decrease in upper and intermediate extracts (excellent, very good, and good) and an increase in lower extracts (regular and insufficient) (p ≤ 0.01) (Table 2).

Table 1. Results of the 12-minute run, VO_2max, push-ups, and sit-up tests from the military of the 3rd Military Police Battalion, in 2019 and 2020.

Tests	2019			2020			p-value
	Minimum	Maximum	Mean ± SD	Minimum	Maximum	Mean ± SD	
12-minute run	2,100	3,300	2,882.93 ± 264.60	1,900	3,900	2,683.54 ± 380.55	0,01**
VO_2max	35	62.10	52.86 ± 5.88	31	75.50	48.44 ± 8.46	0,03*
Push-ups	1	57	36.85 ± 8.05	16	60	33.60 ± 9.59	0,01**
Sit-up	1	100	74.90 ± 17.30	35	157	68.02 ± 19.73	0,01**

SD: Standard Deviation. * significance at p ≤ 0.05; ** significance at p ≤ 0.01; T-test for paired samples.

Table 2. Categorization of the 12-minute, push-ups and sit-up tests from the 3rd Military Police Battalion, in 2019 and 2020.

Tests	2019	2020	p-value
	n = 82	n = 82	
12-minute run			0,01**
Excellent	20 (24.4%)	9 (11%)	
Very good	8 (9.8%)	11 (13.4%)	
Good	51 (62.2%)	26 (31.7%)	
Regular	1 (1.2%)	12 (14.6%)	
Insufficient	2 (2.4%)	24 (29.3%)	
Push-ups			0,01**
Excellent	42 (51.2%)	25 (30.5%)	
Very good	16 (19.5%)	17 (20.7%)	
Good	22 (26.9)	30 (36.6%)	
Regular	1 (1.2%)	4 (4.9%)	
Insufficient	1 (1.2%)	6 (7.3%)	
Sit-up			0,01**
Excellent	56 (68.3%)	39 (47.6%)	
Very good	5 (6.1%)	12 (14.6%)	
Good	20 (24.4%)	28 (34.1%)	
Regular	0 (0%)	3 (3.7%)	
Insufficient	1 (1.2%)	0 (0%)	
Final Mention			0,01**
Excellent	18 (22%)	7 (8.5%)	
Very good	8 (9.8%)	7 (8.5%)	
Good	52 (63.4%)	32 (39%)	
Regular	2 (2.4%)	12 (14.6%)	
Insufficient	2 (2.4%)	24 (29.4%)	

n: sample size. Results expressed through frequency analyses. **significance at p ≤ 0.01; Fisher's Exact Test.

Table 3. Physical Performance Basic Standard (PPBS) of the military of the 3rd Military Police Battalion, in 2019 and 2020.

Year 2019	Year 2020		
	Yes	No	Total
Yes	58 (70.7%)	22 (16.8%)	80 (97.6%)
No	0 (0%)	2 (2.4%)	2 (2.4%)
Total	58 (70.7%)	24 (29.93)	82 (100%)

Results expressed through frequency analysis.

Table 4. Comparison between the mentions of military personnel of the 3rd Military Police Battalion, in 2019 and 2020.

Year 2019	Year 2020					Total
	Excellent	Very good	Good	Regular	Insufficient	
Excellent	6 (7.3%)	4 (4.9%)	8 (9.8%)	0 (0%)	0 (0%)	18 (22%)
Very good	1 (1.2%)	3 (3.7%)	4 (4.9%)	0 (0%)	0 (0%)	8 (9.8%)
Good	0 (0%)	0 (0%)	19 (23.2%)	12 (14.6%)	21 (25.6%)	52 (63.4%)
Regular	0 (0%)	0 (0%)	1 (1.2%)	0 (0%)	1 (1.2%)	2 (2.4%)
Insufficient	0 (0%)	0 (0%)	0 (0%)	0 (0%)	2 (2.4%)	2 (2.4%)
Total	7 (8.5%)	7 (8.5%)	32 (39.1%)	12 (14.6%)	24 (29.3%)	82 (100%)

Results expressed through frequency analysis.

Table 3 shows the number of militaries who reached or did not reach the PPBS before (2019) and during the pandemic (2020). In 2019, only two military personnel did not reach the PPBS, while during the pandemic the number rose to 24. It can be seen that 58 (70.7%) military maintained the basic standard, while 22 (16.8%) failed to maintain it.

When comparing the mention between the years, a decrease during the pandemic can be identified (Table 4). In 2019, the majority of participants (63.4%) achieved the mention "Good". Of these, in 2020, 40.2% passed to lower mentions, such as "Regular" (14.6%) or "Insufficient" (25.6%). Also, while only two militaries had "Insufficient" mention before the pandemic, during the pandemic, this jumped to 24 militaries.

DISCUSSION

This study aimed to verify the level of physical performance of military personnel from the 3rd Military Police Battalion during social isolation as a way to prevent the proliferation of COVID-19. The results showed a decrease in the performance of these soldiers, both in cardiorespiratory variables and in localized muscular resistance ($p \leq 0.05$). Also, there was an increase in the number of military personnel who did not reach the PPBS.

The drop in the performance of military personnel observed may have been caused by a decrease in physical exercise, influenced by social isolation. With the onset of the pandemic, the practice of physical exercises in groups inside the barracks, which was common among soldiers, was prohibited. Another factor that may have discouraged them was the cancellation of the MPT, a test that periodically assesses the physical performance of military personnel. This test only takes place in September, with little adherence by the military compared to the one carried out in 2019, as it was not mandatory for the military. A decrease in the level of physical activity in adults was also identified during the pandemic in Brazil and elsewhere in the world, in addition to a significant increase in sedentary behavior, such as sitting time, TV watching, using electronic and social media (Chew and Lopez, 2021; Costa et al., 2020; Puccinelli et al, 2021; Silva et al, 2021; Schuch et al, 2021). Badminton athletes presented increased sedentary time and decreased physical activity during the COVID-19 pandemic compared to the pre-COVID period (da Silva Santos et al, 2021).

When the results of the two MPT were categorized, there was a decrease in the individual pattern of physical performance in all tests ($p \leq 0.01$). The number of soldiers who have not reached the PPBS in 2020 was higher than in 2019, going from two to 24. Similarly, when individual mentions were compared, we identified a decrease in superior and intermediate mentions, "Excellent", "Very Good" and "Good" from 95.2% in 2019 to 56% in 2020 and an increase in lower ones "Regular" and "Insufficient", from 4.8% to 43.9% ($p \leq 0.01$). This result suggests that these participants were less physically prepared in 2020, as the comparison was made between the same participants. The effects of a lockdown on the Resting Heart Rate (RHR) were observed on elite swimmers from the French Swimming Federation. During this time, swimmers estimated a reduction of 254% compared to their usual training volume. After four weeks of lockdown, RHR increased in the standing position by almost 15 beats

per minute ($p < 0.0001$). These results underline that the lockdown circumstances induced a large reduction in parasympathetic activity in elite athletes, which was associated with a decrease in training volume (Pla et al., 2021). A prolonged period of training cessation could lead to detraining, characterized by alterations in the cardiorespiratory system and metabolic patterns (Mujika and Padilla, 2000 a, b). The decline in cardiovascular function following a few weeks of detraining is largely due to a reduction in blood volume, which appears to limit ventricular filling during upright exercise (Coyle et al., 1986). The decrease in muscle strength due to the interruption of training occurs mainly due to a reduction in neural activation and a decrease in the cross-section area of the muscle, due to the reduction of muscle fibers (Fleck and Kraemer, 2006; Gasparete et al., 2010).

In this research, between the beginning of the social distancing decreed in March until the first MPT in September 2020, 24 weeks have passed, which might have been taken the military to physical detraining. The time required to recover pre-detraining neuromuscular and cardiorespiratory levels may highly vary among athletes based on several factors, including time of training stimuli cessation or reduction, amount of individual detraining-induced effects, individual fitness levels, and sport-specific requirements (Girardi et al., 2020). Regarding the pause time, some studies found reductions in physical performance after four weeks of detraining (Fleck and Kraemer, 2006; Raso et al., 2001), while in others, between 2 and 4 weeks of detraining, no differences were found (Carneiro et al., 2016, Gasparete et al., 2010, Michelin et al., 2008, Mujika and Padilla, 2001).

Comparing the results of the physical performance of military personnel in this study, before or during the pandemic they surpassed the aeronautics military in the 12-minute and push-up tests (Pereira and Teixeira, 2006). As well as they were superior in the cardiorespiratory capacity of 130 police officers, belonging to the Special Operations Battalion (Freitas et al., 2007). However, in 2013, 24 soldiers of the professional staff of the Shock Troop of this same Battalion (3rd Military Police Battalion) had better results in cardiorespiratory capacity and push up when compared to the data of 2019 and 2020. The only exception was the abdominal test, which in this study had a higher average (Ferreira et al., 2013).

This study was conducted under special conditions and necessarily suffers from some limitations. The soldiers during social distancing were released from physical training in the barracks to avoid crowding, but it was not possible to determine the exact reduction in the volume of training for each soldier. Also, it would be interesting to know anthropometric data, medical history, and lifestyle of the military, before and during the pandemic, to verify their potential influence on physical performance. In addition, the MPT held in November 2019 was mandatory for the military, unlike the one held in September 2020, which was optional. This may have influenced the results.

CONCLUSION

This study identified a decline in the physical performance of military personnel from the 3rd Military Police Battalion, comparing test results before and during social isolation due to the Covid-19 pandemic. These results negatively impacted the Physical Performance Basic Standard of the military in 2020, when compared to the results of 2019.

We suggest further investigations in military institutions regarding the physical fitness of its members to verify the main factor that affects these militaries during the pandemic.

FUNDING

This paper did not have financial support of any kind for its elaboration.

CONFLICTS OF INTEREST

The authors declare that there are no conflicts of interest and this paper did not have any financial support for its elaboration.

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