

## PANDEMIC EFFECTS AT PHYSICAL AND PSYCHOSOCIAL LEVEL OF THE ATHLETES

Dan-Mihai ROHOZNEANU<sup>1,\*</sup>, Florin Valentin LEUCIUC<sup>2</sup>,  
Adrian GEORGESCU<sup>3</sup>

---

*Received 2022 November 09; Revised 2023 January 21; Accepted 2023 January 24;  
Available online 2023 May 30; Available print 2023 June 30.*

©2023 Studia UBB Educatio Artis Gymnasticae. Published by Babeş-Bolyai University.



This work is licensed under a Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License

---

**ABSTRACT.** The pandemic COVID-19 has globally affected the physical activity behavior, forcing many people to isolate themselves for a long period of time. These actions caused and increased sedentary behaviors such as excessive sitting or using mobile devices. The lockdown and sedentary behavior have affected the health status and decreased the physical fitness, weakening one's body and inducing a low immunological response. The aim of the study was to determine how elite handball players were affected at physical and mental during the restrictions imposed by the spreading of the SARS - CoV - 2 virus. A questionnaire-based survey was used to conduct the study. For the questionnaire design we used Likert style with three or five level items. The participants voluntarily consented to anonymously participate in our study before completing the questionnaire. The participants were informed that the data would be used only for scientific purpose. The results of our study suggest that pandemic negatively influenced the sport preparation of the handball players due the fact that subjects trained themselves for a period of over 2 months and that meant a reduction of the physical activity (influencing the physical fitness level) to half comparing to a collective preparation for competition. At mental level more than 2/3 felt an increased level of anxiety due to the pandemic, the way that their life was changed and worries concerning their personal and professional future. This period of incertitude had a negative impact at mental level confirming our hypothesis.

**Keywords:** *pandemic, training, handball, communication, team*

---

<sup>1</sup> Babeş-Bolyai University of Cluj-Napoca, Romania

<sup>2</sup> Ştefan cel Mare University of Suceava, Romania

<sup>3</sup> Ovidius University of Constanţa, Romania

\* Corresponding author: dan.rohozneanu@ubbcluj.ro

**REZUMAT. Efecte pandemice la nivel fizic și psihosocial ale sportivilor.**

Pandemia COVID-19 a afectat la nivel global activitatea fizică, forțând mulți oameni să se izoleze pentru o perioadă lungă de timp. Aceste acțiuni au cauzat și au amplificat comportamentele sedentare, cum ar fi lipsa de activitate sportivă sau utilizarea dispozitivelor mobile. Restricționarea ieșirii din case și comportamentul sedentar au afectat starea de sănătate și au scăzut condiția fizică, slăbind organismul și inducând un răspuns imunologic scăzut. Scopul studiului a fost de a determina modul în care jucătorii de handbal de elită au fost afectați fizic și psihic în timpul restricțiilor impuse de răspândirea virusului SARS - CoV - 2. Pentru realizarea studiului folosit metoda anchetei pe bază de chestionar. Pentru proiectarea chestionarului am folosit scala Likert cu trei sau cinci itemi de nivel. Participanții au consimțit voluntar să participe în mod anonim la studiul nostru înainte de a completa chestionarul. Participanții au fost informați că datele vor fi utilizate numai în scop științific. Rezultatele studiului nostru sugerează că pandemia a influențat negativ pregătirea sportivă a jucătorilor de handbal din cauza faptului că subiecții s-au antrenat singuri pentru o perioadă de peste 2 luni și asta a însemnat o reducere a activității fizice (influențând nivelul de fitness) la jumătate comparativ cu pregătirea colectivă pentru competiție. La nivel mental, mai mult de 2/3 au simțit un nivel crescut de anxietate din cauza pandemiei, a modului în care le-a fost schimbată viața și a îngrijorărilor cu privire la viitorul lor personal și profesional. Această perioadă de incertitudine a avut un impact negativ la nivel mental confirmând ipoteza noastră.

**Cuvinte cheie:** *pandemie, antrenament, handbal, comunicare, echipă*

## Introduction

The COVID-19 pandemic and the measures imposed by the governments of the world states: isolation at home, closure of schools and cultural institutions, ban on night traffic adopted to reduce interactions and the virus spread (Mutz & Gerke, 2021), meant negative consequences at global level, for all social categories of the population (Leuciuc, 2021). It was recommended social distancing and contact from person to person in order to prevent transmission of SARS-CoV-2 (Wong et al., 2020). The negative effects covered the national economies, leisure activities, travels, daily activities, work, education (Latella & Haff, 2020). The pandemic COVID-19 has globally affected the physical activity behavior, forcing many people to isolate themselves for a long period of time (Hammami, Harrabi, Mohr and Krusturup, 2020). These actions caused and increased sedentary behaviors such as excessive sitting or using mobile devices (Chen, Mao, Nassis, Harmer, Ainsworth and Li, 2020).

Immediately after the virus spreading, many sports competitions were transferred, reprogrammed and then cancelled (Bowes, Lomax and Piasecki, J., 2020), firstly in Asia, and, as the virus spread globally, all sport events were postponed or cancelled. These lockdown and cancellations of the sport events represented public health problem for the population, default for professional and amateur athletes (Mann, Clift, Boykoff and Bekker, 2020). The impact of the pandemic badly affected sport industry, especially sports events (Haddad, Abbes, Mujika and Chamari, 2021). Evans et al. (2020) expressed the conviction that everyday life and physical activities routine practices "had to change, pause or stop because of the pandemic", because in the midst of a global pandemic affecting millions of people, staying active is a good thing, but staying safe is essential (Wong et al., 2020). However, practical recommendations for staying active at home, with aerobic exercise on ergometers, bodyweight training, dancing or active video games, can help counteract the harmful physical and mental side effects of COVID-19 lockdown (Hammami et al., 2020).

Athletes have experienced significant changes in their lifestyle and routines, human relationships, financial situation (for example, job loss or sponsor loss) and as well as the futility of aspirations and self-fulfillment (Taku & Arai, 2020).

The lockdown and sedentary behavior have affected the health status and decreased the physical fitness, weakening one's body and inducing a low immunological response (Hermassi et al., 2021). At the same time, it could cause anxiety, depression, mental health problems and common chronic health diseases (Ammar et al., 2020); the elite athletes were on the list of those affected by the pandemic (Hakansson, Jonsson and Kentta, 2020), being those who faced the pandemic stress, used strategies for cognitive and behavioral adaptation, the level of sports activity depending on strategies for coping with the stress of the COVID-19 pandemic (Szczybinska, Samełko and Guskowska, 2021); collective experience and team spirit were affected during lockdown (Kehl, Strobl, Tittlbach and Loss, 2021). Researches have shown that athletes' levels of anxiety, stress and depressive symptoms were relatively low, and the use of coping strategies, such as cognitive restructuring and emotional calm, have been associated with lower levels of negative emotional states (Leguizamo et al., 2021). The Association for Applied Sports Psychology suggested that during this period, athletes might have experienced an emotional roller-coaster due to "a constant flow of information, changes in daily routines, uncertainty about personal health and the others' health, together with rapidly changing situations" (Samuel, Tenenbaum and Galily, 2020). At the same time, studies exploring the psychological implications of previous epidemics and pandemics showed that social distancing measures were particularly detrimental to psychological health (Taylor, 2019); the impact of COVID-19 social distancing measures on elite athletes was deep (Woodford & Bussey, 2021), with symptoms such as post-traumatic stress exacerbated by

fears of infection, longer duration of care, frustration, boredom (Brooks et al., 2020). Prolonged pandemics and the process of social isolation can cause anxiety to escalate. Increased anxiety for athletes negatively affects both physical and cognitive athletic performance (Ozen, Koc and Aksoy, 2020). In other words, it should be mentioned that family members were the greatest emotional supporters for professional athletes during the period we are referring to (Parm, Aluoja, Tomingas and Tamm, 2021).

In this context, athletes, namely handball players, were encouraged for individual training, knowing that, in modern handball maintaining individual physical fitness is a key factor for performance (Fikenzer, Fikenzer, Laufs, Pietrek and Hepp, 2021).

While many athletes were adversely affected by this, others have seen positive effects (Taku & Arai, 2020), as free time used for recovery after trauma, improve the quality of motion / mobility, setting new goals, psychological development and enhancing physical activities for health (Latella & Haff, 2020).

The aim of the study was to determine how elite handball players were affected at physical and mental during the restrictions imposed by the spreading of the SARS - CoV - 2 virus.

The hypothesis of the study was that physical activities would decrease as a result of the restrictions imposed by the state authorities and that would influence the level of the physical fitness level and the mental health of the subjects.

## Materials and Methods

### *Participants*

The study involved 208 senior handball players from the teams of the Romanian National Handball League (the highest ranked male competition in Romania), players from all playing positions, aged between 18 and 44 years old (table 1).

**Table 1.** Distribution by age groups and playing positions

Playing position	Under 20 years old	21-25 years old	26-30 years old	31-35 years old	36-40 years old	Over 40 years old	Total
<b>Center back</b>	7	9	8	7	0	0	31
<b>Backcourt</b>	10	13	12	5	3	0	43
<b>Wing</b>	27	18	7	4	4	1	61
<b>Pivot</b>	14	6	9	7	0	0	36
<b>Goalkeeper</b>	13	10	3	6	2	0	34
<b>Defender</b>	1	0	0	1	0	1	3
<b>Total</b>	72	56	39	30	9	2	208

### ***Procedure / Method***

A questionnaire-based survey was used to conduct the study. Thus, in August 2020, 208 handball players of the Romanian National League completed a Google Forms form containing 12 questions that referred to various aspects related to the new way of life during March-July 2020, when the emergency (March, April, May) and alert (June, July) state were established in Romania.

For the questionnaire design we used Likert style with three or five level items.

The participants voluntarily consented to anonymously participate in our study before completing the questionnaire. The participants were informed that the data would be used only for scientific purpose.

The questionnaire was applied to the senior handball players from the teams of the Romanian National League (highest level of handball in Romania). There were collected answers of 208 respondents, players from all playing positions, aged between 18 and 44 old: center back 31 (15%), backcourt 43 (20.6%), wing 61 (29.3%), pivot 36 (17.3%), goalkeeper 34 (16.3%) and defender 3 (1.5%).

### ***Statistics***

To analyze obtained data from research we used SPSS version 26 package by applying descriptive statistics (frequencies, percentages, means and standard variations) and one-way analysis of variation (ANOVA) in order to determine the statistical significance (for p was set a value of 0.05).

## **Results**

A synoptic view of the questions and answers given by the subjects is presented in table 2.

**Table 2.** The questionnaire and the answers given by the subjects

<b>Question</b>	<b>Answers (number / %)</b>
During the emergency and alert period, with who did you keep in touch?	Trainers – 8 / 3.8% Team mates – 48 / 23.1% Trainers and team mates – 152 / 73.1%
During the reference period:	Did you gain weight? – 51 / 24.5% Did your weight stay the same? – 110 / 52.9% Did you lose weight? – 47 / 22.6%

<b>Question</b>	<b>Answers (number / %)</b>
During the emergency and alert period did you exercise?	Daily - 74 / 35.6% Every other day - 105 / 50.5% Once a week - 11 / 5.3% Twice a week - 18 / 8.6% I didn't do any exercises - 0 / 0%
The length of physical activity during one day was:	1 hour - 92 / 42.2% 1.5 hour - 86 / 41.3% 2 hours - 24 / 11.5% 2.5 hours - 4 / 2% Other - 45 minutes - 2 / 1%
The physical activity was:	Moderate - 63 / 30.3% Intensive - 7 / 3.4% Combined - 138 / 66.3
The exercises aimed:	Strength - 65 / 31% Speed - 29 / 14% Endurance - 54 / 26% Coordination - 25 / 12% Flexibility - 35 / 17%
The preparation was achieved:	Only indoors - 21 / 10.1% Only outdoors - 16 / 7.7% Both indoors and outdoors - 171 / 82.2%
How did you practice these exercises home?	Already known exercises - 92 / 44% A program sent by trainers - 68 / 33% Watching YouTube and influencers on socializing networks - 31 / 15% Following the advice of professional sportsmen - 15 / 7% Other - personal trainer program - 2 / 1%
During this period, the attitude of your family members towards you was:	Total support - 151 / 72.6% Understanding/Indulgence - 54 / 26% Indifference - 3 / 1.4%
Do you consider that your level of anxiety (disquietude, worry, fear) was:	Very high - 8 / 3.8% High - 35 / 16.8% Moderate - 96 / 46.2% Low - 52 / 25% Very low - 17 / 8.2%
Choose from the following chapters which were the most difficult in the first training session after restarting the activity?	Strength - 39 / 19% Speed - 41 / 20% Endurance - 76 / 36% Coordination - 21 / 10% Flexibility - 31 / 15%

Question	Answers (number / %)
What is your level from the physical point of view by the end of the isolation (in percentage compared to the moment of the activity interruption?)	80-100% - 21 / 10.1% 60-80% - 84 / 40.4% 40-60% - 84 / 40.4% 30-40% - 16 / 7.7% 20-30% - 3 / 1.4% Below 20% - 0 / 0%

The answers to the first question, *During the emergency and alert period, with who did you keep in touch?* were as follows: 8 handball players kept in touch only with the coaches, 48 handball players kept in touch with their teammates and 152 handball players kept in touch both with their coaches and teammates. Most of the respondents kept in touch both with their coaches and teammates, this facilitating an efficient training during the considered period. It is known that “the coach is the one who designs the objectives to be achieved and the stages of training, whether the structure of the group is stable, communicates with the sports group and the external environment, clarifies the objectives and leads the activity, develops a motivational climate, focuses on responsibility and autonomy, organizes the interactions between the coach and those trained, constantly evaluates the activity proposals according to the athletes’ resources, the effects of the training according to the objective, the results obtained, as well as their causes” (Rohozneanu, 2019), this being entirely true not only in the case of home training, but also in the room intended for the handball player. In the same context, we note the opinion of Epuran, Holdevici and Tonița (2008), according to which “little importance and little time are given to the individual discussions of the coach with athletes, to writing self-monitoring journals, to establishing the perspectives of each athlete and personal self-improvement or harmonization of individual goals with those of the group”.

To the second question: *During the reference period: a. You gained weight; b. You maintained your weight; c. You lost weight*, 51 handball players stated that they gained weight, 110 maintained their weight, and 47 lost weight. The fact that 110 handball players maintained their weight (52.88%) and 47 (22.59%) even lost kilograms proves that the athletes were aware of the need to maintain a proper physical fitness in order to start the training with the team in good conditions.

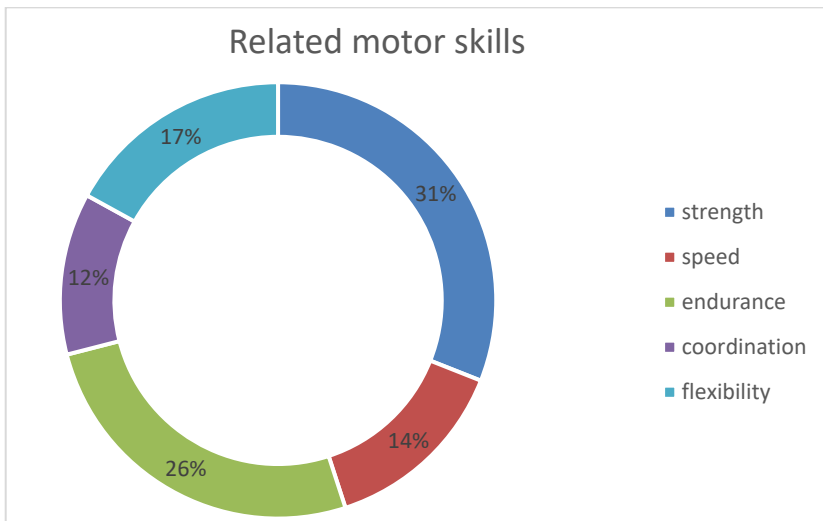
Researches have shown that physical activity performed at least 3-5 times per week is optimal for a good physical fitness (Latella & Haff, 2020; Chen et al., 2020; Hermassi et al., 2021; Evans et al., 2010, Leuciuc, 2020). *The third question* precisely deals with the rhythmicity of the workout. 74 athletes worked

daily, 105 every 2 days, 11 once a week, and 18 twice a week. It can be easily observed that 179 handball players (86.05%) approached this aspect with the most seriousness, maintaining an ideal physical fitness due to a sustained workout rhythm.

To the fourth question, regarding the information about physical activity performed during each session - 92 worked for one hour, 86 for 1.5 hours, 24 for 2 hours, 4 for 2.5 hours, and 2 exercised 45 minutes in each of the held sessions. Handball players' rigor is evident in terms of organizing the physical activities in each session, so that 87% of respondents indicated 1-1.5 hours, as well as the length's training in the gym (Kehl et al., 2021; Fikenzer et al., 2021).

The fifth question took into account the level of physical activity performed: a. moderate; b. intense; c. combined: moderate + intense. The answers were as follows: 63 performed a moderate physical activity, seven - intense, and the rest, 138, a combined physical activity, which demonstrates the handball players awareness of the need to perform both types of physical activity (Chen et al., 2020; Haddad et al., 2021).

The sixth question concerns the motor skills on which the exercises performed by the handball players during the training sessions were channeled. Most of the handball players had in view several of the proposed motor qualities. The distribution of the exercises used for the motor skills development is shown in figure 1.



**Figure 1.** Related motor skills used during the sessions



The main objective of physical training is the development of basic and specific motor skills of athletes by using the most efficient training methods and means. It is considered that a good physical training is the foundation for consolidating and improving technical training, which in turn conditions the achievement of tactical training (Rohozneanu, 2015), in order to be efficient and achieve performance in competitions (Leuciuc, 2018).

An important aspect of maintaining physical fitness is that it does not require large spaces, but helps maintain in normal parameters (Fiorilli et al., 2021).

Considering the state of emergency decreed during two months and then the state of alert, when the official trainings were resumed, *question no. 7* took into account the place where the training of handball players took place: a. indoors; b. outdoors; c. both indoors and outdoors. 21 athletes ticked the option “a” - indoors, 16 - only outdoors and 171 trained both indoors and outdoors (Bowes et al., 2020, Evans et al., 2020; Hermassi et al., 2021).

Wanting to find out how they practiced these exercises at home, the source was variate for many of them: performing well-known exercises, following / practicing the programs recommended by coaches, watching the YouTube channels or influencers on social networks, listening to the advice of some performance athletes or performing exercises proposed by the personal trainer. It can be seen that most of the handball players focused on the known exercises, practiced during their training, and those who kept in touch with the coach followed the program transmitted by him (figure 2) (Kehl et al., 2021; Fikenzer et al., 2021).

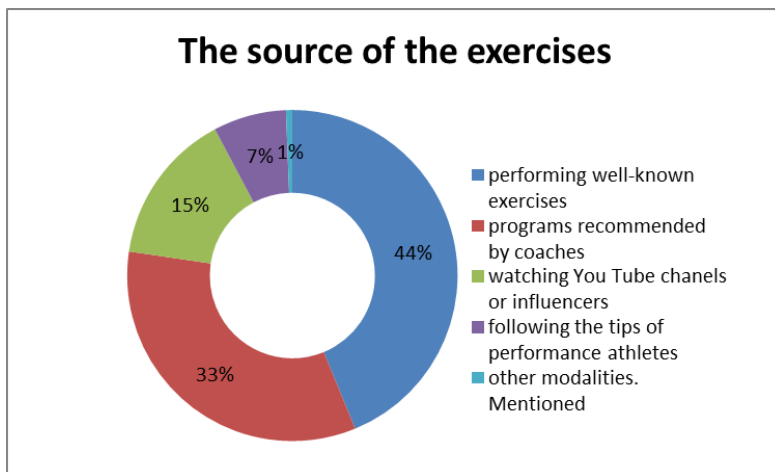


Figure 2. The source of the exercises

Expertise and related knowledge (psychology, physiology, nutrition, recovery, sociology) stand always in the coach's attention who must be up to date with the news in the field in order to transmit it to his athletes. Thus, the coach-athlete discussions, the analysis of the training, the analysis of the competitive evolutions, the video analysis, the previous sports experience are means representing the basis for the theoretical or intellectual training and must be oriented towards reaching the established goals (Hossain, Sultana and Purohit, 2020).

The psychological aspect of the hard measures taken against citizens is not a priority concern for anyone, although such concerns are justified by the authorities precisely by the intention of the authorities to show care for people (Evans et al., 2020; Woodford & Bussey, 2021; Ammar et al., 2020). In the spirit of these statements, *question 9* asked the athletes for information on the attitude of family members towards them, and 152 handball players answered that the family offered them full support during the state of emergency and alert, and for 54, the family showed understanding / indulgence. Unfortunately, three of the handball players felt indifference on the part of the family. The problems faced by people during this period include depression, anxiety, psychological distress, posttraumatic stress disorder, insomnia, fear, stigma, low self-esteem, lack of self-control and other results negative effects on mental health (Hossain et al., 2020). Assessing the level of psychological stress for athletes during the isolation at home (Fiorilli et al., 2021), we find out that one third of respondents were affected by subjective suffering and social interactions, specific to team sports, being crucial to ensure endurance and psychological health. Thus, communication is decisive for improving their response to adaptive stress.

The *question 10* required to determine the level of anxiety in that period and the received answers complete Fiorilli's findings (2020): 96 handball players (46.15%) considered that their worries, fears were at a moderate level and 52 (25%) at a low level. Eight of the athletes (3.8%) felt a very high level of anxiety, 35 (17%) a high level and for 17 of them (8.17%) the level was very low.

The answers of the handball players emphasize their good mental health (80%), knowing that this is, in fact, one of the components of the training program, along the with physical training, technical training, tactical training, theoretical training and recovery. Every component of the training is characterized by a specific role, their importance being different, depending on the training planning, but the approach of all, successively or simultaneously, is a basic principle for ensuring performance (Parm et al., 2021; Fiorilli et al., 2021; Hossain et al., 2020).

The 11th question focused on the motor skills in which they identified difficulties at the first training after resuming the activity: 59 encountered difficulties in terms of strength, 63 in terms of speed, 115 in terms of endurance, 28 in terms of coordination, and 45 in terms of mobility. It must be said that 116 athletes (55.76%) mentioned that they had encountered difficulties with a single motor skill, 62 (29.8%) with two, 22 (10.57%) indicated three, 3 handball players indicated difficulties at 4 motor skills and 5 handball players mentioned difficulties for all motor skills. For these reasons, it is necessary to have a period to adapt to the effort and to be uniform regarding the physical condition of the athletes when the team training is resumed (Wond et al., 2020; Latella & Haff, 2020; Hermassi et al., 2021; Dobrescu, 2020).

Regarding the last question, the handball players were asked to estimate their physical fitness at the end of the lockdown (in percentage, relative to the moment of interruption of activity): a. 80-100%; b) 60-80; c) 40-60%; d 30-40%; e) 20-30%; f) under 20%. The estimates were as follows: 21 were in the first category, meaning that the physical training was very good; 84 indicated the range of 60-80% and 84 considered that they had fallen within the range of 40-60%; 35 mentioned a level between 30% and 40%, and three between 20% and 30%. No player was below 20%. The respondents managed to maintain a moderate level of their physical condition, but, within the common training it would be necessary to work for every component of the training in order to ensure the premises of a complete and efficient sports training for the competition. That is why an important role is played by the activity supervision through control tests and the use of electronic devices in order to monitor the athletes' effort (Leuciuc, 2020).

## **Discussion**

At performance level, the handball game demands from players high-intensity intermittent activities to achieve the goals. The specific sports training must help handball players to perform in competition and they need continuous preparation during the season. All the competitions of the 2019-2020 season were stopped due to the pandemic and the championship was concluded. The confinement imposed by the pandemic there was a unique situation for the humanity, including for the athletes. The handball players needed to adapt to a new context at personal and professional level. Lockdown forced to stop all sports activities, sports trainings and, in many cases, the rapidly changing situation made it impossible to plan and implement a contingency plan.

Our questionnaire was designed in Likert style with 3 or 5 answers. That design allowed to apply ANOVA in order to determine if there are significant differences among the answers of the subjects (table 3).

**Table 3.** The subjects' answers analysis by ANOVA

Question	Answers, df	F	p
During the emergency and alert period, with who did you keep in touch?	1, 2 vs. 3; (1.54)	19.88	0.0004
During the reference period:	1, 2 vs. 3; (1.35)	5.37	0.002
During the emergency and alert period did you exercise?	1, 2 vs. 3; (1.177)	85.92	0.0006
The length of physical activity during one day was:	1, 2 vs. 3, 4, 5; (1.176)	46.34	0.001
The physical activity was:	1, 2 vs. 3; (1.68)	11.78	0.001
The exercises aimed:	1, 2 vs. 2, 4, 5; (1.117)	60	0.003
The preparation was achieved:	1, 2 vs. 3; (1.35)	5.37	0.002
How did you practice these exercises home?	1, 2 vs. 3, 4, 5; (1.158)	18.43	0.0003
During this period, the attitude of your family members towards you was:	1, 2 vs. 3; (1.203)	10.49	0.001
Do you consider that your level of anxiety (disquietude, worry, fear) was:	1, 2 vs. 3, 4, 5; (1.41)	18.50	0.0001
Choose from the following chapters which were the most difficult in the first training session after restarting the activity?	1, 2, 3 vs. 4, 5; (2.153)	61.31	0.0002
What is your level from the physical point of view by the end of the isolation (in percentage compared to the moment of the activity interruption?)	1, 2 vs. 3, 4, 5; (1.103)	47.78	0.0004

df - degree of freedom; F - MS factor/MS residual; p - statistical significance.

In order to keep the level of the physical fitness and also to socialize, the subjects (73.1%) stayed in touch with coaches (especially for sport preparation aspects) and teammates (to socialize) being an significant difference between first two and the third answer ( $F(1.54)=19.88$  for  $p=0.004$ ) (Latella & Haff, 2020; Evans et al., 2020; Woodford & Bussey, 2021).

Concerning the individual sports preparation, due to the confinement, the handball players had to adapt to a new and challenging context in order to maintain the level of their fitness; most of them trained indoors and outdoors

(82.2%) by using already known exercises (44%), programs sent by coach (33%), following the advice of professional athletes (7%) or program designed by personal trainer (1%). At ANOVA test there was registered statistical significance between third and first two answers ( $F(1.35)=5.37$  for  $p=0.02$ ) (Hammami et al., 2020; Chen et al., 2020; Hermassi et al., 2021; Fiorilli et al., 2021).

The use of these adapted programs aimed to maintain or develop strength, speed, endurance, coordination and flexibility as much as possible in the specific context of the handball game. Many of them (66.3%) used a combination of moderate and intensive workout lasting between 45 minutes and 2.5 hours, but most of them (83.5%) trained for 1-1.5 hour. Usually, professional handball players trained 1.5-2 hours per session, had 6 to 8 training sessions per week and an official match weekly during the competition period, being statistical significant between first two answers and last three ( $F(1.176)=46.34$  for  $p=0.001$ ). Many of them (86.1%) prepared daily or every other day, but there were some subjects who prepared once or twice per week, this being visible at body weight: one quarter lost weight, half kept the same weight and another quarter gained weight; at ANOVA test were obtained significant differences between those who maintain their body weight and those who gain or lose weight ( $F(1.96)=55.90$  for  $p=0.001$ ). There is a connection between the number of training sessions per week, the length of these sessions and the evolution of body weight of the participants in our study (Bowes et al., 2020; Ammar et al., 2020; Parm et al., 2021).

The efficiency of the individual preparation imposed by the lockdown was visible at the start of the collective training preparation in August 2020, when 90% of the subjects had encountered difficulties concerning endurance (34%), speed (18%), strength (17%), flexibility (13%) and coordination (8%), being a statistical significance between those who have chosen first three answers and those who have chosen last two ( $F(2.153)=61.31$  for  $p=0.0003$ ) (Kehl et al., 2021; Parm et al., 2021; Fikenzer et al., 2021).

The self-evaluation of the physical level prior and after confinement for the participants in our survey showed that only 10% had been at full or almost full potential and 80.8% at a moderate level, but we must keep in mind that most individuals are not objective in self-evaluation, tending to over or underestimate themselves. Between respondents that claimed a good or very good level and those with an moderate or weak ones was registered a statistical significance for  $F(1.103)=47.78$  and  $p=0.004$  (Wong et al., 2020; Haddad et al., 2021; Kehl et al., 2021).

At social level 98.6% found support and understanding form their family ( $F(1.203)=10.49$  for  $p=0.001$  compared to other two answers) and only 1.4% (3 subjects) felt the indifference in this difficult moment for the humanity (Woodford & Bussey, 2021; Parm et al., 2021).

Psychologically, the handball players felt a certain level of anxiety being moderate for 96 of them, low and very low for 69 respondents, high and very high for 43 participants. At ANOVA analysis comparing those with a high or very high level to other three answers (moderate, low, very low) were obtained statistical significance for  $F(1,41)=18.50$  for  $p=0.0001$ . The level of anxiety concerning the future especially affects athletes at personal and professional level and may be a cause for preparation issues when resuming the team trainings (in our case 90% of the participants) (Leguizamo et al., 2021; Broks et al., 2020; Ozen et al., 2020; Hossain et al., 2020).

The season interruption influenced the performance of elite handball players and required to adapt to an evolving negative situation with bad outcomes at physical, psychological and health level. Quickly implementation of the lockdown did not allow time to prepare a monitoring system for athletes in the situation of individual training at home.

When resuming official training, most of them faced problems with endurance, speed and strength (Parm et al., 2021; Fikenzer et al., 2021), fact confirmed by ANOVA test results.

The resumption of sport activity requires to assess the athlete's physical fitness and health status by a multidisciplinary team. It is necessary to monitor athletes' evolution during the training to avoid health problems caused by the pandemic restrictions (Ammar et al., 2020; Sarto et al., 2020).

These results show that sport activities had positive consequences both physically and mentally, as it was revealed during this pandemic, but we must mention that 90% of the participants were affected at physical level and they struggled to adapt to the conditions of the collective preparation at mental level, where 66.8% reported a moderate to very high level of anxiety; the ANOVA test confirming the statistical significance at respondents answer items (Parm, et al., 2021; Fiorilli et al., 2021; Hossain et al., 2020; Löllgen et al., 2020; Tayech et al., 2020; Ammar et al., 2020).

The results of our study suggest that pandemic negatively influenced the sport preparation of the handball players due the fact that subjects trained themselves for a period of over 2 months and that meant a reduction of the physical activity (influencing the physical fitness level) to half comparing to a collective preparation for competition (Hermassi et al., 2021; Kehl et al., 2021; Fikenzer et al., 2021; Sarto et al., 2020).

The practical implications of our study lie in providing an overview of the Romanian elite handball during pandemic and the effects of the confinement at physical and mental level, issues that must be solved by specialists in order to help handball players to reach their full potential personally and professionally, leading to benefits in competitions. For future pandemic situations, the findings

from this study could be used to efficiently manage the entire situation in a proper manner in the benefit of sport activity.

The study highlights the effects of the pandemic on male handball players, but also there is a limitation because it is not possible to generalize these results due to the sample size. The survey is a subjective method, especially when participants must do a self-evaluation, the level of objectivity being moderate. Additionally, we did not use a physical activity questionnaire to assess their physical fitness before and after confinement in order to determine if there are some differences. We used only questions to determine the level of specific handball preparation and the effects of individual workout before pandemic and after they restarted collective training activities.

The strengths of our study are: providing an overview for a unique situation in the last century for humanity – pandemic – and its effects for professional handball players in Romania at physical and mental level; presenting data concerning their self-preparation during this period and its effects; presenting data concerning their self-evaluation of the physical fitness and giving the opportunity to identify new modalities to copying these kinds of situations.

## **Conclusions**

The COVID-19 lockdown led to individual consequences on the physical fitness and mental level of the elite handball players.

The subjects trained individually by using already known exercises or by applying programs sent by coach or personal trainer for a period of over 2 months.

Comparing to a normal situation training, their physical activity was reduced to half (from 12-16 hours to 6-8 hours per week) and also, the training conditions were not appropriate. All these factors negatively affected their physical fitness.

At the beginning of the collective preparation most of them faced problems to efficiently adapt to the coach requirements due to a low-level physical fitness and that fact increased the risk of injuries.

We can conclude in these conditions that our findings confirm the hypothesis concerning that physical fitness was affected in the period of lockdown.

At mental level more than 2/3 felt an increased level of anxiety due to the pandemic, the way that their life was changed and worries concerning their personal and professional future. This period of incertitude had a negative impact at mental level confirming our hypothesis.

The reduction of the social interactions caused psychological issues for athletes as well for general population, but athletes, due to the previous special preparation, showed a better state comparing to that of ordinary people.

Future study must include more variables concerning training conditions, especially monitoring devices to objectively assess the quality and quantity of the physical activity. Also, the relationship physical fitness level - mental state - wellbeing can be approach more closely approached.

The limits of the study are the number of the participants, only from one collective sport from one country. This kind of study is necessary to identify the needs and problems that athletes dealt with during this period and to find ways to solve them in an appropriate manner in order to optimize the training process to this type of unexpected situations caused by pandemic and its restrictions.

## REFERENCES

- Ammar, A. et al. (2020). Effects of COVID-19 home with confinement on eating behavior and physical activity: Results of the ECLB-COVID19 International Online Survey. *Nutrients*, 12, 1583.
- Ammar, A. et al. (2020). Effects of home confinement on mental health and lifestyle behaviours during the COVID-19 outbreak: Insight from the ECLB-COVID19 multicenter study. *Biol. Sport*, 38, 37–44.
- Bowes, A.; Lomax, L. & Piasecki, J. (2020). The impact of the COVID-19 lockdown on elite sportswomen. *Manag. Sport Leis.* doi: 10.1080/23750472.2020.1825988
- Brooks, S.K. et al. (2020). The psychological impact of quarantine and how to reduce it: Rapid review of the evidence. *The Lancet*, 395 (10227), 912–920.
- Chen, P.J.; Mao, L.J.; Nassis, G.P.; Harmer, P.; Ainsworth, B.E. & Li, F.Z. (2020). Coronavirus disease (COVID-19): the need to maintain regular physical activity while taking precautions. *J. Sport Health Sci.* 9, 103–104. doi: 10.1016/j.jshs.2020.02.001
- Dobrescu, E.M. (2020). *Covid-19 pe înțelesul tuturor*, 1st ed.; Integral Publishing House: Bucharest, 332-337.
- Epuran, M.; Holdevici, I. & Tonița, F. (2008). *Psihologia sportului de performanță: teorie și practică*, 1st ed.; FEST Publishing House: Bucharest, 293-294.
- Evans, A.B. et al. (2020). Sport in the face of the COVID-19 pandemic: Towards an agenda for research in the sociology of sport. *Eur. J. Sport Soc.* 17 (2), 85–95. <https://doi.org/10.1080/16138171.2020.1765100>
- Fikenzer, S.; Fikenzer, K.; Laufs, U.; Pietrek, H.; Hepp, P. (2021). Impact of COVID-19 lockdown on endurance capacity of elite handball players. *J. Sports Med. Phys. Fitness*, 61 (7), 977-982. doi: 10.23736/S0022-4707.20.11501-9
- Fiorilli, G. et al. (2021). A national COVID-19 quarantine survey and its impact on the Italian sports community: Implications and recommendations. *PLoS One*, 16(3), e0248345.



- Haddad, M.; Abbes, Z.; Mujika, I. & Chamari, K. (2021). Impact of COVID-19 on Swimming Training: Practical Recommendations during Home Confinement / Isolation. *Int. J. Environ. Res. Public Health*, 18 (9), 4767. doi: 10.3390 / ijerph18094767
- Hakansson, A.; Jonsson, C. & Kentta, G. (2020). Psychological Distress and Problem Gambling in Elite Athletes during COVID-19 Restrictions-A Web Survey in Top Leagues of Three Sports during the Pandemic. *Int. J. Environ. Res. Public Health*, 17 (18), 6693. doi 10.3390/ijerph17186693
- Hammami, A., Harrabi, B., Mohr, M. & Krustrup, P. (2020). Physical activity and coronavirus disease 2019 (COVID-19): specific recommendations for home-based physical training. *Manag. Sport Leisure*, 25, 1–6. DOI: 10.1080/23750472.2020.1757494
- Hermassi, S. et al. (2021). Effects of Home Confinement on the Intensity of Physical Activity during the COVID-19 Outbreak in Team Handball According to Country, Gender, Competition Level, and Playing Position: A Worldwide Study. *Int. J. Environ. Res. Public Health*, 18(8), 4050. <https://doi.org/10.3390/ijerph18084050>
- Hossain, M.M.; Sultana, A. & Purohit, N. (2020). Mental health outcomes of quarantine and isolation for infection prevention: A systematic umbrella review of the global evidence. *Epidemiol. Health*, 42, e2020038.
- Kehl, M.; Strobl, H.; Tittlbach, S. & Loss, J. (2021). The Person Who Plays Handball Needs the Ball, the Contact and the Community - Changes in Sport Club Activities Due to the COVID-19 Pandemic and its Significance for Sports Clubs. *Gesundheitswesen*, 83 (3), 159-165. DOI 10.1055/a-1341-1609
- Latella, C. & Haff, G.G. (2020). Global Challenges of Being a Strength Athlete during a Pandemic: Impacts and Sports-Specific Training Considerations and Recommendations. *Sports* 8 (7), DOI 10.3390/sports8070100
- Leguizamo, F. et al. (2021). Personality, Coping Strategies, and Mental Health in High-Performance Athletes During Confinement Derived From the COVID-19 Pandemic. *Front. Public Health*, 8, 561198. DOI 0.3389 / fpubh.2020.561198
- Leuciuc F.V. (2018). Women's Handball World Championship 2017 Case Study: European Teams Versus Rest Of The Participating Teams' Efficiency. *Acta Kinesiol.* 12(1), 19-23.
- Leuciuc F.V. (2020). The Validity and Reliability of Ratings of Perceived Exertion in Fitness Activities for Students by Using Electronic Devices, *Int. J. Appl. Exerc. Physiol.* 9(7), 13-18.
- Leuciuc F.V. (2021). The role of physical activities at patients infected with Sars-Cov2 after convalescence period. In *Biomedical Engineering Tools used for the Management of Patients with Coronavirus Disease 2019 (COVID-19)*, 1st ed.; Balas V., Geman O., Wang G., Arif M., Postolache O.; Academic Press: London, United Kingdom, 135-148.
- Löllgen H.; Bachl N.; Papadopoulou T.; Shafik, A.; Holloway, G. & Vonbank, K. (2020). Recommendations for return to sport during the SARS-CoV-2 pandemic. *BMJ Open Sport Exerc. Med.*, 6, e000858. doi: 10.1136//bmjsem-2020-000858

- Mann, R.H.; Clift, B.C.; Boykoff, J. & Bekker, B. (2020). Athletes as community; athletes in community: Covid-19, sporting mega-events and athletes health protection. *Br. J. Sports Med.* 54(18), 1071-1072.
- Mutz, M. & Gerke, M. (2021). Sport and exercise in times of self-quarantine: How Germans changed their behavior at the beginning of the Covid-19 pandemic. *Int. Rev. Sociol. Sport*, 56(3), 305– 316.
- Ozen, G.; Koc, H. & Aksoy, C. (2020). Health anxiety status of elite athletes in COVID-19 social isolation period. *Bratisl. Med. J.* 121(12), 888-893.  
doi: 10.4149/BLL\_2020\_146
- Parm, U.; Aluoja, A.; Tomingas, T. & Tamm, A.L. (2021). Impact of the COVID-19 Pandemic on Estonian Elite Athletes: Survey on Mental Health Characteristics, Training Conditions, Competition Possibilities, and Perception of Supportiveness. *Int. J. Environ. Res. Public Health*, Vol. 18 (8). doi 10.3390/ijerph18084317
- Rohozneanu, D.M. (2015). *Concepte care fundamentează pregătirea la handbaliștii juniori*, 1st ed.; Didactica și Pedagogica Publishing House: Bucharest, Romania, 60-66.
- Rohozneanu, D.M. (2019). On the communication between a coach and his athletes. *Multiculturalism Through the Lenses of Literary Discourse Section: Communication, Journalism, Education Sciences, Psychology and Sociology*, The Alpha Institute for Multicultural Studies Târgu Mureș, 7, 165-171.
- Samuel, R.D.; Tenenbaum, G. & Galily, Y. (2020). The 2020 Coronavirus Pandemic as a Change-Event in Sport Performers' Careers: Conceptual and Applied Practice Considerations. *Front. Psychol.* 11, 567966. doi: 10.3389/fpsyg.2020.567966
- Sarto, F. et al. (2020). Impact of potential physiological changes due to COVID-19 home confinement on athlete health protection in elite sports: A call for awareness in sports programming. *Sports Med.*, 50, 1417–1419.
- Szczypinska, M.; Samelko, A. & Guskowska, M. (2021). Strategies for Coping with Stress in Athletes During the COVID-19 Pandemic and their Predictors. *Front. Psychol.* 12, 624949, doi: 10.3389/fpsyg.2021.624949
- Taku, K. & Arai, H. (2020). Impact of COVID-19 on athletes and coaches, and their values in Japan: repercussions of postponing the Tokyo 2020 Olympic and Paralympic games. *J. Loss Trauma*, 25, 623–650. doi: 10.1080/15325024.2020.1777762
- Tayech, A.; Mejri, M.A.; Makhlouf, I.; Mathlouthi, A.; Behm, D.G. & Chaouachi, A. (2020). Second Wave of COVID-19 Global Pandemic and Athletes' Confinement: Recommendations to Better Manage and Optimize the Modified Lifestyle. *Int. J. Environ. Res. Public Health*, 17, 8385.
- Taylor, S. (2019). *The psychology of pandemics: Preparing for the next global outbreak of infectious disease*, 1st ed.; Cambridge Scholars Publishing: Newcastle upon Tyne, United Kingdom, 19-22.
- Wong, A.Y.Y et al. (2020). Impact of the COVID-19 pandemic on sports and exercise. *Asia-Pac. J. Sports Med. Arthrosc. Rehabil. Technol.* 22, 39-44.  
doi: 10.1016/j.asmart.2020.07.006
- Woodford, L. & Bussey, L. (2021). Exploring the Perceived Impact of the COVID-19 Pandemic Social Distancing Measures on Athlete Wellbeing: A Qualitative Study Utilizing Photo-Elicitation. *Front. Psychol.* 12, 624023.  
doi: 10.3389/fpsyg.2021.624023