ORİJİNAL ARAŞTIRMA ORIGINAL RESEARCH

DOI: 10.5336/sportsci.2020-76399

Investigation of the Performance Status of Elite Taekwondo Athletes Under COVID-19 Conditions: A Mixed Study

COVID-19 Koşullarında Elit Taekwondo Sporcularının Performans Durumlarının İncelenmesi: Karma Bir Çalışma

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ABSTRACT Objective: COVID-19 negatively affected sports environment as well as many other aspects of life. In this process, while all sports stakeholders focused on managing the process with the most economical and effective solutions, athletes at this point had to give a new direction to their training that they had to continue at home. In this context, the research was carried out to collect information on the training processes that elite taekwondo athletes had to continue at home due to the COVID-19 outbreak and their performance status, and to perform analyses. **Material and Methods:** The research was carried out in a mixed pattern, in which the quantitative and qualitative processes were active, with the volunteer participation of 28 elite taekwondo athletes. Within the scope of the research, the training processes which had to be performed at home, the performance status, and the opinions and thoughts of the athletes on the process were obtained. Descriptive and content analysis techniques were used for the arrangement, analysis and presentation of the data. SPSS 25 statistical software was used to analyze the quantitative data. **Results:** Findings obtained from the study showed that the athletes mostly create a sports environment in their homes, receive remote coach support, perform 3-7 trainings a week and perform training an average of 7.47 hours a week, as well as they have some physical, motoric and mental problems. **Conclusion:** As a result, the elite athletes were found to determine a strategy to protect their current status rather than training to improve their performance.

Keywords: COVID-19; sports; performance; taekwondo; mixed study

ÖZET Amaç: COVID-19, yaşamın birçok noktasında olduğu gibi spor çevrelerini de olumsuz etkiledi. Bu süreçte tüm spor paydaşları, süreci en ekonomik ve etkili çözümlerle yönetmeye odaklanırken, sporcular da bu noktada, evde devam etmek zorunda kaldıkları antrenmanlarına yeni bir yön vermek zorunda kaldı. Bu kapsamda araştırma, elit taekwondo sporcularının COVID-19 salgını sebebi ile evde devam etmek zorunda oldukları antrenman süreçleri ve performans durumları hakkında bilgi toplamak ve inceleme yapmak amacıyla yapıldı. **Gereç ve Yöntemler:** Araştırma, 28 elit taekwondo sporcusunun gönüllü katılımı ile, nicel ve nitel süreçlerin aktif olduğu karma bir desende yürütüldü. Araştırma kapsamında; sporcuların evde yürütmek zorunda kaldıkları antrenman süreçleri, performans durumları ve süreç ile ilgili sporcuların görüş ve düşüncelerine başvuruldu. Verilerin düzenlenmesi, analizi ve sunumu aşamasında betimsel ve içerik analizi tekniklerinden faydalanıldı. Nicel verilerin analizinde SPSS 25 istatistik yazılımı kullanıldı. **Bulgular:** Araştırmadan elde edilen bulgular; sporcuların büyük oranda evlerinde spor ortamı oluşturduğunu, uzaktan antrenör desteği aldığını, haftada 3-7 arası antrenman yaptıklarını ve haftalık ortalama 7,47 saat antrenman yapabildiklerini, bunun yanında bazı fiziksel, motorik ve mental anlamda problemleri olduğunu gösterdi. **Sonuç:** Sonuç olarak, elit sporcuların performanslarını geliştirici antrenmanlardan ziyade mevcut durumlarını koruyucu bir strateji belirledikleri tespit edildi.

Anahtar Kelimeler: COVID-19; spor; performans; taekwondo; karma çalışma

In 2020, the world witnessed the emergence of a new, viral, zoonotic pathogen (SARS-CoV2) as a result of the World Health Organization's (WHO) proclaiming a public health-threatening coronavirus disease (COVID-19).[1-3] The increase in global anxiety and number of cases over time is not only limited to China but also affected other countries, and adversely affected their health and many other environments.[1,4] Sports environments also got their share and after the giant events such as Grand Prix and Formula 1, Tokyo Olympics were postponed due to COVID-19.

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Peer review under responsibility of Turkiye Klinikleri Journal of Sports Sciences.

Received: 16 May 2020 ***Accepted:*** 20 May 2020 ***Available online:*** 24 May 2020

In this process, cancellations and postponements are not only limited to large organizations, but also affected places such as sport halls, jogging and walking areas, and stadiums. Postponing all national and international events pushed all sports stakeholders to find solutions from the general to the specific.[5] This, of course, forced the athletes to produce individual solutions. In addition, with the encouragement of policies such as "stay at home", it was inevitable for athletes to continue their training processes at home. The athletes have to undergo a quarantine process in the most appropriate way, obtain training gains or maintain their current status. It is known that immobility in this process will cause many physical, physiological and motoric regressions.[6-8]

The elite athletes are thought to have some difficulties in carrying their work to the home environment in order to increase their sports performance. On the other hand, given that the conditions are almost equal for each athlete, it seems likely that the athletes will turn this crisis into an opportunity. The fact that the athletes prepare the most suitable training environments for themselves, create individual programs, focus on their individual deficiencies and try to improve their physiological, psychological and metabolic parameters will create an important infrastructure for the processes after quarantine. Most importantly, when the athletes focus on maximum efficiency, they will have a solid mood to support them.[9-11]

In this research, the object was to collect information on the training processes that the elite taekwondo athletes had to continue at home due to COVID-19 and their performance status, and to perform analyses. In this context, an important resource about the physical, motoric and psychological status of the athletes was tried to be created, and solutions for the current and possible problems were tried to be produced. In this sense, it is thought that the results of the research will contribute to all sports environments, especially high-performance athletes, coaches and clubs. In addition, the results of the research are thought to be an important road map in order to take early measures against such outbreaks in the future.

MATERIAL AND METHODS

RESEARCH DESIGN

The research was designed as a mixed pattern in which the quantitative and qualitative methods were used together. The qualitative research techniques were used in the research, as well as quantitative data collection tools. In the qualitative aspect of the research, a semi-structured interview technique was used. While quantitative data should be available to perform statistical operations, the data obtained at the end of a qualitative research may be presented without any statistical operation.[12,13] Thus, some data obtained were expressed quantitatively, while some data were presented as is obtained.

PARTICIPANTS

The study was conducted with the voluntary participation of 28 high-performance taekwondo athletes who had to continue their work at home due to the covid-19 outbreak. Details of the participants are given in Table 1.

ETHICAL COMPLIANCE

For the research, a Certificate of Ethics Committee was obtained from Scientific Researches and Publication Ethics Committee of Social and Humanities Sciences at Trabzon University (Issue: 81614018-000-E.152).

TABLE 1: Descriptive information of the participants.

Gender	Variables	X	Sd.	Min.	Max.
Female (n=14)	Age (year)	21.50	2.95	18.00	27.00
	Body mass (kg)	54.93	9.22	46.00	73.00
Male (n=14)	Age (year)	22.21	2.72	18.00	28.00
	Body mass (kg)	66.07	8.66	54.00	80.00
Total (n=28)	Age (year)	21.86	2.81	18.00	28.00
	Body mass (kg)	60.50	10.45	46.00	80.00

All athletes were informed both verbally and in a written form about the purpose of the research and the process. The research was carried out in accordance with the Helsinki Declaration.

DATA COLLECTION TOOL

A semi-structured interview form developed by the researchers and Borg method were used to determine the participants' opinions on the COVID-19 process and performance status.

Semi-structured Interview Form: After the questions of the form developed were created, the questions had their final forms in line with the opinions of 3 field experts. The form consists of questions whether the participants have sufficient opportunities to do sports at home, the content, frequency and duration of their training, the support they have received and the support tools, and their positive and negative opinions about these training sessions (Annex-1).

Borg Method: Borg Method was used to determine the training intensity of the athletes.[14] This method is based on the relationship between the perceived exertion during training and heart rate values. The studies show that there is a positive and very high relationship between the perceived exertion and the heart rate.[14-17] The Borg scale consists of values from 6 to 20 and is interpreted as 6: no exertion at all and 20: maximal exertion. Athletes were asked to choose their exertion levels during training in the range of 6-20 and to share them with the researchers by taking note of these values for each training process for 1 week.

DATA COLLECTION PROCESS

This research was carried out to collect information on the training processes that elite taekwondo athletes had to continue at home due to the COVID-19 outbreak and their performance status, and to perform analyses. After a theoretical basis was formed, the process of collecting data was carried out.

During the data collection process, the purpose of the researcher was discussed with high performance athletes who actively participated in national and international competitions. After the necessary information was provided, an assurance was given that the data collected was reliable, the information as well as the identity of the participants would be kept secret and that their names would not be mentioned in any part of the study. In order to collect the data, the athletes were contacted via online platforms using the semi-structured interview form developed by the researchers and they were asked to answer the questions in a written form. All of the interviews were recorded on a computer. The interview form created consists of open and closed-ended questions. Borg scale was used to analyze the sportive performance aspect of the research.

DATA ANALYSIS

Written documents obtained within the scope of the study were read repeatedly, and the data was simplified by removing the irrelevant topics. In this context, the content and descriptive analysis techniques were used to analyze the data.

In the descriptive analysis, the data were summarized and interpreted according to the themes created. In addition, direct quotations were included in order to dramatically reflect the opinions of the athletes.[18] In the context of descriptive analysis, a content analysis technique was used to reveal and deeply process new concepts and themes.[18] In the descriptive and content analysis step, the opinions of 3 different researchers who were experts in their fields were taken in order to encode the data correctly. A frequency analysis was used during the presentation of the codes under the same themes, the frequencies were expressed as a percentage, and the direct representations of the expressions were included under the tables.

Data on the sportive performance aspect of the study were collected using the Borg scale. The data collected with the Borg scale were subjected to descriptive statistics according to a gender factor. SPSS 25 software was used to calculate the descriptive statistics.

RESULTS

Results obtained from the research consist of the current status of the athletes and the analysis of the data for the opinions of the athletes on their current status.

As a result of the analysis of the information and data about the sports life that the athletes had to continue at home due to COVID-19, it was determined that 82.1% of the elite athletes had sufficient opportunities to do sports at home and might have 3-7 trainings per week, whereas 67.9% of them did not use any mobile applications and 64.3% received coach support (Table 2).

As a result of the analysis of the data obtained about the frequency, duration and intensity of the training programs carried out by the athletes, it was determined that these athletes had a training average of 5.5 ± 1.11 per week, their total weekly training times were an average of 7.47 ± 3.17 hours and their training intensity was 54.65 ± 7.85% on average (Table 3).

When the content of the training done by the athletes is examined, it may be stated that the athletes mostly concentrate on strength, technique, flexibility and endurance (>60.71%) (Table 4).

When the answers of the athletes to the question "What are the positive contributions of a home-based training to you and what are the negative aspects of a home-based training?" are examined, 42.86% of the athletes were found to have material and support problems. Some of the opinions provided by the participants on the subject are as follows.

Q1: I can't train to improve my performance because I don't have enough equipment…

Q7: It is very difficult because there is no partner and enough space, and it is far from being a training environment…

TABLE 2: Information on the current status of athletes.

Questions	Answers	n	%
Do you have enough facilities in your home to play sports?	Yes	23	82.1
	No	5	17.9
How many times a week do you train?	3 tra.	1	3.6
	4 tra.	4	14.3
	5 tra.	9	32.1
	6 tra.	8	28.6
	7 tra.	6	21.4
Do you use any sporty apps (android or ios) or programs?	Yes	9	32.1
	No	19	67.9
Do you have any support, plans or programs that you have received from your coach?	Yes	18	64.3
	No	10	35.7

TABLE 3: Information on training qualifications of athletes.

Gender	Variables	X	Sd.	Min.	Max.
Female (n=14)	Number of training sessions per week	5.93	1.00	4.00	7.00
	Weekly training time (hours)	7.98	2.59	3.75	14.00
	Borg value	11.51	1.60	9.14	14.29
	Loading (%)	57.58	8.02	45.70	71.40
Male (n=14)	Number of training sessions per week	5.07	1.07	3.00	7.00
	Weekly training time (hours)	6.95	3.69	2.00	14.00
	Borg value	10.34	1.35	7.50	12.33
	Loading (%)	51.73	6.73	37.50	61.70
Total (n=28)	Number of training sessions per week	5.50	1.11	3.00	7.00
	Weekly training time (hours)	7.47	3.17	2.00	14.00
	Borg value	10.93	1.57	7.50	14.29
	Loading (%)	54.65	7.85	37.50	71.40

TABLE 4: Information on training content of athletes.

Training Type	Participants	n	%
Strength	2,3,5,6,7,9,10,11,12,13,15,17,18,19,20,21,22,23,24,25,26,27,28	23	82.14
Technic	1,2,3,4,7,8,9,10,12,14,15,17,19,22,24,26,27,28	18	64.29
Flexibility	1,2,3,4,7,8,9,10,12,14,15,17,19,22,24,26,27,28	18	64.29
Endurance	1,2,3,5,6,7,11,14,15,16,17,18,19,23,25,26,28	17	60.71
Tactic	7,8,9,10,14,19,24	7	25.00
Coordination	18	1	3.57

Q21: I think it is very difficult to train at home. I don't feel it is useful for me. Our home is not suitable for training. So, I can't work every day. When I train, I do some exercises only to say that I train. If I had a guide to work at home, maybe I could say otherwise.

Another dominant problem experienced by the athletes was found to be loading and adaptation problems. 21.43% of the athletes stated that they were negatively affected by the lack of technical training, were not able to compete and had training at a low intensity. Some of the opinions provided by the participants are as follows.

Q14: I do not think that we can carry ourselves too far with training at home, as a result, you do not have coaches who will watch you and show your shortcomings…

Q15: I would like to note that a home-based training is more gentle than normal.

QS20: But when I train, I become distracted very quickly. This is a negative effect for me.

When the positive contributions of athletes' home-based training to them were examined, it was determined that 82% of them took measures to protect and improve their performances and created opportunities. Some of the athlete's opinions on the theme of performance protection and improvement are as follows.

Q4: I do not think that a home-based training is improving, we are just trying as much as we can so that we are not out of shape during this difficult process.

Q5: It was good to have time to make a technical correction, of course, a very bad situation for your condition. I can only physically keep my condition.

Another advantage of a home-based training for the athletes was found to be a sense of being trained. An athlete also mentioned that he/she was under equal conditions with everyone.

Q11: Now everyone is under equal conditions, and details will carry us one step further.

Q1: In this process, I have a feeling of being psychologically trained.

Q2: I think that training at home is very useful in terms of foreseeing the future psychologically. It is a great motivation for an athlete to know that his/her body never goes back.

Q3: This process is enough for me to keep in shape. I feel good. It's not as effective as in normal days, but at least I keep training. I think a good athlete should take every opportunity.

Q15: Besides, the best part of the training for me is psychology. When I train and have my meals on a regular basis, I feel the happiness of fulfilling my duties. I know that I do this for myself and this process will end.

DISCUSSION

Although more facilities and infrastructure are needed for physical exercises, training at home during quarantine can be a logical choice to get over the process in a most correct way. This research was carried out to collect information on the training processes that elite taekwondo athletes had to continue at home due to the COVID-19 outbreak and performance status, and to perform analyses. In this context, opinions of 28 athletes were taken, in addition to some demographic information.

The results of the analysis on the determination of the current status of the athletes showed that 82.1% of them had sufficient opportunities in their homes, they train 5.5 day on average at least 3 days a week, and their weekly training time was 7.5 hours on average (Table 2, Table 3). In addition, as a result of the analysis, it was determined that 67.9% of the athletes did not use any auxiliary application. The fact that 64.3% of the athletes received support such as a plan and program from their coaches confirms this result (Table 2, Table 3). The results show that the athletes continue their training to a large extent in a planned and scheduled manner. It was determined that the training plans of the athletes consisted of strength, technique, flexibility and endurance trainings of over 60% (Table 4).

During the quarantine days caused by the COVID-19 outbreak, Jiménez-Pavón et al. (2020) have recommended aerobic trainings which were performed for 5-7 days a week for 150-300 minutes (200-400 minutes in the quarantine regions), stretching exercises in each training day, balance and coordination exercises on different days.[19] They also stated that exercise intensity in the quarantine days being in the range of 65-70% of the maximal heart rate would have a protective effect. On the other hand, those with covid-19 disease are reported to be careful for exercise, but healthy individuals are reported to continue exercising at home.[20] Although the results of the research support the literature quantitatively, considering that our sample group is high performance athletes, it may be stated that they should update their current training plans. Qualitative statements of the athletes also support this outcome.

At the end of descriptive examinations and content analysis, the athletes were found to have problems with training materials, place and environment, coach and partner. It is understood that although the athletes stated that they had sufficient opportunities in their homes, these opportunities did not satisfy them. The training material, coach and partner needs of the athletes are thought to cause them to perform low-intensity, inadequate technical and inadequate competition training. The opinions of the athletes on the theme of loading and adaptation confirm this. In addition, the degree of exertion of the trainings performed by the athletes, determined by the Borg scale, indicates that the athletes could not train hard enough. The average Borg values of the athletes were determined to be 10.93 ± 1.57. This value shows that the average heart rate of the athletes during training is around 110 and they can train at a load intensity of 55%. According to Hettinger (1966), the intensity of a stimulus should not fall below 70% in high performance athletes.[21] In order to develop certain training-related abilities, the stimulus intensity should reach a threshold beyond the level at which training gains begin to be acquired.[21] Hettinger (1966) states that strength training should not be below 30% of the maximal value, and that the intensities under this stimulus do not have a training effect.[21] In this context, it may be stated that the athletes should take measures to increase the intensity of training.

Descriptive examinations and content analysis results show that the training done by the athletes is mostly aimed at preserving their current status. In addition, it was found that the athletes were trying to concentrate on their shortcomings, which they could not spare enough time in normal times in order to turn the outbreak process to an advantage. It may be stated that the planned and programmed lifestyles of high-performance athletes continue at home as much as possible. Athletes try to spend their time in the most appropriate way. This also affects athletes psychologically. It was determined that the training performed by the athletes during the outbreak supported them psychologically (Table 5). The athletes stated that the feeling of being trained is good for them. Studies show that a physical exercise is effective in reducing feelings such as stress, depression and anxiety.[9-11] Also, considering that training is a task for them, fulfilling their duty creates good feelings for them. It is known that the international organizations, financial institutions, Olympic Committee, governments and sports organizations try to maintain the well-being and the feeling of well-being as mentioned, and support consultant services for the Olympic athletes. The object of these strategies is for the Olympic athletes to achieve the best results in the current conditions.[22]

TABLE 5: Opinions and thoughts of athletes about trainings at home.

	Theme	Code	Participants	n	%	Total %
Negative	Material and support	Material problem	1,18	2	7.14	42.86
		Environment problem	3,7,19,21	4	14.29	
		Partner and coach problem	4,7,14,18,20,21,23,24,28	9	32.14	
	Loading and adaptation	Insufficient technical training	4,14,23	3	10.71	21.43
		Insufficient competition	5,6	2	7.14	
		Low conditioning	12	1	3.57	
		Low density	1,11,15,16,19,20,22,24,25,27	10	35.71	
		Motivation problem	7,16,18,20	4	14.29	
Positive	Performance protection and enhancement	Maintaining current status	1,2,3,4,5,7,8,9,10,11,12,14,15,17, 18,20,22,23,25,27,28	21	75.00	82.14
		Adequate strength training	4,19,25	3	10.71	
		Adequate rest	19	1	3.57	
		Opportunity to complete technical deficiencies	12,13	2	7.14	
		Regular nutrition	15	1	3.57	
	Mental	Feeling to be trained	1,2,3,6,9,10,13,15,17,23,25,26	12	42.86	46.43
		Advantage of being on equal terms with opponents	11	1	3.57	

CONCLUSION

It is obvious that the COVID-19 pandemic has also greatly affected the sports environment. However, during these crisis days, especially high-performance athletes should need to continue their training of best quality and to at least maintain their current status. The results of the research indicated that the elite athletes had a substantially sufficient physical environment, they could get coach support, they had an average of 6 trainings per week and they work for 7.5 hours in total, but the training intensity is lower than the expected, the material, trainer and partner support are insufficient, and they experienced certain motivational problems. It may be stated that the athletes have determined a strategy to protect their current status rather than training to improve their performance.

In this process, increasing the rates of remote communication in line with the possibilities, launching the technological tools that allow maximum level of remote interaction, redirecting individual programs according to physiological and physical features and following them tightly can be a solution for the problems expressed by the athletes. In addition, measures to increase family and friend support may be taken during this process.

Source of Finance

During this study, no financial or spiritual support was received neither from any pharmaceutical company that has a direct connection with the research subject, nor from a company that provides or produces medical instruments and materials which may negatively affect the evaluation process of this study.

Conflict of Interest

No conflicts of interest between the authors and / or family members of the scientific and medical committee members or members of the potential conflicts of interest, counseling, expertise, working conditions, share holding and similar situations in any firm.

Authorship Contributions

Idea/Concept: *Cengiz Ölmez;* ***Design:*** *Cengiz Ölmez;* ***Control/Supervision:*** *Cengiz Ölmez;* ***Data Collection and/or Processing:*** *Burakhan Aydemir;* ***Analysis and/or Interpretation:*** *Halit Şar;* ***Literature Review:*** *Mehmet Öztaş;* ***Writing the Article:*** *Cengiz Ölmez, Burakhan Aydemir, Halit Şar, Mehmet Öztaş;* ***Review:*** *Cengiz Ölmez.*

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