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Impact of Covid-19 Semi-lockdown on Sports and Physical Activity Behaviors of Cameroonian Elite Volleyball Players: A Cross-sectional Study

Wiliam Richard Guessogo[1], Elysée Claude Bika-Lele[2], William Mban-Bian[3], Audrey Rose Deborah Mandjek[3], Abdou Temfemo[4], Samuel Honore Mandengue[5], Peguy Brice Assomo-Ndemba[6]

[1] PhD, Senior Lecturer, National Institute of Youth and Sports, Yaounde, Cameroon
[2] PhD, Lecturer, Exercise and Sport Physiology Unit, University of Douala, Douala, Cameroon
[3] MSc, National Institute of Youth and Sports, Yaounde, Cameroon
[4] PhD, Associate Professor, Faculty of Medicine and Pharmaceutical Sciences, University of Douala, Douala, Cameroon
[5] PhD, Full Professor, Exercise and Sport Physiology Unit, University of Douala, Douala, Cameroon
[6] PhD, Associate Professor, Faculty of Medicine and Biomedical Sciences, University of Yaounde 1, Yaounde, Cameroon

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Abstract

Background: The sport domain experienced major disruptions due to the Covid-19 pandemic.
Objective: To determine the effects of Covid-19 semi-lockdown on elite volleyball players in Cameroon.
Methods: From June 29 to July 30, 2020, 111 volleyball players completed a self-administered questionnaire adapted from a physical activity maintenance questionnaire, to collect anthropometric parameters before and after relaxation, physical activity maintenance, number and type of training sessions, and opinion on physical capacities during and after semi-lockdown. Data were analyzed by IBM© SPSS© Statistics version 20. Comparisons were made by independent-samples t-test for quantitative variables and Pearson Chi-square goodness of fit test for qualitative variables. A p-value of <0.05 was considered statistically significant.
Results: Around 70.3% of the players experienced a body mass index (BMI) increase, 1.8% kept the same, and 27.9% decreased their BMI. About 82% of volleyball players continued training, without any sex difference ($p=0.91$). Meanwhile, 72.5% trained at home, 68.1% individually, and 74.7% by self-motivation, with more males training than females ($p=0.004$). Almost 33.3% increased individual training sessions, 71.4% reduced group training sessions, and 29.4% reduced training sessions with a coach. About 60.4% received personalized training programs, 65.0% preferred physical training, and 21.2% completed aerobic exercises. Athletes thought that the semi-lockdown induced strength loss (43.1%), speed loss (55%), and endurance loss (78%). After the first training session, the coach qualified the physical capacities as average (73.2%).
Conclusion: Practice of regular physical activity should be encouraged among athletes during the pandemic period to ensure a safe return to sports.
Keywords: Covid-19, Physical activity behaviors, Semi-lockdown, Elite volleyball players, Cameroon, Sport

Abbreviations / Acronyms:
BMI: Body Mass Index.
UEFA: Union of European Football Associations.

Corresponding author:
Dr. Wiliam Richard Guessogo, National Institute of Youth and Sports, Yaounde, Cameroon.
Tel: +237.698134943, E-mail: guessowiliam@yahoo.fr
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1. Introduction

1.1. Background and study logic

Since December 2019, China (Wuhan) has been affected by a new virus from the coronavirus family, SARS-COV-2, responsible for the disease called Covid-19 (1-4). Covid-19 spread rapidly across the world and became the largest pandemic the world has known. In order to limit the spread of the virus, health authorities have issued safety recommendations and the governments of many countries adopted measures that the public was advised to observe. These measures included travel restrictions, social isolation at home, school closures, etc. (5). The Cameroonian Public Health Ministry declared that there were 17,255 positive cases and 387 deaths in July 2020. The barrier measures decreed by governments affected socio-economic activities (6), as well as the physical activity behavior of the population. This can lead to health problems associated with inactivity (7, 8). Therefore, it has been recommended to continue physical activity at home during this period of confinement (9-11). The sports milieu was also affected all over the world, with a total interruption or postponement of sports activities and championships since early March 2020, such as the Olympic Games, the UEFA Champions League, the African Cup of Nations, and the African Nations Championship (12, 13). In Cameroon, following the introduction of the barrier measures enacted on March 17, 2020 by the Cameroonian Government, the sports federations also suspended their activities. This is the specific case of the Cameroonian volleyball federation, whose championship was just beginning. This public health situation forced players and coaches to adopt new behaviors to maintain the level of fitness already acquired. Several studies have assessed the impact of the Covid-19 pandemic on the sport. One study carried out among South African athletes showed that this pandemic has affected over 14 sports disciplines, including volleyball (14). In Cameroon, where the pandemic also led to a change in sports programs, a recent study by Guessogo et al. (15) focusing on basketball players revealed that the semi-confinement due to the Covid-19 pandemic has significantly affected the behavior and attitude of players. To our knowledge, there are no dedicated studies conducted so far on Cameroonian elite volleyball players.

1.2. Objective

The objective of this work was to determine the effects of Covid-19 semi-lockdown among elite volleyball players in Cameroon, in 2020.

2. Material and Methods

2.1. Study design and time period

This cross-sectional study was carried out in the period from June 29, 2020 (resumption of normal professional and academic activities) to July 30, 2020, in the city of Yaounde (Cameroon). The survey was carried out among volleyball players, based on a questionnaire adapted from a validated physical activity maintenance questionnaire (16). Information collected included anthropometric parameters (height, weight, and body mass index), maintenance of physical activity, number of training sessions, type of training session, and opinion on physical capacities.

2.2. Sampling method and participants

Because of the barrier measures introduced in Cameroon, such as restriction of movement, we used a convenience non-probability sampling method. The sample size was calculated using Raosoft calculator with a 95% confidence level and a maximum error of 5%. The total population consisted of 111 volleyball players so that the required response rate would be 50% (recommended). They were recruited after signing an informed consent form. Due to the relaxation of the barrier measures enacted by the government of the Republic of Cameroon, on the one hand, and the provision by the administration of the Cameroon Volleyball Federation of the telephone file of players from the different teams in Yaounde, on the other hand, these athletes were approached by the principal investigator. Elite sportsmen affiliated with the Cameroon Volleyball Federation, over 18 years old and residing in the city of Yaounde, were included in the study.

2.3. Measures and instruments

2.3.1. Anthropometric parameters

The anthropometric parameters were determined in compliance with the barrier measures decreed by the government and health authorities (social distancing, wearing a mask, regular hand washing, and use of hydro-alcoholic gel). The weight of the athletes was measured using a TANITA BC 532 brand electronic scale (Tokyo, Japan) placed on a hard and flat surface, calibrated before measurement, while the weight before the introduction of barrier measures was estimated and reported by the players themselves. The heights were measured using a Seca brand measuring rod (Hamburg, Germany). The body mass index (BMI) was calculated by dividing the weight (in kilograms) by the square of the height (in meters squared).

2.3.2. *Questionnaire on maintenance of physical activities*

This instrument was adapted from a validated questionnaire on the maintenance of activities (16). For the reliability of the questionnaire, content validity was used to establish the internal validity of the questionnaire. Nevertheless, it was revised by an expert panel with the participation of university professors not involved in the project, who approved the final version of the questionnaire. The administration of the questionnaire took place during a meeting with the athletes who answered directly. This self-administered instrument included the maintenance of physical activities, the number of training sessions per week (alone, in a group, and/or in the presence of a trainer), the measures taken to compensate for the lack of group training, the type of training session (physical and/or technical), the player's personal opinion on their physical capacities (decreased, maintained, or improved), and the qualification of the physical capacities of the players by the coach (poor, medium, good).

2.4. Data analysis

Quantitative variables were presented as mean ± standard deviation (SD) while qualitative variables were presented as frequencies and percentages. The quantitative variables were compared between men and women using the independent samples t-test and the qualitative variables using the Pearson Chi-square goodness of fit test. As items were single or multiple-choice, the proportions do not add up to 100% for the questions with multiple responses. All analyses were performed using IBM© SPSS© Statistics version 20 (IBM© Corp., Armonk, NY, USA). A p-value of <0.05 was considered statistically significant.

2.5. Ethical consideration

The survey was approved by the Deputy Director in charge of Studies and Research of the National Institute of Youth and Sports, Yaounde, Cameroon (N° 008/DA/INJS). All participants were informed of the research procedures, which conformed to the ethical standards of the Declaration of Helsinki revised in 1989, before giving their written consent to join the study. Participants were assured that the surveys would be anonymous and that the data would be kept confidential.

3. Results

Table 1 presents the anthropometric characteristics of the participants. Out of a total of 111 questionnaires distributed, the mean age of respondents was 22±6 years, (44.1% under 20 years old, 42.3% from 20 to 30 years old, and 13.5% over 30 years old), with a significant difference depending on gender ($p<0.0001$). There were 86.5% students and 13.5% workers with a significant gender-wise difference ($p<0.0001$). The players were junior (28.8%) and senior (71.2%), which included gender-related differences ($p=0.004$). Regarding BMI, no significant sex difference existed in the mean value before ($p=0.761$) and after ($p=0.711$) semi-lockdown. A total of 70.3% of the players experienced a BMI increase, 1.8% kept the same BMI, and 27.9% decreased their BMI. No significant BMI variation was noted based on gender ($p=0.657$).

Table 1. Participant's anthropometric parameters

Variables			Total	Women	Men	p-value
Age (years)		Mean±SD	22±6	18±3	25±6	< 0.0001*
		< 20	49 (44.1)	38 (70.4)	11 (19.3)	
		20-30	47 (42.3)	15 (27.8)	32 (56.1)	
		≥ 30	15 (13.5)	1 (1.9)	14 (24.6)	
Profession		students	96 (86.5)	54 (100)	42 (73.7)	<0.0001*
		workers	15 (13.5)	0	15 (26.3)	
Category		Juniors	32 (28.8)	23 (42.6)	9 (15.8)	0.004*
		Seniors	79 (71.2)	31 (57.4)	48 (84.2)	
BMI	BMI (before Semi-lockdown	Mean±SD	22.7±3	22.7±2.9	22.7±3.2	0.761
	BMI (After Semi-lockdown)	Mean±SD	23.3±2.6	23.4±2.8	23.2±2.5	0.711
	≠ BMI	Mean±SD	0.6±1.6	0.6±1.7	0.5±1.6	0.657
	ΔBMI	Gain	78 (70.3)	37 (68.5)	41 (71.9)	0.657
		Equal	2 (1.8)	1 (1.9)	1 (1.8)	
		Lost	31 (27.9)	16 (29.6)	15 (26.3)	

Δ Variation; ≠ Difference * Independent samples t-test

Regarding the continuity of training, 82% of the volleyball players continued training during the semi-lockdown period against 18% who interrupted totally, without any significant gender-wise difference (p=0.91) (Table 2). Of the 91 volleyball players who continued training, 72.5% trained at home and 27.5% on a court, with more male players training than females (p=0.004). In addition, 68.1% did their training individually, 25.3% with teammates, and 6.6% with a coach, which showed a significant gender difference (p=0.011). Finally, out of 91 volleyball players, 6.6% trained due to coach recommendation, 18.7% to chase boredom away, and 74.7% by personal initiative, without any significant gender-wise difference (p=0.948).

Table 2. Comparison by gender of training continuity [n=91 (45 women and 46 men)]

Variables		Total %	Women %	Men %	p-value
Where did the training take place?	Home (alone)	72.5	57.8	87	0.004*
	Training ground (collective)	27.5	42.2	13	
With who did you train?	Alone	68.1	53.3	82.6	0.011*
	With teammate	25.3	37.8	13	
	With coach (s)	6.6	8.9	4.3	
What was the reason for your training during the semi-lockdown period?	Coach recommendation	6.6	6.7	6.5	0.948
	Boredom	18.7	20	17.4	
	Self-motivation	74.7	73.3	76.1	

n: total participant; * Pearson Chi-square (goodness of fit test) [significant at level ≤ 0.05.]

Concerning the effects of semi-lockdown on the number of sessions, Table 3 shows that out of a group of 30 volleyball players, 40% maintained, 26.7% reduced, and 33.3% increased the number of solo training sessions. This trend was the same in males and females (p=0.897). Of the 21 athletes who continued collective training among the 111 volleyball players, 23.8% maintained, 71.4% reduced, and 4.8% increased the number of collective training sessions, with the same behavior between males and females (p=0.301). Of a total of 17 volleyball players, 52.9% maintained, 29.4% reduced, and 17.6% increased the number of training sessions with their coach without gender-wise difference in behavior (p=0.413).

Regarding the effects of semi-lockdown on the relationship with the coach and the scheduling of training sessions, out of 111 volleyball players, 37.8% were not in permanent contact, 13.5% were in contact at least once a day, 17.1% were in contact at least once every two days, and 31.5% were in contact at least once a week with the coach. No significant difference was observed between men and women (p=0.118). About 60.4% of 111 volleyball players had personalized training programs during the confinement period while 39.6% did not, with no significant gender differences observed (p=0.087). In addition, 52.3% indicated that they took precautions to address the lack of group training and 47.7% took no action. These measures were the same in both genders (p=0.212) (Table 3). According to the effects of semi-lockdown on the type of training sessions, the results revealed that of the 100 volleyball players out of the 111, 53% performed physical training, 5% performed technical training, and 42% performed both physical and technical training. There were no gender-wise differences in behavior (p=0.306) (Table 3). Of these 100 volleyball players, 65% preferred physical training, 13% technical training, and 22% both types of training (physical and technical). No significant gender difference was observed (p=0.872). Of a total of 99 among the 111 volleyball players, 21.2% performed aerobic training and 78.8% completed some other type of training. We noted no difference in the choice of training type in both genders (p=0.958).

Regarding the effects of semi-lockdown on physical performance (Table 3), of 109 out of 111 volleyball players, 43.1% thought the period of confinement led to diminishing strength capacity. This effect was the same in males and females (p=0.657). In addition, 55% of them thought that the confinement period resulted in a decrease in speed capacity, and no significant gender difference was noticed (p=0.9). Furthermore, 78% of the players thought the confinement period caused an endurance capacity decrease with no significant gender difference (p=0.397). At the end of the first training session in the presence of the coach, out of 82 volleyball players, the coach qualified the player's physical capacities as good (18.3%), bad (8.5%), and medium (73.2%). The male players showed better physical capacities than females (p=0.005).

Table 3. Effects of semi-lockdown on the number of sessions, Relationship with the coach and the scheduling of sessions, Type of session, and Physical performance

Variables			Total %	Women %	Men %	p-value*
Number of sessions	Variation of training sessions alone	Equal	40	50	38.5	0.897
		Less	26.7	25	26.9	
		Plus	33.3	25	34.6	
	Variation of training sessions in group	Equal	23.8	14.3	42.9	0.301
		Less	71.4	78.6	57.1	
		Plus	4.8	7.1	0	
	Variation of training sessions with the coach	Equal	52.9	40	71.4	0.413
		Less	29.4	40	14.3	
		Plus	17.6	20	14.3	
Relationship with the coach and the scheduling of sessions	Were you in constant contact with your head coach?	No	37.8	35.2	40.4	0.118
		At least once a day	13.5	11.1	15.8	
		At least once every two days	17.1	25.9	8.8	
		At least once a week	31.5	27.8	35.1	
	Did you have any personalized programs during the semi-lockdown period?	Yes	60.4	68.5	52.6	0.087
		No	39.6	31.5	47.4	
	Had measures been taken to compensate the lack of group training?	Yes	52.3	59.3	45.6	0.212
		No	47.7	40.7	54.4	
Type of session	What type of training did you completed during the semi-lockdown period?	Physical	53.0	58.0	48.0	0.306
		Technical	5.0	2.0	8.0	
		Both (technical and physical)	42.0	40.0	44.0	
	What type of training did you prefer?	Physical	65.0	64.0	66.0	0.872
		Technical	13.0	12.0	14.0	
		Both (technical and physical)	22.0	24.0	20.0	
	Did you complete aerobic training sessions?	Yes	21.2	20.0	22.4	0.958
		No	78.8	80.0	77.6	
Physical performance	Do you think that the semi-lockdown period resulted in a decrease in your strength capacity?	Yes	43.1	45.3	41.1	0.657
		No	56.9	54.7	58.9	
	Do you think the semi-lockdown period caused a decrease in your speed capacity?	Yes	55	56.6	53.6	0.9
		No	45	43.4	46.4	
	Do you think the semi-lockdown period caused a decrease in your endurance capacity?	Yes	78	73.6	82.1	0.397
		No	22	26.4	17.9	
	What did the coach say about your physical abilities at the end of the first session together?	Good	18.3	6.7	32.4	0.005**
		Bad	8.5	13.3	2.7	
		Average	73.2	80	64.9	

* Pearson Chi-square (goodness of fit test), ** significant at level ≤ 0.01 (the level of significance considered ≤0.05 for the rest of examined hypotheses)

4. Discussion

The results obtained in this research show that semi-confinement significantly affected the sporting and physical activity behavior of volleyball players, with women seemingly affected more than men. The semi-lockdown period did not induce anthropometric changes in volleyball players. Previous studies have shown that it takes a significant amount of time in physical activity to cause changes in weight status (8, 17, 18). Moreover, the research participants were certified athletes and therefore, they had to maintain a certain level of physical activity during the restriction period, which favored the maintenance of body mass. This result is similar to that of Kaux and Francaux (2) who concluded in their study that physical activity carried out in moderation remains recommended for all and is beneficial during the Covid-19 pandemic, with some precautions to be taken. Furthermore, low-intensity training is recommended for recovery (19), and this is important during the Covid-19 pandemic to avoid a weakened immune system (9, 14, 20-22). This result is contrary to that of Hughes et al. (13) who demonstrated that the preventive measures taken to limit the spread of Covid-19 have negatively affected a range of professional and social activities, including physical activities.

The volleyball players continued training during the semi-lockdown period. This result is similar to that obtained by Pillay et al. (14) among South African athletes who reported that more than half of the athletes exercised at a moderate intensity for 30-60 minutes per day. We also observed the same trend in Cameroonian basketball players where they maintained a certain level of training even though it was mostly done alone (15). The changes in quality of life and behavior observed in some cases as a result of the restrictions include a certain level of physical activity and exercise to maintain an adequate level of health (1). Indeed, the enacted government measures have banned collective training in clubs. To maintain a certain level of physical fitness, athletes had to continue physical activities individually at home. In relation to the continuity of training, male and female athletes behaved the same. This can be justified by the fact that despite the barrier measures, including travel restrictions, both male and female players continued to practice sports during the restriction period. We believe that the pandemic has not prevented volleyball players from continuing to practice sports on an individual basis, especially for athletes who believed in maintaining their performance. These results agree with those of previous studies (15, 14, 23), showing that most athletes (2/3) continued to train alone daily. Unfortunately, there is the risk of the eventual development of trauma (24).

The present study found that the volleyball players continued physical activity during semi-lockdown by simple personal motivation, meaning that the training carried out by these players was not supervised. As a result, this could cause physical and technical deficiencies (14, 24). Such changes can lead to impaired performance and an increased risk of injuries such as ruptured ligaments and muscle injuries (12) as the work performed during this period was not included in a specific volleyball program. This result is consistent with those of Aicale et al. (24) and Pillay et al. (14) who claim that inadvertent adoption of a poor technique and poor posture can predispose athletes to injury. For most athletes in general, individual training sessions increased and, group training sessions and training sessions with their trainer decreased. Indeed, the increase in the number of individual sessions, the decrease in the number of group sessions, and the stabilization of sessions with the trainer (52%) during the restriction period are only normal. This could be justified in view of the measures enacted by the public authorities aimed to limit the gatherings of more than 50 people in public places, on the one hand, and the closure of structures approved for sports practice, on the other hand. It is in this sense that Hughes et al. (13) found that group training has been banned in sports clubs, forcing athletes, coaches, and managers to adopt new sports and managerial approaches. However, this situation could lead to technical shortcomings, as personal training and the absence of sport-specific training programs can be challenging for athletes who participate in highly technical and team sports (14, 19).

Regarding the relationship with the coach, to compensate for the lack of collective training, the coaches adopted virtual and remote methods to avoid any regrouping, following the prescriptions of health and government authorities. Other consequences of isolation are the lack of organization in training and competition, lack of communication between athletes and coaches, the inability to move freely, and inappropriate training conditions (5, 25, 26). The measures adopted by the coaches helped to avoid deconditioning in athletes facing a long period of potential inactivity. This possible deconditioning would have posed problems when resuming normal sports activities (14, 23). Contrary to the results of Pillay et al. (14) who showed that only a minority of athletes followed a digital guide offered by a professional, most players (60.4%) used coach-designed training programs during the restriction period. These programs were established to maintain the physical capacities of athletes while awaiting a probable resumption of the national championships and to prevent athletes from adopting a fully sedentary lifestyle. Physical activities during the restriction period limited the risk of injury in the event of an abrupt resumption of competition (12, 14, 23, 27). Indeed, due to the lack of material for technical work and the reduction in group

sessions, the players opted for physical work based on the program developed by their coach. Numerous studies have reported that, during the confinement period, the majority of athletes engaged in weight training, cardio training, and sport-specific functional training (14, 28, 29).

Regarding the type of session performed during the restriction period, very few players performed aerobic exercises, because the weight training sessions offered by the coaches required them to perform explosive exercises. The fear of being infected with Covid-19 would have helped to reduce the number of aerobic sessions. Athletes, therefore, preferred to perform physical exercises (78.8%), such as proprioception, which is easy to perform indoors, in confined spaces (14). Other studies have noted that only a small number of athletes have included proprioception in their programs (14, 26, 28). Concerning physical performance, volleyball players experienced a decrease in strength, speed, and endurance capacities. This result seems normal since the restriction period led to a decrease in physical activity. Furthermore, due to the socio-economic status of our country, the players do not always have the necessary equipment for home training. Yet, during this period of restriction, players should have had full access to sports equipment such as treadmills, steppers, dumbbells, swimming pools, and stationary bikes, which provide plenty of opportunities for varied training (14, 26). Meanwhile, previous studies have shown that those not engaged in regular physical activity have a higher risk of functional decline (30). Once the government eased barriers, some volleyball players resumed group training and the coach qualified their physical capacities as being average. According to the results, the restriction period had a greater impact on women. Guessogo et al. (15) reported the same trend among Cameroonian basketball players.

5. Strengths and limitations

The present study is the first research on the activities of volleyball players in Cameroon during the Covid-19 restriction period intended to maintain their physical fitness. The semi-lockdown is similar to the inter-season in various championships. Coaches and sports managers must put in place strategies to limit inactivity during the cessation periods in order to promote a healthy and safe return to sport. One of the limitations of this study was access to accurate information such as weight before the pandemic, which had to be estimated by the athletes themselves. Furthermore, the cross-sectional approach may also limit the validity of the results.

6. Conclusions

Volleyball players adapted their physical activity behavior during the Covid-19 semi-lockdown, which had a significant physical effect on factors including body composition, the maintenance of physical activity and, the number and type of training sessions. Specific individualized programs are recommended to reduce the effects of semi-lockdown on physical capacity and promote a safe return to sport. Future studies can undertake the evaluation of the effects of semi-lockdown on the mental health of Cameroonian athletes.

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Conflict of Interest:

There is no conflict of interest to be declared.

Authors' contributions:

All authors contributed to this project and article equally. All authors read and approved the final manuscript.

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