



## Effect of Circuit Dumbbell-Weight Training on The Volleying and Digging Skills of Volleyball Players at the University of Benin

Leghemo, T.S.

Department of Science Education, Niger Delta University, Wilberforce Island, Bayelsa State, Nigeria

Corresponding author email: [tinimoteistephen@ndu.edu.ng](mailto:tinimoteistephen@ndu.edu.ng)

### Abstract

The study was aimed at determining the effect of an 8-week circuit dumbbell-weight training on the digging and volleying skills of University of Benin volleyball players. Two (2) researchable questions were raised and two (2) hypotheses were also formulated in line with the questions. The “pre-test, post-test experimental control group research design” was employed for this study. The population of the study was made up of 72 volleyball players with a sample size of thirty-six (36) players comprising (18) male and (18) female volleyball players who were selected for the study using a simple random sampling technique. The sampling technique involved balloting by replacement. The study was a field test constructed by the researcher with expert approval involving volleyball digging, process, product, and protocol. The Fundamental Skill Data Capture Device (FSDCD) was used to record the test results. The experimental group took part in an 8-week training programme which was supervised by the researcher with the assistance of the school’s volleyball coach. After the intervention training programme, two tests (posttest) were conducted. One on the control group and another on the experimental group. Data were analyzed using a T-Test based on the findings of the study. The outcome of the study indicated that the intervention (experimental) group had a high mean value compared to their control group in both the digging process-product-protocol and volleying process-product-protocol tests of the volleyball game. It was recommended that the use of a well-structured circuit dumbbell-weight training programme should form part of every coach’s tool for training university volleyball players.

**Keywords:** 8-Week Circuit, Dumbbell-Weight Training, Volleying, Digging Skills.

### Introduction

Participating in sports is an important ingredient of physical fitness and it is a worldwide phenomenon today. The game of volleyball is a very popular national and international sport. It was developed in 1895 by American Williams G. Morgan combined aspects of handball, baseball, basketball, and baseball to create what was then known as Mintonette (Kessel, 2009). To encourage physical health, volleyball was created with less physical contact than basketball to cater to businessmen in Morgan's Young Men's Christian Association (YMCA). At the Los Angeles Olympic Games in 1984, it was included in the Olympic Games (Wise, 2002). A standard volleyball game involves six persons in a team. The game presently is played competitively by men and women. Volleyball is a movement-oriented game that is action-packed. Nevertheless, the skills of the game are pleasurable and provide immediate reward. Competitive volleyball is composed of six basic skills which are service, pass, set, volley, block and dig. Every skill in volleyball is based on a set of rules and procedures that have evolved and are now standard practice at the high level (FIVB, 2007, 2011). Being a high-impact activity, volleyball may cause a wide range of overuse injuries. Among these injuries, are patello-femoral syndrome, shoulder impingement, jumpers’ knees and the like (FIVB, 2007)

Knowing which skill to develop and use is a key element to a volleyball player's success. Digging and volleying in volleyball remains a vital part of defensive play in volleyball as they begin the transition from defence to offence. An essential volleyball manoeuvre, a dig may be tricky if you want to keep a strong spike from crashing to the floor (or the retriever's face, for that matter) (Kessel, 2009). In addition to controlling the ball and passing it to the setter close to the net, the dig is a forearm pass. It is often the team's first point of contact and provides a useful defensive opportunity, such as after receiving a spike (Kessel, 2009). An efficient spike-dig requires not only the right planning, placement, and tactics, but also the ability to swiftly adapt (Dunphy & Wilde, 2009). Volleying is a motion of passing the ball back and forth over the net or for setting a ball for spiking. The technique of volleying in volleyball requires technical skills and practice. It is a basic skill that anyone playing the game should be able to perform proficiently

(Kessel, 2009). In ball games, some players are extremely strong but cannot execute movement quickly; others could move quickly but may lack the strength to move quickly against resistance (Agwubike & Efe-Aigbovo, 2008). It is in the bid to balance up these two qualities that necessitated the choice of these two skills (dig and volley) for the present study. The 1950s saw the development of circuit weight training, which aimed to answer the issue of whether a single programme could strengthen muscles and aerobically train the body (Corey-Crane, [www.selfhelp.magine.com](http://www.selfhelp.magine.com)).

Strength training using dumbbell weights aids in the production of a protective layer around the joints, making the player or athlete much more resistant to injury. Strength training and aerobic endurance workouts are the building blocks of circuit training, an interval training method that combines the best of both worlds. This training includes a series of exercises and calls for a quick sequence of visits to several carefully chosen stations placed across the facilities. When designing circuit training, the workouts are selected based on each person's needs (Curtis, 2010.) and in the present study, circuit dumbbell weight training is the choice. The present study used a well-structured circuitous dumbbell weight training programme to improve the basic skills of volleying and digging patterns of University of Benin volleyball players. The aim was to ascertain the efficacy of an 8-week circuit training on improving the volleying and digging skills of the players.

### Statement of the Problem

A close observation has been made by the researcher during the training sessions of volleyball players in schools on the coaching abilities of the coaches and trainers. It was observed that most of the coaches do not make use of well-structured patterns of training programmes for the volleyball skill training of volleyball players. Players oftentimes go home with injuries during practice either in the process of volleying or digging a spiked ball. Unlike most other games, the game of volleyball requires energy, strength and some tactical approach.

Research has been concentrating on the use of anaerobic and plyometric training on the leg power of volleyballers without considering strength training for the acquisition of basic skills improvement and development. Volleying and digging are the most valuable fundamental skills in the game of volleyball game and as such proper strength training is required for effective performance of the skills. To the best knowledge of the researcher, no known study has been carried out on the use of dumbbells in training the muscular strength and endurance of volleyball players in this part of the country. Some of the studies using dumbbell training for volleyball players in other countries have not been on circuit training and have been on elite volleyball players but not on amateur volleyball players. A gap has been created by this approach. The observation of this problem needs to be empirically supported; hence the present study intends to bridge this existing gap by using a well-structured circuitous dumbbell weight training programme to improve the basic skills of volleying and digging patterns of University of Benin volleyball players.

### Aim and Objectives of the Study

The study examined the effect of an 8-week circuit dumbbell-weight training on the volleying and digging skills of University of Benin volleyball players. Specifically, the study achieved the following:

- i. To determine the mean difference between the pre-test and post-test digging process product protocol of volleyball players after an 8-week circuit dumbbell-weight training.
- ii. To determine the mean difference between the pre-test and post-test volleying process product protocol of volleyball players after an 8-week circuit dumbbell-weight training.

### Research Questions

The study was guided by the following research questions:

- i. What is the difference between the pre-test and post-test digging process product protocol of volleyball players after an 8-week circuit dumbbell-weight training?
- ii. What is the difference between the pre-test and post-test volleying process product protocol of volleyball players after an 8-week circuit dumbbell-weight training?

### Hypotheses

The following hypotheses were formulated and tested at 0.05 alpha level.

- Ho<sub>1</sub>. There is no significant difference between the pre-test and post-test digging process product protocol of volleyball players after an 8-week circuit dumbbell-weight training.
- Ho<sub>2</sub>. There is no significant difference between the pre-test and post-test volleying process product protocol of volleyball players after an 8-week circuit dumbbell-weight training.

## Methodology

The study adopted the "pretest-posttest experimental control group design." This design was chosen because this method of research helps to find the differences between initial (pre-test) and post-test mean values which represent the impact of the training (Charles-Owaba, 2024). The population of the study comprised all 72 registered male and female volleyball players of the University of Benin, Ugbowo Campus, during the 2023/2024 academic session. The sample size of thirty-six (36) players comprising (18) male and (18) female volleyball players were selected for the study using a simple random sampling technique. The sampling technique involved in their selection was balloting by replacement. The participants were serialized into male and female groups and the systematic sampling was used to assign them to the groups. A proforma known as Fundamental Skill Data Capture Device (FSDCD) was used to record the test results. The data in FSDCD were made up of two sections: Section A consists of the players' demographic data designed to obtain information about their anthropometric variables of age, height and body weight, while Section B consists of individualized digging skill and volleying skill following their exact sequences. The required materials were two sets of dumbbells (20kg and 25kg) which were used in a circuitous form as a training modality, a stopwatch, a whistle and a volleyball ball which were used for the digging and volleying tests. The research instrument was validated by two other experts from the Department of Human Kinetics and Sports Science, University of Benin, Benin City. The reliability of the instrument was established using Cronbach Alpha Formula and a value of 0.80 was obtained. The researcher administered the training programme in a circuitous form as well as supervised the training sessions with the help of a trained assistant, who is the coach of the volleyball team of the University of Benin Ugbowo Campus. The participants used the 20kg dumbbell for the first 3 weeks in all the stations and then switched over to the 25kg dumbbells for the rest of the 5 weeks. The data were analyzed with descriptive statistics of frequency counts, mean, standard deviation and percentages and the hypotheses were tested using a t-test. The alpha was set at a 0.05 level of significance.

## Results

**Table 1: Descriptive statistics showing the effect of an 8-week training on digging process product protocol among volleyball player**

Variable	N	$\bar{X}$	SD	MD
Pre-test product and process for digging	36	16.5	6.3	10.1
Post-test product and process for digging	36	25.6	10.1	

Key: Mean Difference (MD)

Table 1. Indicates that the pretest of the digging process-product-protocol test among volleyball players scores ( $M = 16.5 \pm 6.3$ ). The table also reflects that the posttest process-product-protocol test among volleyball players scores ( $M = 29.6 \pm 10.1$ ) with a mean difference (MD), of 13.1. The necessity to look into hypothesis testing becomes relevant to determine whether or not the increased difference is significant.

**Table 2: Descriptive statistics showing the effect of an 8-week training on volleying process product protocol among volleyball player**

Variable	N	$\bar{X}$	SD	MD
Pre-test product and process for volleying	36	14.9	5.5	15
Post-test product and process for volleying	36	29.9	10.7	

Table 2 indicates that the pretest of the volleying process-product-protocol test among volleyball players scores ( $M = 14.5 \pm 5.5$ ). The table also reflects that the posttest process-product-protocol test among volleyball players scores ( $M = 29.9 \pm 10.7$ ) with a mean difference (MD), of 15. The necessity to look into hypothesis testing becomes relevant to determine whether or not the increased difference is significant.

**Table 3: Paired T-test analysis showing the mean difference in the effect of 8week training on digging process product protocol among volleyball players**

Variable	N	$\bar{X}$	SD	MD	df	p	Decision
Pre-test product and process for digging	36	16.5	6.3	10.1	35	0.00	S
Post-test product and process for digging	36	25.6	10.1				

**\*S= Significant**

A paired sample t-test was conducted to determine the effect of 8-week training on volleyball players involving their digging-process-product protocol. There was a statistically significant increase from the pre-test digging-process-product-protocol scores ( $M= 16.5\pm6.3$ ) to the post-test digging-process-product protocol score ( $M=25.6\pm10.1$ ) with a mean difference (MD) of -13.1 ( $p=0.00$ ). The eta square statistics (0.72) indicated a large effect, with a substantial difference in the effects of training post-intervention.

**Table 4: Paired t-test analysis showing the mean difference in the effect of 8week training volleying process product protocol among volleyball player**

Variable	N	$\bar{X}$	SD	MD	df	p	Decision
Pre-test product and process for volleying	36	14.9	5.5	15	35	0.00	S
Post-test product and process for volleying	36	29.9	10.7				

A paired sample t-test was conducted to determine the effect of 8-week training on volleyball players involving their volleying-process-product-protocol. There was a statistically significant increase from the pre-test volleying-process-product-protocol scores ( $M = 14.9\pm5.5$ ) to the post-test volleying-process-product protocol score ( $M=29.9\pm10.7$ ) with a mean difference (MD) of 14.9 ( $df=35$ ,  $p= 0.00$ ). The eta squared statistics (0.73) indicate a large effect with the sustainable difference in the effects of training Post-intervention.

**Discussion**

The present study aimed to determine the effect of an 8-week circuit dumbbell-weight training on the digging and volleying skills among University of Benin volleyball players. Circuit training is a popular exercise method that maximizes time efficiency while addressing several aspects of fitness. It has been determined from this research that an 8-week circuit dumbbell-weight training program on digging and volleying skills among University of Benin volleyball players has a beneficial effect on the selected basic skills of the game. The findings are inconsistent with the results of the study by Sivakumar et al. (2014), which examined the effects of circuit training and weight training on the aerobic power, leg strength, and back strength of college volleyball players. Javid et al. (2017) carried out a study on the "effect of circuit training and plyometric training on strength endurance of college men volleyball players". In their study, it was revealed that the mean value of the posttest of the control group and the experimental group showed a significant difference when compared. This might be a result of the consistent training of the experimental group. One can draw out from this that, similar to strength, endurance is a conditional capacity that is mostly governed by the process of energy release. In all sports, it is very important, either directly or indirectly. Circuit weight training is a form of strength and endurance training that can improve strength, speed and endurance. This study is the supportive result of the present investigation.

Ramakrishnan et al. (2014) whose purpose were to find out "the effect of weight training and circuit weight training on strength and physiological variables among male players of various games and sports" in their analysis as they applied ANCOVA to determine if there was a discernible difference between the experimental and control groups on a few criteria, of which volleyball was a part. It was determined from the outcome of their research that weight training and circuit training have generated good improvement in back strength, and muscular endurance and it improved the performance of the study participants. Based on this note, one can say due to good circuit weight training, the experimental group has shown vast improvement compared to the control group in the pretest and posttest results.

**Conclusion**

Based on the findings of the study, the following conclusions were arrived at:

- Circuit dumbbell-weight training was capable of improving the basic skills of digging and volleying of the study participants.
- The statistical results showed that there were significant differences between the experimental group who trained for 8 weeks and those who did not train for 8 weeks.

**Recommendations**

Based on the findings of the researcher, the following recommendations were made:

- The use of a well-structured circuit dumbbell-weight training programme should form part of every coach's tool for training university volleyball players.
- Coaches should put more effort into seeing that this training programme and method is adopted by the athletes not only the volleyball players but also other team games for this could be modified to meet the bio-motor demands of the athletes as well as the envisaged nature of some competitions they do go for.

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