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# The Effect of Physical Biorhythm Cycle on Some Physical Fitness Factors of Adolescent Volleyball Players

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## ABSTRACT

Biorhythm is one of the latest topics in the field of identifying mind's ergonomics. Of all the performances with which biorhythm deals is the physical performance. The purpose of present research is to study the effect of physical cycle of biorhythm on the designated factors of physical fitness among teenage volleyball players in the city of Qom. In the present field research, 30 people were selected out of volleyball players aged 12 to 15 at random in the city of Qom. Biorhythm cycles were obtained with the biorhythm software. Vertical jump and medicine ball throwing were used as tests associating with muscular power; pull-up and sit-up were used as tests associating with muscular endurance in two states of charged (the second position) and discharged (the first position) of biorhythm physical cycle. The statistical correlated t test with the significance level of  $p \leq 0.05$  was used to analyze data. The findings indicated that the tests pertaining to power including Vertical jump and medicine ball throwing were well-correlated with the physical cycle of biorhythm ( $p=0.042$ ;  $p=0.019$ ). However, the muscular endurance tests (revised sit-up and pull-up) did not show any significant difference between the two states and were not correlated with the physical cycle of biorhythm ( $p=0.75$ ;  $p=0.73$ ). The predictions by physical cycle of biorhythm on the muscular power of athletes are correct, but it was not possible with the muscular endurance of athletes. Of course, more researches should be conducted to increase the certainty of correctness predicted by the physical cycle of biorhythm. The prediction of this theory can be used to increase the performances of athletes in sports competitions if the biorhythm cycles prove right.

**Key Words:** Biorhythm, Volleyball, Muscular Power, Muscular Endurance.

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**INTRODUCTION**

Have you ever asked yourself why you aren't ever in the same emotional or physical state? One day you are lively, while another day you are bored, one day you are so energetic that you are able to successfully carry out the deeds you couldn't do before, while another day you are so exhausted and weak that you are not able to do your own daily chores. One day in your sports activities you appear so smart and energetic that you win everyone's satisfaction, while another day your performance is so lower than the previous session and you have to tell yourself that today was not your day or you were not on a roll (1). Also, teachers get confused about different performances by students in different days; days when people show a noticeably good performance and days when people are distracted and are not able to carry out the simplest mental tasks (2). In fact, why can a person not stay in a certain state all the time? Why do we have to say that today was not our day while we were physically healthy all the way? Why do teachers get surprised at students' states? If we take a thoughtful look at our environment, we understand that everything is repeated and changed periodically like the moon orbiting around the earth, the earth orbiting around the sun, emergence of day and night, change of seasons and migrating or hibernating of birds and animals, falling of trees' leaves and growing again, etc. Human beings are no exception to this rule, undergoing internal changes periodically (3). Regarding this matter, scientists discovered cycles named biorhythm in people's body. Biorhythm is one of the latest topics in the field of identifying mind's ergonomics. It can be quite effective on reducing incidents and mistakes without any visible reason and on reducing people's sudden performance by identifying the physical, intellectual, and

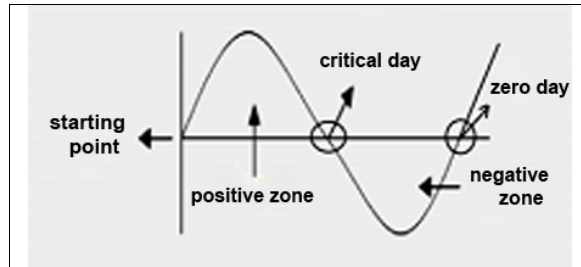
emotional aspects of the individual (4). The word "Biorhythm" is derived from two Greek words of bios meaning life and rhythmus meaning regular or thought-out motion (5). In the Oxford dictionary, biorhythm is defined as any repeated pattern of physical, emotional, and intellectual activities which some believe to affect human's behavior. The biorhythm theory has been based on a certain harmony regarding body's physical, emotional, and intellectual cycles. Some of the conducted researches indicate that human's physiologic behaviors can be programmed to be made the most of, if known (4, 6, 7). According to biorhythm theory, everyone spend days of life in a regular harmony from birth to death, and their behavioral pattern follows three physical, emotional, and intellectual cycles which start up based on the individual's exact birth date (8). This theory emerged in Europe in late 19th century, but it was first formed by a Berlin surgeon named William Fleiss (1809-1928) in 1890s somehow different from its 1970 version (9). In 1890, a German physician named William Fleiss discovered the existence of biorhythm cycles in human body. He carried out a lot of research on his patients' states and discovered the existence of 23-day physical cycles and 28-day emotional cycles in his patients. The reason and incentive for this research was that it was strange for him why some children who got an infectious disease exactly at the same time got cured at different times (10), while at Fleiss's time and without knowing his results, in Austria a psychologist named professor Hermann Swoboda got the periodically 23-day physical and 28-day emotional results, which these same and independent results surprisingly verified the biorhythm theory by some scientists like Freud and their interest and conducting other tests in this field (9). In

1920, Alfred Teleshter discovered the 33-day intellectual cycle by studying the powers of learning and thinking and believed that this rhythm is adjusted by spattering of certain glands like thyroid and pineal (10, 11). In 1904 in a book about biorhythms, Hermann Swoboda (1873-1963) claimed that he discovered 23-day and 28-day cycles through researches he had done (11). This psychology teacher of the University of Vienna claimed that many patients he had been curing of psychological disorders had dreams, beliefs, and projections which seemed to repeat based on a certain regulation. He, later on, claimed that a lot of these patients had suffered from problems like fever, heart attack, or asthma which appeared periodically and whose cycles of occurrence were different from their emotional cycles. Therefore, he inferred that physical disorders happened almost in 23-day cycles and emotional disorders happened in 28-day cycles (10). Fleiss believed that 23-day physical cycle emerged from muscular tissues and affected physiological activities of the body. It also had effects on body endurance against ailments, physical power, the speed of doing physical activities, strength, stamina, adaptability, and other physiological factors (11).

The 28-day period of emotional cycle dominates the nerves system and mostly includes things like creativity, sensitiveness, health, perception, and other emotional factors which are impressed by this period. The 33-day period of intellectual cycle is emerged from brain's cells. Some researchers believed that the gland of thyroid is synchronized with the intellectual cycle and has period of 33 days and affects the intellectual issues (12). At the time of birth, every three cycles starts from zero and they intersect at the zero point in a specific period after 21252 days which means the age of 59. A biorhythm cycle includes three states of

charged, discharged, and, critical which are symmetrically set (Figure 1). Each charged (second state) and discharged (first state) part has two parts one of which is the ascending part and the other one is descending (8). Meanwhile, there are days called critical and zero days. When a cycle crosses the zero level from the negative zone, it is said that the individual is spending the zero day and each time a cycle crosses the zero level from the positive zone, it is said that the individual is spending the critical day. On a critical day, capabilities relating to a certain cycle are sort of unstable (9). The same thing is true on a zero day, which is why both days are named critical. But the zero days is a lot better than the critical day, because it is ascending to the positive zone. Two critical days exist in one biorhythm cycle because the flow switches between the day with a capacity less than 50 and a day with a capacity more than 50. This change of flow causes a kind of inconstancy in individual's performance and that is why these days have been called the critical days (13). Studies have indicated that 70% of accidents in chemicals and detergents factories in the US in 80s happened when the biorhythm cycles of human resources were at the critical point (4). Most of the accidents happen when there is a twofold crisis. Soviet's bureaucratic organization of Odessa port and some labor unions and institutions studied the accident happening during work and found out that the human factor had an obvious role in them, realizing that 56% of the reviewed accidents coincided with victims' critical day (7). By the middle of 90s, the United Airlines used biorhythm to prognosticate pilots' states. Despite stopping using it in this American company, Nippon Express which is an air freight company still uses it (7). Regarding the risk of investing in stock market, the results have shown that biorhythmic factors with intellectual and emotional cycles

influence people's intention to invest in stock market (9).



**Figure 1.** Different parts of a biorhythm cycle (taken from Momeni *et al.*, 1391)

On average, every 5 days count on critical day. There are averagely 3 twofold crises during a year (a day on which two cycles are placed in one critical zone). By taking another look at biorhythm cycles, it can be said that a complete biorhythm cycle consists of two parts of increasing capacity (charged) and decreasing capacity (discharged). This concept can be explained in this way that the increasing part starts after the day when capacity is at the lowest level and continues until the day when capacity reaches maximum, while the decreasing part acts reversely (9). Researchers believe that using biorhythm can be effective on better programming to reduce mistakes and increase people's productivity and performance, a fact by which a lot of researches have been carried out in this area (6). For example in Japan and Germany, pilots and navigators of high-speed trains are not allowed to work on critical days. Also, workers of dangerous industries are dismissed on critical days. This has made the statistics of accidents and fatalities to be reduced by approximately 60% (4).

Rabiei and Khatamino (2011) showed a significant relationship between biorhythm and job satisfaction (7).

The results of Singh *et al.* (2011) study indicated that the reviewed accidents

included every injury relating to the skeletal system, disorders and amputations, treatment, and hospitalization which needs long therapy had a significant relationship with people's biorhythm. The results also indicated that 72.8% of accidents of serious situations happened on critical days (14).

Few studies have been done in the sports field of biorhythm theory. Some of them confirmed the theory, while some others showed contradictions in their results. For example, a research conducted by Faria and Elliott (1980) who tested the maximal consumed oxygen (vo2max) by gymnast girls on the critical days of physical biorhythm cycle. The results revealed that the physical cycle of biorhythm theory did not have a significant effect on the maximal aerobic power (vo2max) of athletes (15).

Moldovan *et al.* (2011) studied gymnasts' performance and their biorhythm cycles. The results of this study in positive phases (charged) and negative phases (discharged) of biorhythm cycle indicated that subjects had a better performance in positive phase rather than negative phase (16).

Also, Maura (2009), in a research named "Studying the relationship between biorhythm cycle and sports performance by students participating in soccer matches", studied 21 players of 7 teams in 3 steps on critical days. His results indicated a significant relationship between people's performance and their critical days (17).

Sha'bani Bahar *et al.* (2013) tested the performances of 216 participants in the individual field sports of Student Olympiad Tournament by using Charbonneau questionnaire which was answered by coaches. He also studied the relationship between matches' results and physical, intellectual, and emotional cycles and finally understood that there was a significant relationship between the physical,

emotional, and intellectual cycles and matches' results (8).

Pillianidis *et al.* (1993) studied the relationship between sports performances by athletes in track and field and the critical days. They studied the world records set by 88 athletes (62 men and 26 women) from 1901 to 1993. The results did not show a significant difference between observations and athletes' records (1).

Given the fact that researchers believe if the coach or those who are in touch with the athletes know of the days when the athletes are in positive zone, negative zone, or critical days of physical cycle, they can be more effective on precise and appropriate scheduling for exercise in physical terms. This can increase productivity, improve performance, and prevent sports injury and other effective factors on physical performance of athletes (6). Undoubtedly, an athlete's success and performance in different sports depend on many factors, which the physical factor, given the type of sport, is highly effective on people's performance and coaches will definitely succeed if they know their athlete's performance very well. Considering the relationship between the theoretical basics of physical cycle mentioned in biorhythm theory and effective factors on athletes' performance, we studied the physical biorhythm out of three cycles mentioned in biorhythm theory in present survey. So, the main question here is if physical biorhythm cycle has an effect on the designated factors of physical fitness amongst teenage volleyball players.

## MATERIALS AND METHODS

**Subjects.** 30 teenage volleyball players aged 13-15 from the city of Qom were studied. By checking the medical cases of people and New York test, the statistical was chosen out of people who hadn't had any

structural problem, ailment, and injury in the past 6 months.

**Instruments.** The tools used in this research include Biorhythm software and tests relating to designated factors of physical fitness which include vertical jump, revised pull-up, sit-up, and throwing the medicine ball forwardly.

**Procedure.** The comprehensive explanations on the process and purposes of the research were given to subjects' parents so that they complete the testimonial sheet after agreeing. Then, information pertaining to chronological age is entered into the software by comparing to valid documents and inquiring subjects' parents. After putting the chronological age into the software, athletes' physical cycle and also their critical, charged, and discharged days were revealed. In the next step and according to the predetermined days for each athlete, we tried to hold the designated tests in a way which each athlete were put once in ascending curve's flat (charged or second position) and once in descending curve's flat (discharged or first position) during the 23-day cycle. Tests were given to the athletes in these two days and the scores were reported in the score sheet. According to the given explanations on the official biorhythm site, the physical biorhythm cycle affects endurance, strength, power, and public health (18). Given the fact that the subjects in this research were teenagers and using strength tests could have hurt them, the muscular endurance test and power test were chosen to check different situations of physical biorhythm cycles. The sit-up test was used to measure muscular endurance. The revised pull-up test was used to measure scapula muscle's endurance. The vertical jump test was used to measure lower limb's endurance. In order to measure upper limb's endurance, throwing medicine ball test was used (5). Pictures showing correct

performance of test and practical indication were presented along with the instructions for the tests. How to warm up and tests' time were the same for all athletes during two days of testing. The sit-up test was held in a way that the maximal number of touching the knee by elbow should be recorded in 60 seconds when subject's hands had to be on the back of ears (5). The pull-up test was done with palms opposite the subject (5). In the vertical jump test, the distance between the base point (the highest point subject's hand could reach while standing) and highest point which was obtained by jumping was set as subject's record (5). To perform throwing medicine ball, the subject stood behind a line drawn on the ground with the feet opened as wide as shoulders. On examiner's command, the subject immediately brought the ball which was in front of his body to his chest and then did the throwing in a way the forearms were parallel to the ground after the projection (like passing to chest in basketball). Projections were done by using a 2-kilogram

medicine ball. This test was run 3 times and the best record was registered (5).

**Statistical Analysis.** Shapiro-Wilk test was used to evaluate data normality and then correlated sample t test was used to analyze data. The effect size (ES) of exercises was calculated through eta squared formula. Every statistical test was run by SPSS and with a significance level of  $p \leq 0.05$ .

## RESULTS

In second position (charged), all physical fitness factors were designated in this study showed increment in performance. Checking data of muscular endurance factors including sit-up ( $t=1.88$ ,  $p=0.073$ ) and revised pull-up ( $t=1.85$ ,  $p=0.075$ ) did not show any significance between two positions, but power factors including vertical jump ( $t=2.48$ ,  $p=0.019$ ) and throwing medicine ball ( $t=2.13$ ,  $p=0.042$ ) showed a significant increment in the second position.

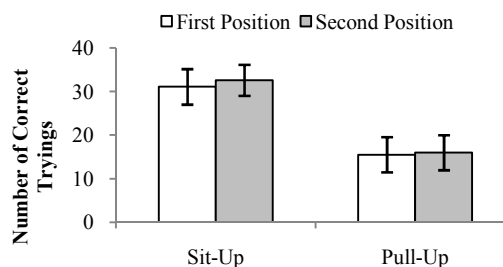
Table 1 indicates statistical indices pertaining to designated tests of study in two positions of biorhythm cycle.

Table 1. The mean and standard deviation for designated factors of physical fitness in first position (charged) and second position (discharged) of physical biorhythm cycle

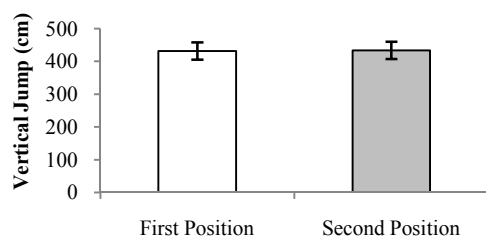
Cycle positions	Sit-up	Revised pull-up	Vertical jump (cm)	Throwing medicine ball (cm)
First position	31.17±4.08	15.5±4.03	432±26.47	32.1±4.77
Second position	32.6±3.55	15.97±4.02	434.1±26.63	32.77±3.97
t	1.88	1.85	2.48	2.13
p	0.073	0.075	*0.019	*0.042
Eta squared	0.108	0.105	0.175	0.135

Significance level:  $P \leq 0.05$

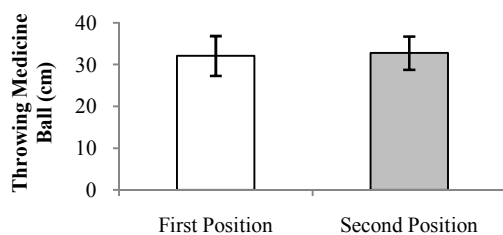
Graph 1 indicates the results from muscular endurance tests (sit-up and pull-up) schematically while Graphs 2 and 3 show the results from upper limb power test (throwing medicine ball) and lower limb power (vertical jump) in two positions of biorhythm cycle respectively.



Graph 1. Muscular endurance tests in two physical biorhythm cycles



Graph 2. Upper limb power test (throwing medicine ball) in two physical biorhythm cycle



Graph 3. Lower limb power test (Vertical jump) in two physical biorhythm cycle

## DISCUSSION

The purpose of this study was to compare volleyball players' power capacity and muscular endurance in two different positions of biorhythm cycle. The results showed that the distance in throwing medicine ball in second position of physical biorhythm cycle (charged) was significantly farther than first position (discharged) ( $p=0.042$ ), and the height had a significant increment in Vertical jump test ( $p=0.019$ ). The result pertaining to muscular power in present research is compatible with researches conducted by Sha'bani Bahar *et al.* (2013), Rabiee and Khatamino (2011), Hosseini *et al.* (2009), Singh and Sharma (2011), Moldovan *et al.* (2011), Parikh *et al.* (2010), Biclesanu *et al.* (2009), and Maura (2009) (7, 8, 14, 16, 17, 19-21).

Moreover, the results of present research are not compatible with Joncas *et al.* (2011),

and Pilianidis *et al.* (1993) (1, 22). Therefore, according to the research's findings, it can be inferred that athletes' performances in upper limb and lower limb power is affected by different positions of physical biorhythm cycle. Since evaluating upper limb power is essential to succeed in performing motor skills in planning a training and competitive program and to assess athletes' improvement process and is one of the main axes in athletic competitions and athletes' physical factor, it is always taken into account by most of coaches and athletes. So, it can be stated that knowing of positive (charged) and negative (discharged) positions of physical cycle is effective on obtaining a desirable performance by athletes. Hence, it can be said that the best time to do sports competitions which are mostly affected by muscular power is when the physical cycle is in the positive position. Also, if athletes' physical cycle is in negative position, it influences their performance very badly and reduces it. Identifying and correct planning for different positions of physical cycle can be useful in reaching better performance by athletes. Also, paying attention to different positions of biorhythm cycle in sports in which physical factors are more important can be influential for coaches and athletes to make more precise plans.

Comparing the data from two positions of physical biorhythm cycle in muscular endurance tests of sit-up ( $p=0.073$ ) and pull-up ( $p=0.075$ ) did not show any significance difference. Therefore, the results of present study pertaining to muscular endurance are compatible with the researches done by Ezanloo *et al.* (2007), Joncas *et al.* (2011), and Pilianidis *et al.* (1993) (1, 9, 22).

Also, the results of present study pertaining to muscular endurance are not compatible with Sha' (7, 8, 14, 16, 17, 19-21) bani Bahar *et al.* (2013), Rabiee and Khatamino (2011), Hoseini *et al.* (2009), Singh and Sharma (2011), Moldovan *et al.*

(2011), Parikh *et al.* (2010), Biclesanu *et al.* (2009), and Maura (2009). The reasons for the research's incompatibility may be the difference in the method of doing other studies. In most surveys (8, 9, 17, 21), tests or evaluations were done on critical days of cycles and since the cycle is unstable on critical days, this action was practically wrong. And, according to the biorhythm theory (6), this model is not correct, and the results of these studies could not be strongly referred to. All in all, by checking the history of biorhythm, it can be shown that people's performance is affected by internal and biological factors, regardless of external factors (6). Most of studies stated that the biorhythm theory results could be exploited to increase productivity of people who are led to obtain better performance (8). In this study, the relationship between biorhythm and athletes' performance was checked in volleyball, too. Given the present study's findings, it can be inferred that athletes' physical cycle does not affect muscular endurance, but different positions of physical cycle affects the muscular power and when the physical cycle is in the negative position, the average score of athletes' muscular power is less than the time when the cycle is in the positive position. So, it can be said that athletes' performance has been better in positive positions.

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## CONCLUSION

Generally, different positions of athletes' biorhythm cycles can be discussed a lot and these cycles shouldn't be confirmed or denied hastily while a comprehensive research is felt in it. The other point is that since caution is demanded by wisdom, coaches are advised to pick the athlete whose biorhythm cycles are in better conditions on the day of competition when two athletes are at the same level (technical, physical, etc.). Also, athletes, coaches, sports program planners are advised to benefit from the findings of the present study for better managing athlete selection for critical matches, athletes' expectation level, their behaviors, and their performances. Plus, coaches are advised to draw athletes' biorhythm cycles by having their exact birthdates so that they know athletes' expectation levels better and communicate better with them by identifying the cycle positions in order to plan their effective factors during exercises, competitions, etc.

Despite a lot of efforts to omit interfering variables, it can be declared that one of the incontrollable limitations of the present study and every study pertaining to biorhythm theory is the complete uncertainty of subjects' chronological ages.



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# اثر سیکل جسمانی بیوریتیم بر برخی عوامل آمادگی جسمانی والیبالیست‌های نوجوان

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## چکیده

بیوریتیم یکی از تازه‌ترین موضوعات در حیطه شناسایی ارگونومی ذهن است. از جمله کارکردهایی که بیوریتیم به آن توجه دارد، عملکرد جسمانی می‌باشد. هدف پژوهش حاضر بررسی اثر سیکل جسمانی بیوریتیم بر فاکتورهای آمادگی جسمانی منتخب بر والیبالیست‌های نوجوان شهر قم بود. در تحقیق میدانی حاضر تعداد ۳۰ نفر به صورت تصادفی از بین ورزشکاران والیبالیست ۱۳ تا ۱۵ سال شهر قم انتخاب شدند. سیکل‌های بیوریتیم توسط نرم‌افزار بیوریتیم به دست آمد. از پرش سارجنت و پرتاب توپ مدیسنبال به عنوان آزمون‌های مرتبط با توان عضلانی، و از بارفیکس و درازونشست به عنوان آزمون‌های مرتبط با استقامت عضلانی در دو وضعیت شارژ (موقعیت دوم) و دشارژ (موقعیت اول) سیکل جسمانی بیوریتیم استفاده شد. یافته‌های تحقیق نشان داد که آزمون‌های مربوط به توان که شامل پرش سارجنت ( $p = ۰/۰۱۹$ ) و پرتاب مدیسنبال ( $p = ۰/۰۴۲$ ) بود با سیکل جسمانی بیوریتیم انطباق داشت. اما آزمون‌های استقامت عضلانی [دراز و نشست ( $p = ۰/۷۳$ ) و بارفیکس اصلاح‌شده ( $p = ۰/۷۵$ )] تفاوت معنی‌داری را در بین دو موقعیت نشان نداد و با سیکل جسمانی بیوریتیم منطبق نبود. پیش‌بینی‌های سیکل جسمانی بیوریتیم از توان عضلانی ورزشکاران صحیح می‌باشد، ولی در رابطه با استقامت عضلانی ورزشکاران این امکان وجود ندارد. البته برای افزایش اطمینان از درست بودن پیش‌بینی سیکل‌های بیوریتیم باید تحقیقات بیشتری انجام شود. با اثبات درستی سیکل‌های بیوریتیم می‌توان از پیش‌بینی این نظریه برای افزایش عملکرد ورزشکاران در رقابت‌های ورزشی استفاده کرد.

**واژگان کلیدی:** بیوریتیم، والیبال، توان عضلانی، استقامت عضلانی.

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