# The Effect of Volley Ball Training Program on The Reaction Time

**Kadhem M. Abu-Saleh**

College of Education, King Faisal University
Al-Hassa, Saudi Arabia

**Abstract:**

The researcher selected randomly (96) students from non-athletic male freshmen KFU aged (17-18). The researcher divided the (96) subjects into two groups the experimental group and a control group, measured the hand-reaction time, the pre-test of the two groups.

The experimental group had volleyball training program from 1/1/2003 to 1/6/2003 three times per week for two hours.

The hand-reaction time was measured for the two groups in a post-test using T. test.

The results showed differences in the post-test between the two groups. A T.test showed There was improvement in the hand-reaction time of the experimental group compared with the control group.

## Introduction :

Volleyball is a very popular game worldwide. As is true in any other game, specific factors make some players better than others. The objective of this study is to discover whether a volleyball training program improves reaction time or not. If the results are as expected and the volleyball training program improves reaction time, it will aid coaches of volleyball teams in determining players' levels and abilities. Initial reaction time will also be a valuable tool in evaluating beginners.

Reaction time is involved in many areas of life. It is a factor in driving a car and in many factory jobs; workers with good reaction time are more productive. A volleyball training program could conceivably help improve driving skills (Schmidt 1988), increase worker production and even prevent dangerous accidents by improving reaction time.

There has been a good deal of research concerning reaction time in baseball, basketball, strength (weight lifting), and tennis, but apparently no research has been carried out regarding volleyball and reaction time. Most

of the aforementioned sports can help improve reaction time; however volleyball offers additional advantages: it is safe, both sexes can play volleyball and they can play it together, it can be played indoors or outdoors, any number of players can play, and it doesn't cost much.

Most research on volleyball focuses on strategic skills. I have found no research about the effect of volleyball training on reaction time.

**The significance of the study**

Beside the measurement of the reaction time for Saudi university students and knowing their level, the study aims at finding out the factors responsible for improving reaction time in general. Certain sports, such as volleyball, are affected by the reaction time more than others. This study is concerned with determining if volley ball training program can improve the reaction time.

The improvement of the reaction time should give the person a better response in different situations. It can also make him a safer driver and it enables him to lead a happier life.

**Review of Literature**

There are many factors that affect reaction time such as fore period, practice, and catch trial, resistance responses, athletes and non-athletes, muscle condition, movement time.

The fore period provides the temporal frame of reference in which a subject prepares to respond to the reaction stimulus on a certain trial. The presentation of the fore period can take one of two forms – either constants or variables (Niemi and Naatanen, 1981). When a constant fore period is used, it is commonly observed that the longer the fore period, the longer the reaction time.

Preparatory intervals of one, two, three, and four seconds were used and it was found out that the middle two fore periods were significantly faster than the extreme fore periods of one and four periods (Blank, 1977). A fore period of two seconds was optimum for a quick reaction.

The period for rapid reaction time is about 8.0 seconds. Its placement in this range reflects a number of factors, including the duration and intensity of the warning signal and stimulus, the amount and time of production of muscular tension. Individuals reacted faster when potential stimuli were presented in rhythmic rather than non-rhythmic series.

It was found that mean simple reaction time increased significantly when some catch trials were employed as opposed to when none were used (Schmidt, 1988).

Some researchers have found that practice improves reaction time, others have found that it did not (Sage, 1984).

Some researchers have noted improvement in reaction time as a result of increased number of trials and/or as a result of more days available for practice in low fitness subjects trained for minutes, four times a week (Morris, 1977).

Significant changes in reaction time were associated with resistance responses, and longer reaction time was attributed to lengthening of latent motor time for resistance responses (wood, 1979). Normally, under no resistance conditions, knee extension reaction time was comparable to previously reported times, but under resistance conditions, the total reaction time lengthened and increase was due solely to an increase in motor time. The pre-motor time was not affected, thus the time for both resisted and non-resisted conditions were similar (Morris, 1977).

The power exhibited by motor times at both levels of reaction time tasks is comparable to endurance athletes. Power athletes are better able to quickly generate tension to overcome the imposed resistance to the reaction time task (Champion, 1977).

There were no significant differences between reaction times when the limb was relaxed, or placed under stretch. It was observed that, during states of pretension, a seven percent faster reaction time was produced compared to when the arm was in a relaxed condition. The fastest reaction time was observed in the stretch condition followed by pretension and then relaxed conditions (smith, 1964).

Many researchers such as Schmidt (1988) found out that there was a statistically significant correlation ($r = +0.56$) between reaction time and movement time.

Another study found, arm movement, a statistically significant correlation between reaction time and movement time for both athletes and non-athletes. Also it found a relationship between reaction time and movement time (75 yard full sprint) revealed a positive correlation (Schmidt, 1988).

Magill and Powell, 1975 used visual stimuli presented at varying intervals to initiate the reaction and movement times for lateral hand and arm movements. Results indicated significant relationships between movement time and reaction time for 18 males:

(r = 0.482 – 0.544), for female (r = 0.341 – 0.379)

For comparing Athletes and Non-Athletes, the researcher found that Women athletes and non-athletes were given hand reaction time tests, which found that women athletes were significantly faster than the women non-athletes in reaction time. The women athletes reacted more quickly than non-athletic women. Also the varsity athletes had significantly shorter over-all reaction time than physical education, music and liberal arts majors (Pick, 1994).

Buckellew (1962) concluded in his study that five athletic player groups (football players, basketball players, baseball players, track athletes, and gymnasts) were all faster than the non-athlete group.

Pick (1994) found that athletes were able to react quicker than non-athletes and found that champion sprinters recorded the shortest reaction times and, as the running distances increased, the reaction times for the runners also increased.

From measuring the reaction time of a group of basketball players using a visual stimulus for the data, pick, 1994 concluded:

1. Boys with the best reaction time were the best basketball players.
2. Potential basketball players have quicker reaction time to visual stimuli.
3. Experience and maturity have a direct effect upon the reaction time.
4. Reaction time improves with practice and experience. And found that athletes respond faster than non-athletes. Baseball, basketball, football and track athletes had significantly faster reaction time than gymnasts, swimmers and wrestlers.

In testing simple reaction time with a visual stimulus, the baseball players recorded a significantly faster time than did football linemen, football backs, and high school letter winners. High School letter winners were significantly faster than swimmers and non-letter winners.

In summary, the RTTS (reaction time tool system) is a reliable and valid system to measure simple, choice, and complex reaction time. It is also a friendly, convenient and efficient tool in research measurement and data collection as well as classroom teaching demonstration (Wang and kao, 1997).

The time obtained in the first part (call it reaction time-t) is really the sum of three other times:1 the time that it takes for your brain to realize that the object has been dropped (call it processing time-t), 2 the time for the nerve signal to travel from your brain to your fingers (call it nerve time-$t_n$), and 3 the time that it takes for your fingers to close (call this dynamic time-$t_d$); (i.e., $t_r=t_p+t_n+t_d$) (Coleman, 1982)

Jan (1994) reported that the reaction time is important to many factors in our life such as driving a car which has a mass of 800 kg and is traveling along a level road at 25 m/s. He observed that the thinking time is 0.65 s and the braking distance for the car traveling at this speed is 40 m. He also worked out the overall stopping distance of the car.

The "stopping" process of the car is divided into two parts – reaction and braking. During reaction time, the driver is deciding to stop and telling his feet to press the pedal etc. During this t = 0.65s period, the car continues at its constant v = 25m/s velocity and covers a distance of $t_r$=v0.65s*25m/s=16.25m (see Jan 1994).

The formal relation that has come to be known as Hick's law states that the choice RT is linearly related to the Log of the number of stimulus alternatives. In equation form, Choice RT = a + b [$Log_2$ (N)] where N is the number of stimulus-response alternatives and a and b are the empirical constants (Schmidt, 1988).

Reaction time is important in many sports and day to day activities, though it is not often measured. Below are a few options for measuring reaction time in normal way. As with all sports fitness testing, specificity is very important, and if you were to seriously want to measure an athlete's reaction time in a certain sport, you would want a test that is more specific to the visual cues and muscle reactions that are encountered during that sport. If you do all these tests, you will notice that you get quite different scores for quite similar tests (Kramer, 2004).

Another aspect to reaction time is that when you see the screen color change, the change in color is registered in your brain, from which a message is sent to another part of your brain that controls your muscles. Your brain must then send a signal to your muscles, then to depress the mouse button. Signals travel fast along each of the nerve pathways required, however the majority of the reaction time is taken up at the junction points in between the different nerves involved, and between the nerves and the muscles at your fingers (Kramer, 2004).

**Statement of the problem :**

The purpose of this study was to determine the effect of a volleyball training program on the improvement of reaction time for non athlete's men.

**Assumption :**

1. Because volleyball is played with the hands, a test of sample hand reaction time would be suitable. The assumption is that every exercise in a volleyball training program will help to develop hand reaction time.
2. The subjects will give maximum effort on all tests.
3. The control group will not be involved in any sports activities during the period of the experiment.
4. The subjects will demonstrate maximum effort throughout the volleyball training program.
5. The subjects will demonstrate interest and motivation to do their best.
6. Hand reaction time can be measured accurately and reliably.

**Delimitation**

1. Subjects' diets were not controlled during the experiment period.
2. The researcher had no control of the subjects' rest habits.
3. There was no control of the subjects' natural activities during their daily routines.

**Limitations**

1. This study was limited to 96 male non-athletic students aged 17-18 from King Faisal University.
2. The treatment (volleyball training program) was limited to two hours three times per week for five months starting January 1-2003 to June 1-2003.

**Definitions :**

Reaction time is the time that transpires between the presentation of a stimulus and the initiation of a response. in this study, the visual stimulus and response is hand movement (Sage 1984).

**Research Hypothesis :**

A volleyball training program will significantly improve reaction time.

**Procedure :**
**Selection of subjects :**

The experimental period of the study was carried out from January 2003 to June, 2003 at King Faisal University. The subjects were randomly selected from non-athletic male freshmen K.F.U students aged 17-18. These subjects are expected to be interested in this experiment. A group of 96 subjects was randomly divided into two groups. One group was experimental and another group was being controlled. Those who agreed participated in the experiment. The experimental group had to do the following:

1. go with the experiment to the end,
2. attend all the training programs scheduled,
3. not participate in any other programs,
4. do their best in all practice sessions,
5. cooperate with the instructor and followed the instructions,
6. Make up missed trainings.

**Testing Equipment:**

1. Chronoscope's Timer records time in thousandths of a second (using computer for timing).
2. Four lights button to choose from.
3. Screen so the subject cannot see which light will be on.
4. Four Stimuli white color light.
5. Hand reaction time key which, when released stops the time (See Figure 1.).

**Methodology :**

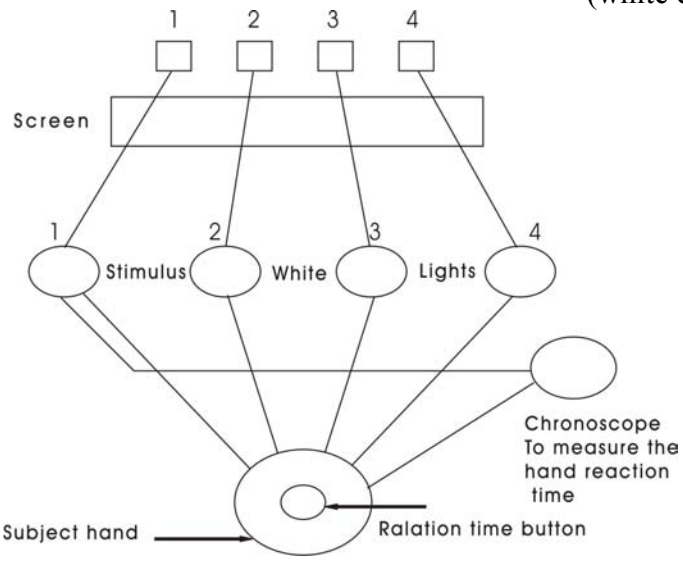
This study included pretest-post test randomized groups. Both groups had pretests and posttests. The hand reaction time test was administered to individual subjects several times until they were ready to take it. Subjects stood, with their hand on the reaction key button which, when released, would stop the time (figure 1.).

Each subject had 10 trials of which the means were taken. The researcher gave the command "ready" before turning the stimulus light button, then waited two to four seconds until the stimuli (light) comes on. The subject needed to release his hand from the reaction key button (Rutton). The reaction time was measured from the time when the researcher turned the stimuli (light) on until the subject releases his hand from a reaction key button.

**Statistical Analysis**

One hypothesis was tested with simple analysis of covariance (ANCOVA) or factorial repeated measures (ANOVA). T-tests or F tests could also be used. The means of pre-test and post-test groups and the means of post-tests of each group were compared.

Figure (1)
Reaction time measurement




The subject raises his hand from the reaction time key when he sees one of the stimulus lights on.

The chronoscope starts when one of the stimulus lights is on and stops when the subject raises his hand from the key of the reaction time button

**Procedures :**

For this experiment we needed a gymnasium with volleyball's court training. We also needed at least 4 instructors in the treatment, one for every 12 students. All the 48 subjects had the same treatment in the same building. The treatment was given for five months, three times per week for two hours. This volleyball training program contained seven points of regular training for volleyball.

1. Warm-up
2. Movement patterns
3. Individual tactics
4. Group tactics
5. competitive play
6. warm down
7. Team tactics

Table (I) demonstrated how this program develops over time. See Appendix A for examples of exercises.

**The Results :**

This study had two main purposes:-

The first was to measure the reaction time for the sample of 96 male students from King Faisal University.

The second purpose was to find the effect of the volleyball training program on reaction time.

The results of the measurements of the reaction time showed the average for 10 trails for the reaction time for the sample (see Table 1) the pretest to the control group and experimental group. The mean reaction time for the control group is 536.2292 milliseconds, while it is not far from the mean for the experimental group for the pretest is 535.5205 milliseconds. Table (2) shows, the mean of the post test for the control group is 533.4792, whereas it is 515.375 milliseconds for the experimental group.

**Table (1)**

**Table shows**

Average for (10) trails for reaction time in the pre-test for the sample (96).

| V1 Control group | V2 Experimental group |
|---|---|
| 510 | 509 |
| 531 | 535 |
| 488 | 490 |
| 550 | 553 |
| 526 | 515 |
| 475 | 472 |
| 603 | 595 |
| 551 | 546 |
| 569 | 551 |
| 552 | 569 |
| 515 | 520 |
| 461 | 472 |
| 476 | 465 |
| 601 | 601 |
| 465 | 459 |
| 495 | 486 |
| 569 | 561 |
| 532 | 541 |
| 563 | 555 |
| 581 | 576 |
| 503 | 510 |
| 481 | 472 |
| 462 | 481 |
| 522 | 532 |
| 521 | 515 |
| 603 | 581 |
| 482 | 480 |
| 555 | 549 |
| 565 | 569 |
| 521 | 511 |
| 542 | 551 |
| 573 | 569 |
| 582 | 591 |
| 612 | 599 |
| 562 | 549 |
| 479 | 502 |
| 513 | 520 |
| 572 | 581 |
| 605 | 593 |
| 525 | 541 |
| 553 | 561 |
| 485 | 505 |
| 591 | 584 |
| 535 | 541 |
| 573 | 569 |
| 491 | 509 |
| 562 | 572 |
| Mean 522 | 531 |
| 536.2292 | 535.5208 |

All number in milliseconds

**Table (2)**

Table shows the average for (10) trails for reaction time for the sample (96) in the post-test.

| V3 | **Control group** | **V4** | **Experimental group** |
|---|---|---|---|
| | 512 | | 481 |
| | 526 | | 510 |
| | 485 | | 460 |
| | 556 | | 532 |
| | 531 | | 516 |
| | 469 | | 432 |
| | 598 | | 581 |
| | 549 | | 515 |
| | 571 | | 531 |
| | 559 | | 535 |
| | 509 | | 482 |
| | 460 | | 455 |
| | 473 | | 449 |
| | 605 | | 583 |
| | 469 | | 438 |
| | 489 | | 451 |
| | 562 | | 541 |
| | 529 | | 511 |
| | 556 | | 527 |
| | 575 | | 559 |
| | 495 | | 483 |
| | 475 | | 461 |
| | 460 | | 460 |
| | 546 | | 511 |
| | 523 | | 503 |
| | 593 | | 572 |
| | 475 | | 463 |
| | 553 | | 532 |
| | 563 | | 511 |
| | 519 | | 503 |
| | 535 | | 522 |
| | 565 | | 552 |
| | 579 | | 583 |
| | 609 | | 583 |
| | 559 | | 532 |
| | 480 | | 482 |
| | 509 | | 511 |
| | 565 | | 562 |
| | 601 | | 581 |
| | 523 | | 512 |
| | 551 | | 543 |
| | 486 | | 491 |
| | 586 | | 561 |
| | 536 | | 534 |
| | 573 | | 552 |
| | 487 | | 491 |
| | 560 | | 556 |
| | 518 | | 502 |
| Mean | 533.4792 | | 515.375 |

In Table (3) all the necessary statistics for the data show the difference between the control group and the experimental group in the pre - test and post-test.

**ANOVA**
Table (3)
**Summary**

| Groups | Count | Sum | Average | variance |
|---|---|---|---|---|
| V2 | 48 | 25705 | 535.5208 | 1840.34 |
| V3 | 48 | 25607 | 533.4792 | 1819.148 |
| V1 | 48 | 25739 | 536.2292 | 1590.691 |
| V4 | 48 | 24738 | 515.375 | 1758.495 |

| F crit | p-value | F | Ms | df | Ss | Rce of variance |
|---|---|---|---|---|---|---|
| 2.652646 | 0.047303 | 2.695504 | 4722.977<br>1752.169 | 3 | 14168.93 | Between Gro |
| | | | | 188 | 329407.7 | Within Gro |
| | | | | 191 | 343576.6 | Total |

The second purpose of the study was to determine the correlation between the control group and experimental group for the pre-test for one tail and two-tails and it shows that there is no significant difference between the two groups (Table number (4)

**Table (4)**
**Paired Samples Statistics**

| | Mean | N | Std. Deviation | Std. Error Mean |
|---|---|---|---|---|
| Pair PRE.C | 535.5208 | 48 | 42.8992 | 6.1920 |
| 1 PRE.T | 536.2292 | 48 | 39.8835 | 5.7567 |

**Paired Samples Correlations**

| | N | Correlation | Sig. |
|---|---|---|---|
| Pair 1 PRE.C & PRE.T | 48 | 969 | 000 |

**Paired Samples Test**

| | Paired Differences | | | | | t |
|---|---|---|---|---|---|---|
| | Mean | Std. Deviation | Std. Error Mean | 95% Confidence Interval of the Difference | | |
| | | | | Lower | Upper | |
| Pair 1 PRE.C & PRE.T | - 7083 | 10.6870 | 1.5425 | -3.8115 | 2.3948 | -459 |

**Paired Samples Test**

| | Df | Sig. (2-tailed) |
|---|---|---|
| Pair 1 PRE. C – PRE. T | 47 | 648 |

**Paired Samples Test**

The inspection of table (3) and (5) provides information regarding the opinion differences on different level of the control group and experimental group for the post-test. The Anova and t-test, used to determine the differences between the two groups the results show Anova in the table (3) and t-test table (5) for two-tails are significant differences between the two groups.

**Table (5)**
**Paired Samples Statistics**

| | Mean | N | Std. Deviation | Std. Error Mena | Pair1 V3 and V4 | N | Correlation | Sig |
|---|---|---|---|---|---|---|---|---|
| Pair1 V3 V4 | 533.4792 515.375 | 47 47 | 42.99 42.08 | 6.27 6.14 | | 48 | .955 | .000 |

Paired Samples Test

| | Paired Differences | | | | | t | df | Sig. (2-tailed) |
|---|---|---|---|---|---|---|---|---|
| | Mean | Std. Deviation | Std. Error Mean | 95% Confidence Interval of the Difference | | | | |
| | | | | Lower | Upper | | | |
| Pair1 v1-v2 | -17.83 | 12.77 | 1.86 | -21.58 | .14.08 | -9.569 | 47 | .000 |

**Discussion**

The present paper presents a clear picture of King Faisal University students' level in terms of hand reaction time. The results of the experiment can be compared with similar results obtained from similar groups outside King Faisal University. The results can also be compared with the mean of reaction time in performing different tasks.

The results have shown the presence of significant differences in the mean of reaction time between the experimental group and the control group. This indicates that the training program has a positive role to play in the volley ball training program. This supports the researcher's position concerning the role of training programs in improving reaction time which has an important implication for other skills such as driving and reducing accidents (Jan 1994).

The researcher suggests that the experimental variable, i.e. training, utilizes the suitable time and amount of exercise. This takes us to suggest possible extensions of these two variables in an attempt to widen the scope of the present argument. Experimental work can also look at these variables in other games and skills and can include the variable of movement. (Magill and Powell 1975). The number of throws can also be changed to see if it results in a different reaction time. Maximum accuracy is a special feature of this type of research. This makes this type of research both interesting and reliable. Accuracy is attested in the comparability of the present results with results obtained from previous works in the same area.

## Conclusion

Based on the results of this study, the researcher found that there was no significant difference between the control group and the experimental group in the pretest; but the researcher found that there was a significant difference between the control group and the experimental group for the post-test. For that the investigator found there was an affect of the volley ball training program for three times a week for Two hours each time which did improve hand-reaction time. The study shows the importance of the exercise to every one at the same time the volleyball game is suitable to every one. Many studies investigated the effect and benefit of exercise, but very few looked at the relation exercise and reaction time specially the volley ball game in Saudi Arabia.

## Recommendation

The findings of the present study suggest the need for inclusion of RT in sport training which may lead to better performance in different sports. We recommend that RT measurements are included in the early stages of team selection and at different stages of the selection at particular levels. Sports such volleyball can help the general public, not only sportsmen, in improving their RT but also in transferring this skill to other fields in life.

## APPENDIX A

**Based on 120 minutes**

| | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| 1. warm-up<br>Includes stretching alone or with partner. Employ movements with ball which could be used in practice. Agility jump and reaction training. | 20 | 20 | 15 | 15 | 15 | 15 |
| 2. Movement patterns without the ball. Includes form drills (approach, block, individual defense), team tactics (offensive and defensive movement, transition). | 35 | 15 | 15 | 10 | 5 | -- |
| 3. Individual tactics (1-2 players). Emphasis serve, serve receive, ball control. | 40 | 35 | 25 | 20 | 15 | 10 |
| 4. Group tactics (3-5) players, emphasis on individual tactics). | 20 | 35 | 30 | 20 | 15 | 10 |
| 5. Competitive play. Scrimmage; triples, doubles. | -- | -- | 5 | 10 | 15 | 20 |
| 6. Warm-down Stretching – light running. | 5 | 5 | 5 | 5 | 5 | 5 |
| 7. Team Tactics | -- | 10 | 25 | 40 | 50 | 60 |

ALLOCATE TIME FOR LIQUID BREAKS. BREAKS MAY BE ORGANIZED OR WATER BOTTLES MAY BE AVAILABLE WHICH PLAYERS USE ON THIS OWN WHEN NOT ACTIVELY INVOLVED IN LEARNING PROCESS.

MOST IMPORTANT FACTOR IN PRACTICE IS AMOUNT OF CONTACTS EACH PLAYER HAS WITH THE BALL AND THE AMOUNT OF TIME INVOLVED IN ACTIVE LEARNING.

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# تأثير برنامج تدريب الكرة الطائرة على سرعة رد الفعل

**كاظم محمد أبوصالح**

قسم التربية وعلم النفس ، كلية التربية ، جامعة الملك فيصل
الأحساء ، المملكة العربية السعودية

**الملخص :**

لقد قام الباحث باختيار ٩٤ طالب اختيار عشوائي من طلاب جامعة الملك فيصل بالأحساء من غير الرياضيين وأعمارهم ١٧- ١٨سنة، وقسمهم إلى مجموعتين، مجموعة ضابطة ومجموعة تجريبية وقام الباحث بقياس سرعة رد الفعل قياس قبلي للمجموعتين وخضعت المجموعة التجريبية لبرنامج تدريب الكرة الطائرة ثلاثة مرات في الأسبوع ولمدة ساعتين في كل مرة وللفترة من ٢٠٠٣/١/١م إلى ٢٠٠٣/٦/١م.

ثم قام الباحث بقياس سرعة رد الفعل للمجموعتين قياس بعدي. وبمقارنة نتائج سرعة رد الفعل للمجموعتين دلت النتائج أن هناك اختلافات وتحسن في سرعة رد الفعل لصالح المجموعة التجريبية باستعمال اختبار (ت) للمقارنة بين المجموعات.