# Effects of Periodic and Continuous Resistance Training on Muscular Strength of First Year Male Students of College of Natural and Computational Sciences, Haramaya University, Ethiopia.

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**ABSTRACT**

*The primary purposes of the study were to assess effects of Periodic and Continuous Resistance Training on Muscular Strength on male students of CNCS. For this study 40 subjects (age 18-30) were randomly assigned into Periodic and Continuous Resistance Training, with 20 participants in PRTG and 20 participants in CRTG. The study design was experimental research design with pre, during and posttest independently in both groups. PRTG trained for 15 training sessions, paused 6 training sessions and resumed 15 training sessions, while CRTG trained continuously without intermission 30 training sessions. All subjects performed moderate intensity exercises regularly 3 days per week with 60 minutes of each training session, four set of twelve repetitions of selected exercises on first month. But on second and third month set and repetitions were increased, five set of fourteen repetitions and six set of sixteen repetitions respectively as pre-designed on training schedule. Pre, during and Post Test were conducted on muscular strength assessments variables such as Squat, Push-up, Sit-up and Bench press test. The data was analyzed using SPSS version 20 software package. Independent sample t- test was used to determine whether there is a statistically significant difference between both groups and the level of significance was at 0.05. According to finding of the study, the significance difference between the groups ($p>0.05$) on pre and during training test in all Muscular strength assessments variables which were non-significant. But on Post Test ($p<0.05$) in all Muscular strength assessments variables which were significant. Based on the result and findings, CRTG show more muscular improvements in all selected parameters than PRTG. Intermission of 6 raining session of PRGT leads to back ward from CRTG in all selected variables. Coach, professionals, physical fitness enthusiasts and other expertise used to train muscular strength need to encourage athletes to work hard continuously to obtain Muscular Strength improvement as well as to accomplish their goal.*

***Key word**: Resistance training, Periodic and Continuous Resistance Training, Muscular strength.*

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## 1. INTRODUCTION

### 1.1. Back Ground of the Study

**Resistance training is a form of physical activity that is designed to improve muscular fitness by exercising a muscle or a muscle group against external resistance.** RT is any exercise that causes the muscles to contract against an external resistance with the expectation of increases in strength, power, hypertrophy, and/or endurance. The external resistance can be dumbbells, exercise tubing, your own body weight, bricks, bottles of water, or any other object that causes the muscles to contract (Hongu *et al*., 2015).

Resistance training is designed to improve muscular fitness by exercising a muscle or a muscle group against external resistance. This resistance training is an efficient method to increase strength, power, and local muscular endurance. However, the prescription patterns should be related to the goals and individual needs of the participant (Garber et al., 2011).

It is well known that high amount of resistance training is an effective tool for improving muscle strength and size. Several factors, such as training volume, intensity, frequency, and the rest interval between sets may affect the chronic response to resistance training (Kraemer, *et al*., 2002).

### 1.2. Statement of the Problem

Most time the athletes, body builder, weight lifter and other trainees are starts the resistance training program. After some weeks the trainees are dropping out due to different reason: as lack of motivation, lack of time, disease for some weeks, during injury related to sport and other, seminars and work for some session, change the environment and etc. After some weeks they will, start to retrain again the program. The Researcher stands on this problem and attempted to study the effects of the Periodic and Continuous resistance training on Muscular strength. So the present's study tried to answers the following research question.

1. Does interruption of 6 training session able to bring vary between the groups on the muscular strength?
2. Which training subjects improve more muscular strength after both group completed 30 training?
3. Does pause (detraining) of 6 training session leads to decrease in muscular strength?
4. Does performing Resistance training continuously better to improve muscular strength than periodic Resistances training?

### 1.3. Scope of the study

Due to the financial, time and resources constraints the study limited to only Haramaya University main campus first year male students of College of Natural and Computational Sciences.

### 1.4. Significance of the study

The Researchers believes that the finds and results of this study will have contribution for

athlete, coach, body builder, weight lifter and all professional in the area of the muscular strength. So the significances of the studies were as follow.

1. It will create the awareness about effect of the continuous resistance training and periodic resistance training.
2. It will provide genuine concepts which one is more effective to make the participants more muscle strength.
3. It helps the coach, Athlete, body builder, weight lifter, and other to add effective resistance training to their program.
4. It will create golden opportunities for other Researcher to do further research on the area.

### 1.5. Objective of the study

#### 1.5.1. General objective of the study

The overall objective of the study was to study the effect of Periodic and Continuous Resistance Training on Muscular Strength in first year male students of College of Natural and Computational Sciences of Haramaya University.

#### 1.5.2. Specific objective of the study

The specific objectives of the study were:-

To differentiate either periodic or continuous resistance training is more successful to make the subjects Muscular Strength.

To scrutiny the change occurred between Periodic and Continuous resistance training group after both complete 30 training session.

To investigate detraining of 6 training session can significantly backward Periodic Resistance Training group from continuously performed group on muscular strength.

To analysis that, Perform Resistance training continuously without intermission is effective to gain Muscular Strength.

## 2. REVIEW OF RELATED LITERATURE

### 2.1. Historical Background of Resistance Training

Strength training can be traced back to the beginning of recorded time. As early as 2000 b.c. the ancient Egyptians lifted sacks of sand to strength train for hunting and military duty. According to military records, the Chinese also used strength training for their military personnel as early as700 b.c. Many of the athletes who competed in the ancient Olympics lifted heavy stones to develop strength and boost their athletic performance. Besides those functional results, strength training provided the development of a muscular physique. This masculine physique was honored in classic Greek art and writing. In fact, it may be the ancient Greek culture's celebration of muscle that is responsible for spawning the modern sport of bodybuilding. Several famous athletes during that period, such as Milo and Heracles, often performed feats of strength and displayed their muscularity to spectators (Stoppani, 2014).

## 2.2. Resistance Training Goal Setting

The act of resistance training, itself, does not ensure optimal gains in muscle strength and performance. Rather, it is the magnitude of the individual effort and systematic structuring of the training stimulus that ultimately determines the outcomes associated with resistance training. Thus, resistance-training programs need to be individualized in order to maximize the outcomes (Kraemer and Ratamess, 2004).

## 2.3. Designing Resistance Training Programme

Designing a resistance training programme is a complex process incorporating several acute programme variables and key training principles. Historically, programme design has been more of an art than a science, yet science remains a vital part of the process, as prescription of any exercise requires an understanding of the underlying scientific principles involved. Program design is a systematic process that uses a sound understanding of the basic principles of resistance training to meet the needs of each trainee. Program variables should be modulated to create an effective individualized exercise stimulus. Thus, a more involved program design system offers a larger tool box to use to develop, prescribe, and then modify resistance training workouts over a training period (Fleck and Kraemer, 2014).

## 2.4. Muscular Strength

Muscular strength may be defined as the maximal amount of force one can generate during a specific movement pattern at a specified velocity of contraction. For a dynamic muscle action, it may be assessed in the weight room via a 1 RM lift for a given exercise; that is, the maximal amount of weight lifted in one all-out effort. In other cases, it may be estimated from sub maximal strength performance (Ratamess, 2011).

# 3. MATERIALS AND METHODS

## 3.1. Description of the Study Area

The research was conduct in Haramaya University main campus. Haramaya University is found in eastern Hararghe zone which is 517km from Addis Ababa and 17 km from Harar as well as 40km from Dire Dawa. The elevation of the area is about 2000 m above sea level and geographically it located 9.4217 "latitude and42.0333"longitudes. The University is equipped with facilities like swimming pool; gymnasium and soccer stadium (www.haramaya.edu.et, 2013).

## 3.2. Research Design

The Researcher used the experimental research design pre, during and posttest independently between the groups in order to identify the Effects of Periodic and Continuous Resistance Training on Muscular Strength. The training schedule were given three days per week i.e., Monday, Wednesday, and Friday and hence, a total of 30 training session accomplish in a two-months and two-weeks' time(December, January and February, 2019/20) for training sessions in which 60 minutes were allow for each training session.

**Table 7:-The Study Design Layout Description**

| **Treatment** | **Muscular strength training** |
|---|---|
| Frequency | 3 days/week |
| Total duration | 3 months |
| Duration /session | 60min |
| Intensity | Moderate |
| Exercise days | Monday, Wednesday and Friday |
| Time of training | Afternoon at 5:00 pm |

### 3.3. Population of the Study

Populations of the study included all first year male Students of College of Natural and Computational Sciences of Haramaya University.

### 3.4. Sampling Techniques and Sample Size

The sampling techniques the Researcher was used to obtain the subjects were simple random sampling and the sample size were 40 male students of College of Natural and Computational Sciences first year respectively.

### 3.5. Inclusion and Exclusion Criteria

Subjects who fulfilled for health history and physical readiness questionnaire were selected, screened and participated in this study. 40 subjects from Haramaya University male students of College of Natural and computational sciences who were free from any forms of acute and chronic disease and not having current physical and mental injury were included whereas the subjects contrary to the criteria were excluded from the study politely.

### 3.6. Experimental Materials

The Researcher used the following materials or tools to complete the study. Chair**,** weights, dumbbell, barbell, parallel bar, Bench, Flat surface, Mat, pen, $A_4$ papers, notebook, chalk, whistle, gym and so on.

### 3.7. Sources of the Data

The Researcher was used the primary sources of data. The primary data was collected from the subjects of experimental study group through pre, and post tests on effects of periodic and continuous resistance training.

### 3.8. Method and Procedures of Data Collection

To collect the data from the experiment the Researcher was used the squat test, bench press test, sit-up test and push up test. The data were recorded by the four data recorders who have been trained and oriented with how to collect data of pre-test, during test and posttest before test has been started. The researcher has used the gymnasium as study site.

**Squat test:** this test is used to evaluate the strength of the lower limbs or legs strength. To do this test the Researcher required Chair that

makes the subjects knees bend at right angles when they are sitting and one Assistant.

## Analysis

Analysis of the result is by comparing it with the results of previous tests. It is expect that, with appropriate training between each test, the analysis would indicate an improvement.

**Bench press test:** it is used to measure the strength of the upper body. To do this test the Researcher required different tools: such as, bar bell and weights, Bench and Assistant.

## Analysis

Analysis of the result is by comparing it with the results of previous tests. It is expected that, with appropriate training between each test, the analysis would indicate an improvement. The following equation provides a good estimate of the maximum load providing the number of repetitions does not exceed 12.

One Repetition Maximum is = Weight / (1.0278 – (0.0278 x Number of repetitions)) for an assessment of your one repetition maximum divide your one repetition maximum (kgs) by your body weight (kgs) and then determine an assessment of your score from the normative table.

**Sit-up test:** is used to evaluate the strength of the abdominal muscles. To perform this sit-up test the Researcher required tools are sources: Flat surface, Mat and Partner to hold the feet.

### Analysis

Analysis of the result is by comparing it with the results of previous tests. It is expected that, with appropriate training between each test, the analysis would indicate an improvement.

**Push up test:** is used to assess the strength and endurance of your athlete's upper body muscles. To perform this push-up test the Researcher required tools such as: Flat surface, Mat, Stop watch and assistant.

### Analysis

Analysis of the result is by comparing it with the results of pre-test and posttest. It is expect that, with appropriate training between each test, the analysis will indicate an improvement.

**Assessment:** The table below provides standards for scoring the full body push-up.

### 3.9. Method of Data Analysis

The data collected through physical fitness tests variables were analyzed, tabulated and interpreted in to meaningful ideas using manually and by inferential statistical analysis computerized statistical package software SPSS version 20 to compare muscular strength observed in subjects. Independent sample t-test was used to analysis the difference between PRTG and CRTG pre, during and Post Test results. The level of significance was at 0.05%.

### 3.10. Data Quality Control

To ensure quality of the data, all tests procedures, collection of data and handling information of muscles strength and standardized resistance strength exercises test were used. To avoid the errors that may occur during data collection, training were given for the assistance data collector how to use and record data collecting instruments and

measurements during data collections. Only standardized materials were used to keep the quality of the data. To collect the data the researcher was used strength test parameters, like squat test, push up, bench press test and sit up test. Additionally, all the above mentioned tests were recorded with photography. Finally, the data was coded and fed to software twice by different persons to avoid error in data feeding.

### 3.11. Ethical Consideration

The study was dealt with the ethical issues related to the investigation. The privacy of the research subjects was protected as well as can make a guarantees and confidentiality of the information that was given to the study and risk of harm due to participation. Participation in this study is purely voluntary activity and their right not to participate and can resign at any time were respected. Therefore, the study was conducted all actions based on the university rule, code of conduct and policy concerning the research ethics. Since subjects were volunteers and if they are refraining for the situations, not ready or not feel comfort they have the right to excludes themselves at any time they want. Ethical approvals were obtained from International Research Ethics Review Committee (IRERC) of Haramaya University College of Healthy science. The protocols were approved by University guide lines and written consent was given and informs the concern bodies.

## 4. RESULT AND DISCUSSION

### 4.1. Overview

This chapter dealt with the analysis of data collected from the samples under this study. The purpose of the study was to scrutinize **Effects of Periodic and Continuous Resistance Training on Muscular Strength of First Year Male Students of College of Natural and Computational Sciences, Haramaya University, Ethiopia**. The variables which were selected for this study were normal squat, push-up, sit-up and bench press. Pre, during and post tests were conducted for all 40 study subjects and the test results were recorded. The collected data were analyzed by independent sample t-test using SPSS version twenty (V.20). The results for each fitness variable were tabulated, support with bar graph discussed and interpreted below.

### 4.2. Mean and SD Values of the Anthropometric measurements

Table 8:- Anthropometric measurements for Periodic Resistance Training Group, Height and weight were measured in cm and kg respectively.

| Anthropometric measurements | N | Mean± Std. Deviation |
|---|---|---|
| Age | 20 | 21.05 ± 1.31689 |
| Height | 20 | 174.60± 5.286 |
| Weight | 20 | 60.30± 6.325 |

Table 9:- Anthropometric measurements of subjects for Continuous Resistance Training Group, Height and weight were measured in cm and kg respectively.

| Anthropometric measurements | N | Mean± Std. Deviation |
|---|---|---|
| Age | 20 | 20.65 ± 0.933 |
| Height | 20 | 173.00± 7.567 |
| Weight | 20 | 59.15± 4.945 |

### 4.3. Effects of the Squat on muscular strength in Periodic and Continuous Resistance Training Group

Table 10:- pre, during, and posttest mean and mean difference values of Squat.

| Name of Parameter | | Periodic Resistance Training Mean ±SD | Continuous Resistance Training Mean ±SD | MD | t-value | P-value |
|---|---|---|---|---|---|---|
| **Squat** | PTT | 32.90±7.73168 | 32.8500 ± 9.82090 | 0.050 | 0.018 | 0.986 |
| | DTT | 40.15 ± 5.60334 | 41.1500±10.30215 | -1.00 | -0.381 | 0.705 |
| | POTT | 43.00 ± 6.17295 | 50.100 ±6.41462 | -7.10 | -3.567 | 0.01 |

PTT= Pre-Training Test, DTT=During Training Test, POTT=Post Test, SD=Standard Deviation, MD=Mean Difference.

As showed in above table 4 and below figure 1 the pretest of the squat for Periodic and Continuous Resistance Training group were 32.90 and 32.85 with mean difference of 0.05 respectively. After they started training there were improvements in both groups, during training test were 40.15 and 41.15 for Periodic and Continuous Resistance Training group with mean difference of -1 respectively. But on posttest there were more improvement in both groups with 43 for Periodic and 50.1 for Continuous Resistance Training group with mean difference of -7.10.

When compared the Squat mean values result of both groups with international standard Norms among similar ages 18-25, the pretest result of Periodic and Continuous Resistance Training Group were 32.9 and 32.85respectively. Hence, the result of both study have fallen in below Average.

As the result of the study indicate during training test were 40.15 and 41.15 for Periodic and Continuous Resistance Training Group respectively. When compared with Normative among similar age, the result of both group fallen in above Average.

The results of Post Test were 43 for periodic Resistance Training Group and 50.1 for Continuous Resistance Training Group. Hence the study result showed that periodic Resistance Training Group fallen in above average and

Continuous Resistance Training Group fallen in excellent. So the founded result indicated that, Continuous Resistance Training Group becomes more muscular strength than periodic Resistance Training Group. (Norms found on appendix Q and table 17).

As indicated in independent sample t-test of Squat analysis (Appendix O, Table 13) the result of t-test (t= 0.018, p=0.98>0.05) for pre-training test and (t=-0.381, p=0.705>0.05) for during training test and it suggested that, there were no statistically difference between the two groups but on Pre and during training test because of insufficient difference mean values of 0.05 and -1.00 respectively. But on Post Test the result of independent sample t-test were (t=-3.567, p=0.01<0.05) which indicate that there was statistically difference between Periodic and Continuous Resistance training group.

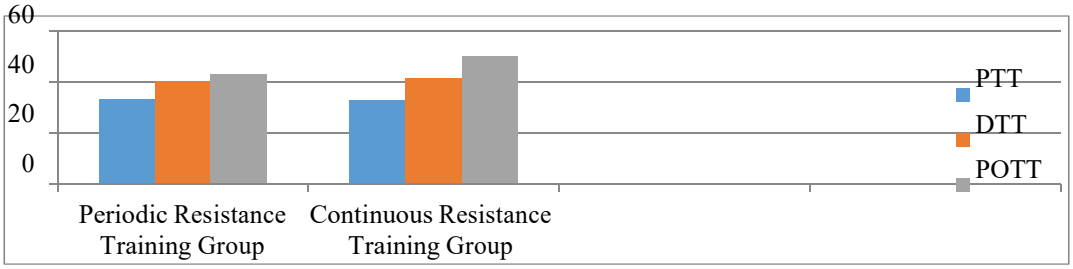


**Figure 2:- Mean comparison among pre, during and post step test Squat results of the study subjects.**

### 4.4. Effects of the Push-up on muscular strength in Periodic and Continuous Resistance Training Group.

Table 11:- pre, during, and posttest mean and mean difference values of Push-up

| Name of parameter | | Periodic Resistance Training Mean ±SD | Continuous Resistance Training Mean ±SD | MD | t-value | P-value |
|---|---|---|---|---|---|---|
| **Push-up** | PTT | 32.1500±8.14523 | 32.3500±10.68829 | -.200 | -0.067 | 0.947 |
| | DTT | 38.3500±6.59565 | 39.8000±8.51377 | -1.450 | -0.602 | 0.551 |
| | POTT | 42.5000±5.69857 | 49.2000±5.49258 | -6.700 | -3.786 | 0.001 |

PTT= Pre-Training Test, DTT=During Training Test, POTT=Post Test, SD=Standard Deviation, MD=Mean Difference.

As suggested in above table 5 and figure 2 pretest of Push-up for Periodic and Continuous Resistance Training Group were 32.15 and 32.35 with mean difference of -0.2 respectively. But on during training test, the results were 38.35 for Periodic and 39.8 for Continuous Resistance Training group with mean difference of -1.45. After both group completed 30 training session there were improvements with study result of 42.5 for Periodic and 49.2 for Continuous Resistance Training group with mean values of -6.7.

The Push up test result compared with international standard norms of push up test

among similar age 20-29. The pretest results for periodic and continuous Resistance Training group were 32.15 and 32.35 respectively. Hence the result of both group fallen in Fair. On during test there were improvements on both group because of the training exercise given for them and the results were 38.35 and 39.8 for periodic and Continuous Resistance Training group respectively and both fallen in Average. But on Post Test the result were 42.5 and 49.2 for periodic and Continuous Resistance Training group respectively and periodic fallen in Average as well as Continuous fallen in Good. This implies that cessation of 6 training session show a discrepancy between both group and subjects who perform 30 training session continuously were being more muscular strength than PRTG. (Norms found on appendix Q and table 17).

As indicated in independent sample t-test of Push-up analysis (Appendix O, Table 14) the result of t-test (t= -0.067, p=0.947>0.05) for pre training test and (t=-0.602, p=0.551>0.05) for during training test and it suggested that, there were no statistically difference between the two groups on Pre training and during training test But on Post Test the result of independent sample t-test were (t=-3.786, p=0.001<0.05) which indicate that there was statistically difference between Periodic and Continuous Resistance training group.

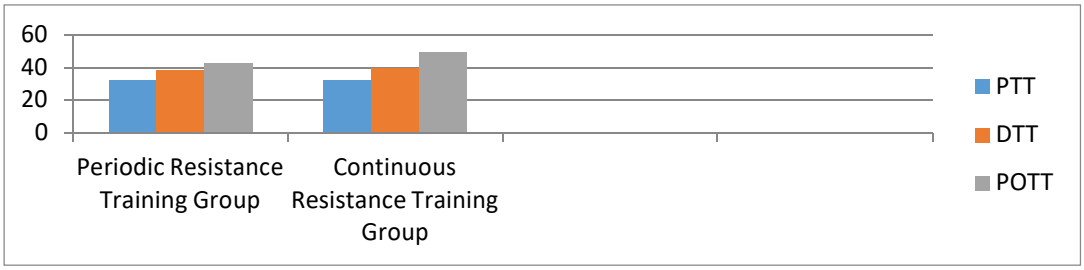


Figure 3:- Effects of mean among pre, during and post step test Push-up results of the study subjects.

## 4.5. Effects of the Sit-up on muscular strength in Periodic and Continuous Resistance Training Group

Table 12:- pre, during, and posttest mean and mean difference values of Sit-up.

| Name of Parameter | | Periodic Resistance Training Mean ±SD | Continuous Resistance Training Mean ±SD | MD | t-value | P-value |
|---|---|---|---|---|---|---|
| **Sit-up** | PTT | 28.7500±2.61323 | 27.5500±3.34782 | 1.20 | 1.264 | 0.214 |
| | DTT | 35.4000±3.01575 | 35.3000±3.34192 | 0.10 | 0.099 | 0.921 |
| | POTT | 40.3500±3.91051 | 44.9000±3.29114 | -4.55 | -3.981 | 0.000 |

According to above table 6 and below figure 3 the pre training test of sit-up for periodic and Continuous Resistance Training group were 28.75 and 27.55 respectively with mean difference of 1.20. At middle of training the result of the data scored on during training test for Periodic and Continuous Resistance Training group were 35.40 and 35.30with mean difference of 0.10respectively. However, the Post Test indicated more improvements in both groups and their study result were 40.35 and 44.90with mean difference of -4.55respectively.

International standard Norms for one-minute sit-up test among similar age 20-29 Compared with study result. Hence, the pre training test result of sit-up for PRTG and CRTG were 28.75 and 27.55 which both group fallen in Poor at initial level. Because of training they involved in, there were improvement on during training test and the result were 35.40 and 35.30 for PRTG and CRTG which the result shown that, both group fallen in Average. But on Post Test both groups accomplish the training session appropriately as designed and structured in previous, there were improvement of both groups. The results of the study were 40.35 and 44.9 for Periodic and Continuous Resistance Training Group respectively. Therefore Periodic Resistance Training group fallen in Above Average whereas Continuous Resistance Training Group fallen in Good. (Norms found on appendix R and table 20).

As depicted in independent sample t-test of Sit-up analysis (Appendix P, Table 15) the result of t-test (t= 1.264, p=0.215>0.05) and (t=0.099, p=0.921>0.05) for pre training and during training test respectively and it reveals that, there were no statistically difference between the two groups on Pre training and during training test. But on Post Test the result of independent sample t-test were (t=-3.981, p=0.000<0.05) which indicate that there was statistically difference between Periodic and Continuous Resistance training group.

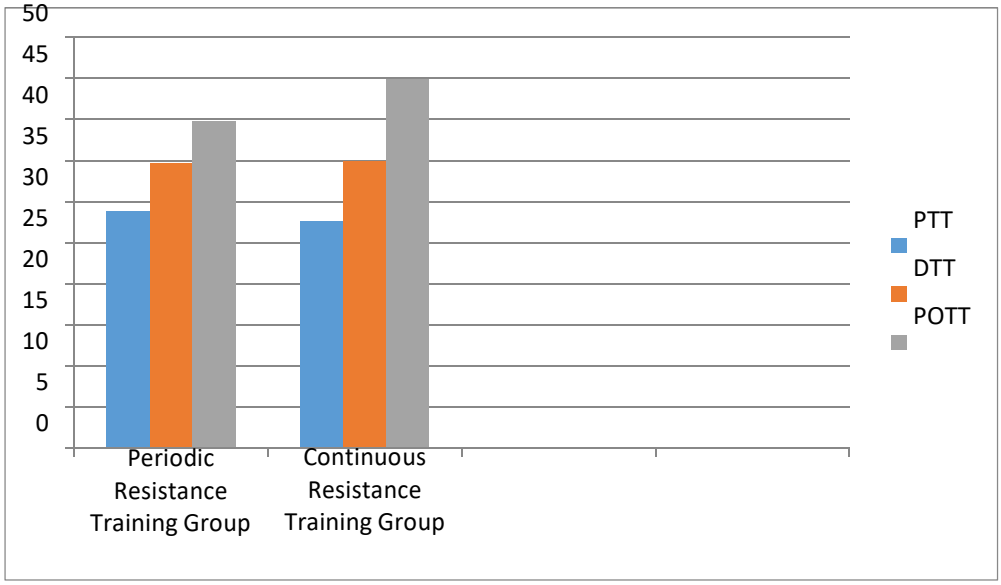


Figure 4:- Mean comparison among pre, during and post step test Sit-up results of the study subjects.

### 4.6. Effects of the Bench press on muscular strength in Periodic and Continuous Resistance Training Group

Table 13:- pre, during, and posttest mean and mean difference values of Bench press.

| Name of Parameter | | Periodic Resistance Training Mean ±SD | Continuous Resistance Training Mean ±SD | MD | t-value | P-value |
|---|---|---|---|---|---|---|
| **Bench Press** | PTT | 0.9627± 0.08847 | 0.9634± 0.08137 | -0.00067 | -0.025 | 0.980 |
| | DTT | 1.0429± 0.08137 | 1.0669± 0.09989 | -0.02401 | -0.683 | 0.499 |
| | POTT | 1.1350± 0.12556 | 1.2778± 0.12679 | -0.14278 | -3.578 | 0.001 |

Table 7 and figure 4 showed that, pre-training test were 0.9627and 0.9634for periodic and Continuous Resistance Training group respectively with mean difference of -0.00067. On during training test there were improvement in both group due to they started training, then the result of the study were 1.0429for Periodic and 1.0669for Continuous Resistance Training Group with mean difference of -0.02401. Post Test showed more improvement in both groups with study result were1.1350for Periodic and 1.2778for Continuous Resistance Training Groups with mean difference of -0.14278respectively.

When compared the result of Bench press test with International standard Norms among similar age 20-29, the pre training test were 0.9627and 0.9634for Periodic and Continuous Resistance Training groups respectively. Based on found result both groups fall in Fair. Because of training they took part in, both groups showed improvement and their results were1.0429 for Periodic and 1.0669 for Continuous Resistance Training Group, which indicate that, both groups fallen in Average. But on Post Test the study result shows more improvement because of 30 training session exercises and their study result were 1.1350 and 1.2778 for Periodic and Continuous Resistance Training Group respectively which depict that, Periodic Resistance Training Group fallen in Average and CRTG fallen in Excellent.(Norms found on appendix R and table 19). As shown in independent sample t-test of Bench press analysis in (Appendix P, Table 16) the result of t-test ($t=-0.025$, $p=0.980>0.05$) for pre-training test and ($t=-0.683$, $p=0.499>0.05$) for during training test and it implies that, there were no statistically difference between the two groups on Pre and during training test. But on Post Test the result of independent sample t-test were ($t=-3.578$, $p=0.001<0.05$) which indicate that there was statistically difference between Periodic and Continuous Resistance training group.

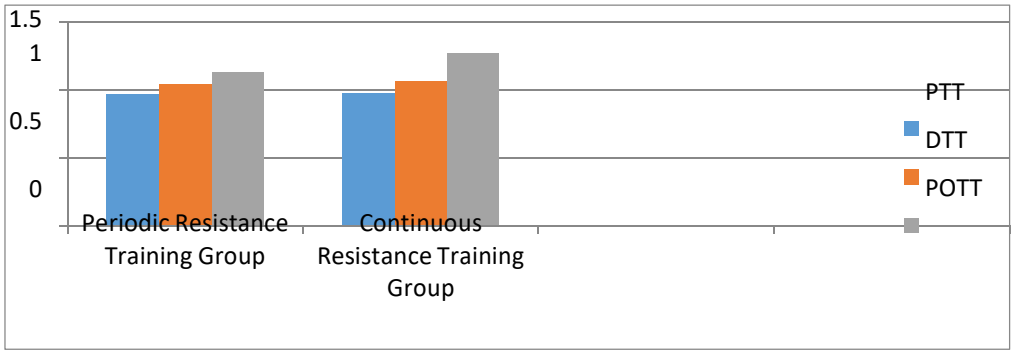


Figure 5:- Mean comparison among pre, during and post step test Bench press results of the study subjects

Generally, the four variables the researcher used to assess effects of RT on muscular strength, the result showed that, there were discrepancies between both groups. After both groups get done 30 training session, CRTG show more improvement in Muscular Strength than PRTG because of 6 detraining session. This implies that, intermission of 6 training session lead PRTG back ward from CRTG. The result of this study indicates that, in all parameters of muscular strength assessments, Continuous Resistance Training Groups were gain muscular strength than PRTG.

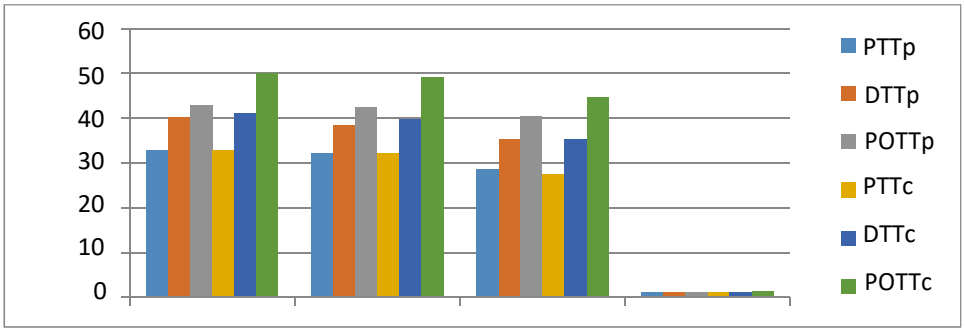


Figure 6:- The mean result of all parameters of both groups

Therefore, the results of the study were contrast with (Gentil *et al*., 2015) 2 weeks of detraining does not affect strength gains after a total of 10 weeks of resistance training in previously detrained women. It is generally argued that frequency and continuity are important factors in designing resistance training. Nevertheless, the present results showed that 2 weeks of detraining was not sufficient to affect upper and lower body strength gains between the continuous and periodic resistance training programs.

Overall improvements in Muscular Strength in the detraining group were similar to those observed in the continuous training group. These results suggest that a relatively short-term detraining period does not attenuate

muscle adaptations over 15 weeks of resistance training (Ogasawara *et al*., 2011).

## 5. SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

### 5.1. Summary

The world of strength training has seen hundreds of different types of training programs introduced in muscle magazines, by fitness and health clubs, by champion lifters, by fitness experts, and in TV infomercials. Designing a resistance training program is ultimately a very individual process, and the needs of the individual are paramount to the program characteristics (Fleck and Kraemer 2004).

The research attempted to assess Effects of Periodic and Continuous Resistance Training on Muscular Strength of First Year Male Students of College of Natural and Computational Sciences, Haramaya University. At opening, the results of the pre training test of both groups were no significance difference between them, because they were not involved in any resistance training in last 6 month and at least they have the same training age. Both groups started similar exercise at similar time until during training test or completed fifteen training session. As the result of during training test there were no significance differences between both groups, because they were trained the same duration with same exercise. Then, CRTG continued their training without intermission whereas PRTG pause 6 training session and retraining fifteen training session. Then both groups treated with similar exercises at the same day Monday, Wednesday and Friday PRTG at 4:00-5:00 whereas CRTG at 5:15-6:15.

Finally, after both groups accomplished the planned training session and result of Post Test showed that there were significance difference in squat, push-up, sit-up and bench press from mean values which indicated that, CRTG show more improvement than PRTG with mean values differences -7.1, -6.7, -4.55 and -0.14 respectively due to intermission of 6 training session.

### 5.2. CONCLUSIONS

Based on the result of this study, the following points were stated as the conclusion.

- Continuous Resistance Training Group becomes more muscular strength than Periodic Resistance Training Group.
- Cessation of 6 training session brought discrepancy between the groups.
- Intermission of 6 training session of PRTG leads to back warded from CRTG.
- Performing RT continuously without intermission helps to get better result on muscular strength.

### 5.3. RECOMMENDATIONS

Based on the findings of this study it would be recommended as below:

The finding of this study proved that, CRTG has brought much better Muscular improvement. Based on finds of the study the following recommendations are made.

Muscular strength coach, professionals and other expertise of muscular strength need to encourage athletes to work hard continuously to obtain Muscular Strength improvement to accomplish their goal.

Further researches may follow the methodology in more sophisticated manner; while this study used as a spring-board for the improvement of muscular strength performance of Athletes by using longer training period.

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