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A Study Of A Weight Training Exercise Program As A Method To Increase Vertical Jumping Ability

James M. Soloman, Sr.

Prairie View Agricultural and Mechanical College

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A STUDY OF A WEIGHT TRAINING EXERCISE PROGRAM
AS A METHOD TO INCREASE VERTICAL JUMPING ABILITY

SOLOMON

1955

JAMES M. SOLOMON

- 1929 Born in Harrison Township, Pa.
- 1947 Graduated from Prairie View Training School
- 1947 Enrolled in Prairie View A & M College
- 1951 Graduated from Prairie View A & M College
- 1951 Began work on M. S. Degree at Prairie View A. & M. College

DIVISION OF GRADUATE STUDY

PRAIRIE VIEW AGRICULTURAL AND MECHANICAL COLLEGE

FINAL EXAMINATION

JAMES M. SOLOMON

For the Degree of
MASTER OF SCIENCE

Thursday, August 4, 1955 2:00 P.M. Ed 106

COMMITTEE IN CHARGE:

Dr. J. C. Mitchem Chairman and Professor of Physical Education

W. J. Nicks Head, Department of Physical Educ.

H. McKinnis Professor of Physical Education

T. Williams Professor of Physical Education

H. T. Jones Professor of Education

LIST OF GRADUATE COURSES

BRIEF OF THESIS

Major Field: Physical Education

- PE 633 Community Planning for Health
- PE 683 Administration of Athletics in High Schools
- PE 713 Seminar in Physical Education Research
- PE 733 Methods of Teaching Physical Education in Elementary School
- PE 753 Scientific Foundation in Physical Education
- PE 800 Advanced Coaching
- PE 843 Recreation Problems
- PE 853

Statement of Problem: The investigation was to determine if the vertical jumping ability can be increased through a properly guided exercise program.

Purpose: The purpose was to set up an exercise program that will increase vertical jumping ability.

Brief Summary: This study showed that vertical jumping ability could be increased through a properly guided exercise program.

Minor Field: Administration and Supervision

- Adm. 713 Fundamentals of School Administration
- Sup. 643 Elementary School Supervision
- Sup. 753 Principles and Practices of Supervision

An investigation to determine whether Vertical Jumping Ability could be increased through a properly guided exercise program.

A STUDY OF A WEIGHT TRAINING EXERCISE PROGRAM AS A
METHOD TO INCREASE VERTICAL JUMPING ABILITY

By

James M. Solomon, Sr.

A Thesis Submitted in Partial Fulfillment

of the Requirements for the Degree of

Master of Science

In The

Graduate Division

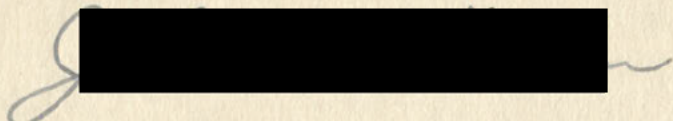
of

Prairie View Agricultural and Mechanical College
Prairie View, Texas

August, 1955

ACKNOWLEDGEMENTS

The writer wishes to express his sincere appreciation to all who made this study possible, and particularly to the members of the Dunbar High School basketball team, Temple, Texas and Dr. John C. Mitchem.



DEDICATION

This study is dedicated to my son
James M. Solomon, Jr. who was an in-
spiring influence.

J. M. S., Sr.

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Chapter I

INTRODUCTION

Basketball was originated in 1892 at the International Young Men's Christian Association Training School, Springfield, Massachusetts by Dr. James A. Naismith and Luther H. Gulick. The game was originated because it was felt that there was a need for an indoor game for the winter, as football is a fall sport and baseball is a summer sport.

The original game was played using peach baskets for goals. As each goal was made the ball had to be retrieved by the use of a ladder. The first ball used for the game was a soccer football, due to its bouncing qualities. Eighteen boys, nine on each team were first used because Dr. Naismith had eighteen boys in his Young Men's Christian Association Training School.

Basketball attracts many spectators. Weather never causes a postponement, and spectators have all of the comforts of home. The game probably owes its popularity to the comforts it offers to spectators and the fact games can be played day or night. Basketball has grown so much since its existence that some of the high school contests now draw as high as fifteen thousand fans for one game. It is estimated that at the present time there are between seventy-five and

one hundred million people who attend basketball games of one type or another in the United States alone, during the period from December 1 to March 1.¹

Basketball has rapidly become a tall man's game. It is the hope of every basketball coach to have tall boys over six feet on his team. He realizes that taller boys will have the advantage over a team of shorter boys because they stand a better chance of getting rebounds, tip-offs, tip-ins and even a greater chance of making layup shots. Even if the coach has some tall players it would be to his advantage to try to get the best results from them because there will come a time when he will meet a team equal to his in height. There will also be instances when opposing teams will have a height advantage. This situation will necessitate the use of strategy or tactics not total dependence on height. Since jumping ability is one way to overcome height advantages it would behoove a coach to investigate any method that might be used to increase jumping ability.

STATEMENT OF THE PROBLEM

It is the purpose of this investigation to determine if vertical jumping ability can be increased through a properly

¹ Morley, Ave, Beu and Newtson, Fundamentals and Techniques Of Winning Basketball, School-Aid Company, Danville, Illinois, 1951.

guided exercise program to strengthen the muscles used in vertical jumping. The exercise program to be used utilizing the application of the overload principle.

Chapter II

REVIEW OF LITERATURE

Weight training is a rapidly growing activity in physical education, although there are many physical educators who deplore its introduction to their programs. The reasons most frequently given are: (1) it causes "muscle boundness", (2) it slows the athlete, and (3) it ruins co-ordination and ability. Weight training is the fastest way to build strength and muscle size.^{2 3}

Will weight training cause muscle boundness? It has been established that there is no increase in the number of muscle fibers when a muscle is hypertrophied. Rather, the individual fibers increase in cross-sectional size. There have been several recent studies that have shown weight training to not slow muscular action but to increase speed of movement.⁴

² J. E. Counsilman, "Does weight training belong in the Program", Journal of Health-Physical Education-Recreation, January 1955, p. 17.

³ Edward Chui, "The Effect of Systematic Weight Training on Athletic Power", Research Quarterly, Volume XXI, (October, 1950.)

⁴ W. S. Zorbas and P. V. Karpovich, "The Effects of Weight Lifting upon Speed of Muscular Contractions", Research Quarterly, Volume XX, p. 145.

"Recently in the first of a series of studies at Cortland State Teachers College, three weight-lifting champions including the "Mr. America" title winner of 1952, were tested and were found to be considerably above average in three tests of flexibility devised by Cureton. The flexibility of 15 other competitive weight lifters was also measured by the same three tests of flexibility with the same results".

An experiment that has a direct relationship to subject under investigation was reported in Look magazine.⁵

Last year, the University of Iowa's basketball team finished second in the tough Big Ten Conference, with eleven victories and only three losses in conference play. Iowa players had great stamina, always hawked the ball, consistently outjumped their foes.

Iowa's secret did not leak out until after the season ended. It was disclosed in the master's thesis of an Iowa graduate student, Richard Lee Garth. Garth told of a six-week pre-season program of weight training and jumping, which added an average of 2.7 inches to the players' jumping height.

Three times a week, the Iowa players went through a set of seven exercises with bar bells and dumbbells and made jumps against a backboard. Garth debunked the notion that weight lifting makes men muscle-bound. It even increases speed he says. The stronger a person is the faster he can go. And greater arm strength gives thrusting power which carries the whole body into the air.

⁵"Hoops My Dear", Look, Volume XVIII, December 28, 1954, p. 80.

Chapter III

PROCEDURE

The subjects used in this study were ten high school basketball players (boys) between the ages of sixteen and seventeen. These subjects were thought to be in good physical condition because the experimental exercise program started one week following the final basketball game of the season. These boys had above normal jumping ability because they did vertical jumping in their daily practices and in games.

Each boys' vertical jumping ability was tested and recorded before the training started. The study was conducted for six consecutive weeks with each subject exercising fifteen minutes per day, for three days each week. The exercise program consisted of ten curls with thirty pounds and fifteen clean-and-press with sixty pounds. The final exercise was to hold eighty pounds on shoulders in back of the neck, a sponge rubber pad was used for protection, and walk fifty steps bending the knees to an angle about one hundred degrees. The subjects' jumping ability was measured on the backboard immediately following the exercise period. The backboard was marked with one inch

graduation to score jumping ability. The boys jumped every Friday - ten times with the right hand touching and then ten times with the left hand touching. The best jump was recorded. Tables and graphs were constructed and the data was statistically analyzed.

Chapter IV

ANALYSIS OF DATA

Graphs were constructed showing the increase in vertical jumping ability for each of the ten boys used in the study. See Tables 2-11. A chart showing the average increase per week for all of the subjects was also constructed. See Table number 1. A short description of each subject was included with the graph of his jumping ability.

The group of ten boys increased their total vertical jumping ability a total of seventy-nine inches in the six week exercise program. There was an average increase, for the group, of over an inch for every week except one and the increase for that week was nine-tenths of an inch. The least any subject increased his jumping ability was five inches (subject number 5) and the most any subject increased his jumping ability was eleven inches (subject number 10).

It is significant to note that all of the subjects except one subject number 5, who also increased his jumping ability the least, were still showing an increase in jumping ability when the exercise program was discontinued. This would indicate the possibility that further benefits might be derived from continuing the exercise program for

longer than six weeks .

The difference of the mean of jumping ability before the exercise program and the mean of jumping ability after the program was statistically significant above the .001% level, thus proving that the difference in increased jumping ability could not have possibly been due to chance.

TABLE I

GRAPH OF AVERAGE INCREASE IN JUMPING
ABILITY FOR THE WHOLE GROUP

Group average started jumping at 9 feet 7 inches
Group average ended at 10 feet 2.9 inches

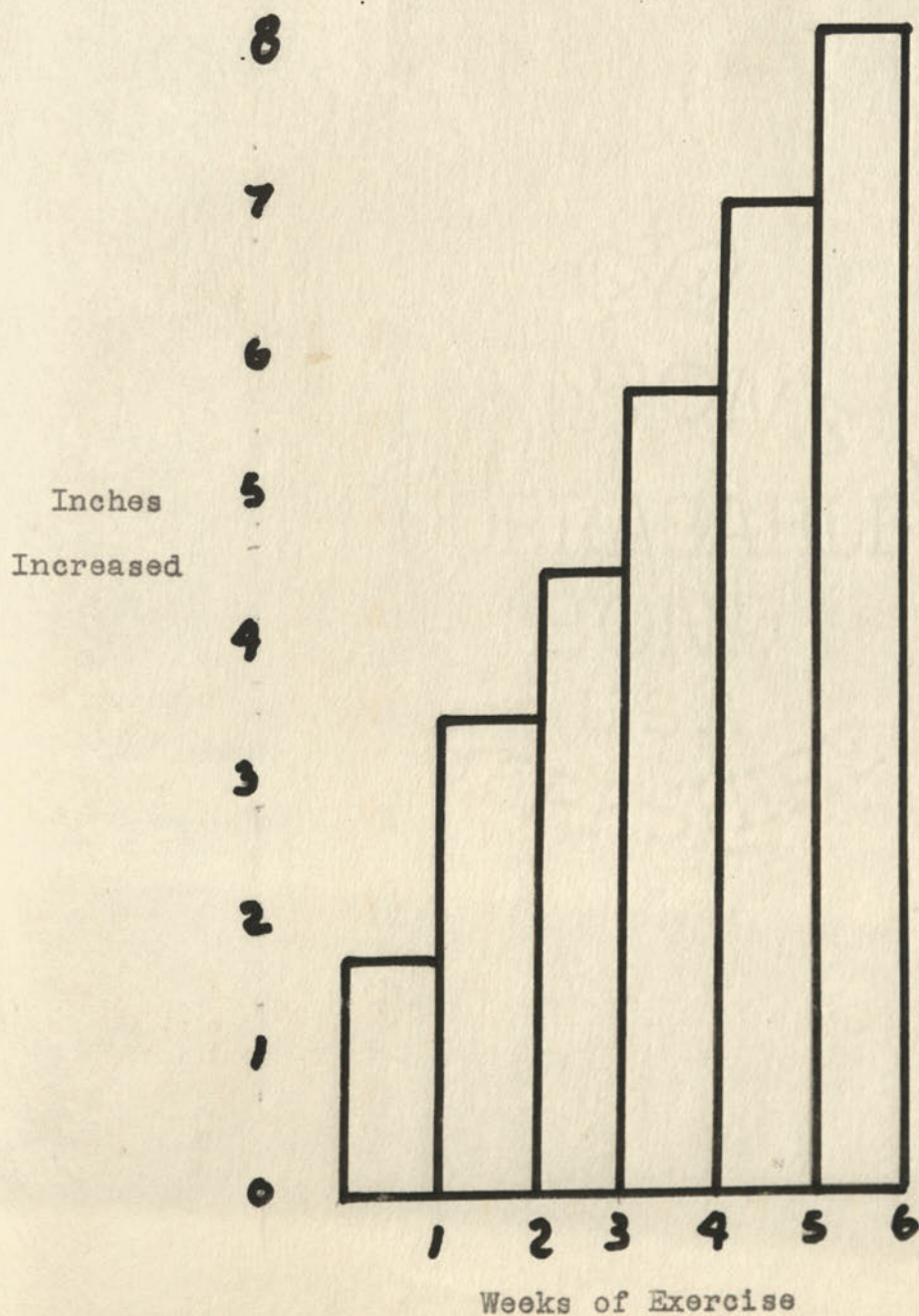


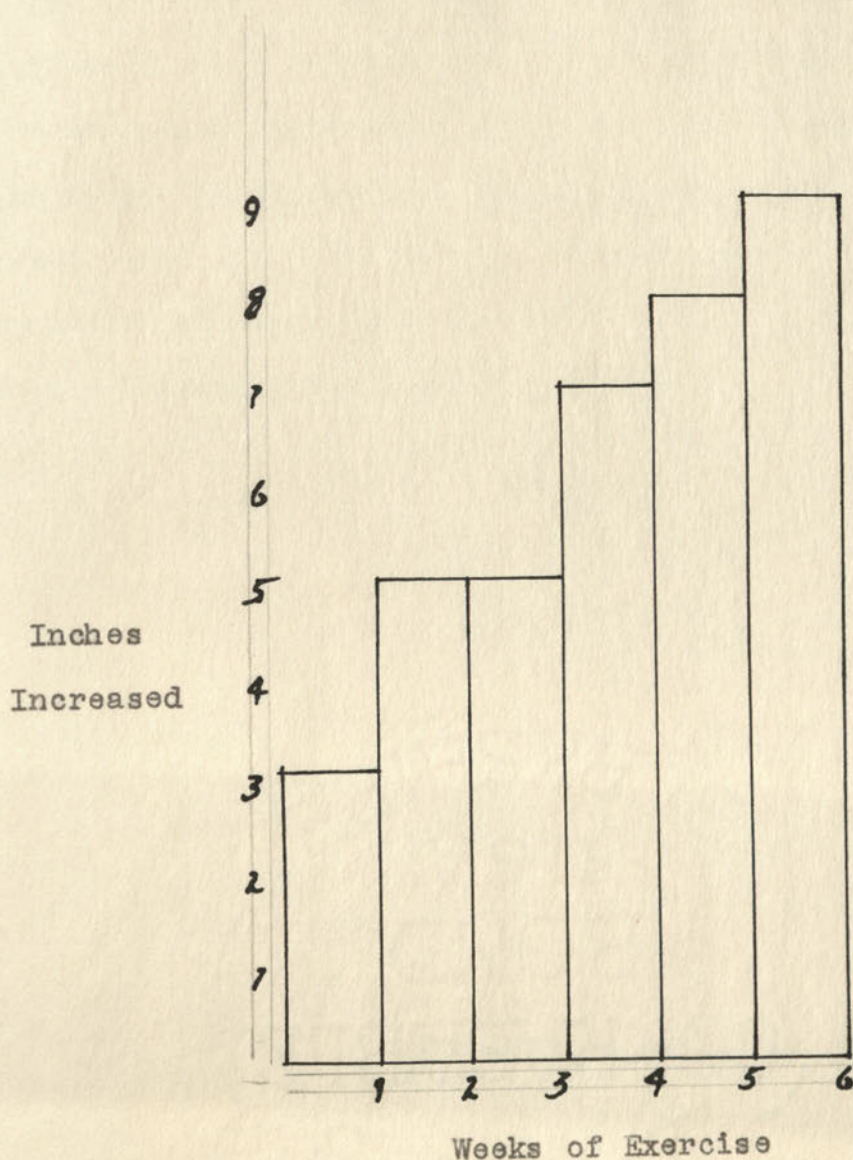
TABLE II

PROGRESS GRAPH OF INCREASE IN VERTICAL
JUMPING ABILITY

Subject No. 1

Subject's jumping ability before exercise program 9 feet
10 inches.

Subject's jumping ability after exercise program 10 feet
7 inches.



Subject No. 1

The subject is a well built boy, six feet one inches tall and weighs one hundred seventy pounds. He is one of the better basketball players on the team due to his all-round play. The exercise program increased his vertical jumping by nine inches. The first week showed a three inch increase, two inches were added the second week, two more inches the third week and one inch each for the next two weeks. The six week exercise program ended with an increase which might have continued had the exercise program also continued. See Table No. 2 page 11.

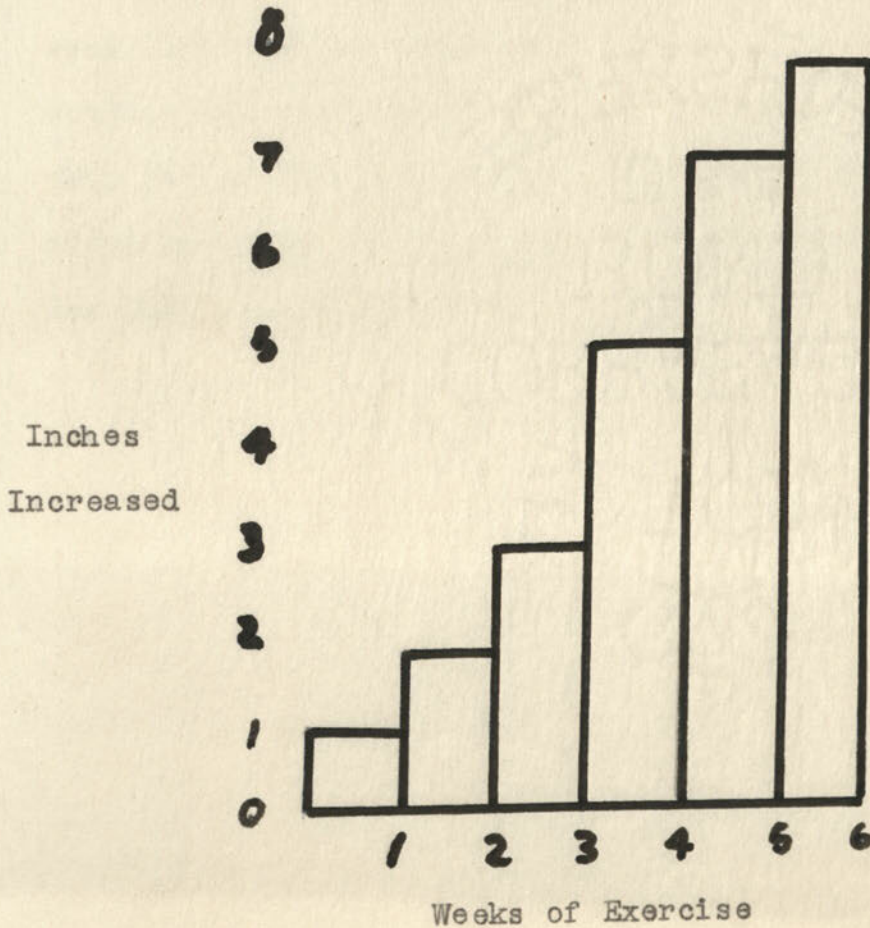
TABLE III

PROGRESS GRAPH OF INCREASE IN VERTICAL
JUMPING ABILITY

Subject No. 2

Subject's jumping ability before exercise program 9 feet
8 inches.

Subject's jumping ability after exercise program 10 feet
4 inches



Subject No. 2

The subject is a well built high school athlete, five feet ten inches tall and weighs one hundred fifty-five pounds. He is a quarter-back on the football team, and is currently the state champion hurdler in class AA. The subject added eight inches to his jumping ability through the exercise program. He has a very strong looking pair of legs. The subject showed a steady increase in jumping ability of one inch per week, every week except the fourth week, in which he showed an increase of two inches. The subject was still increasing at the end of the six weeks thus indicating that continuance of the exercise program might have led to still more increased jumping ability. See Table No. 3 page 13.

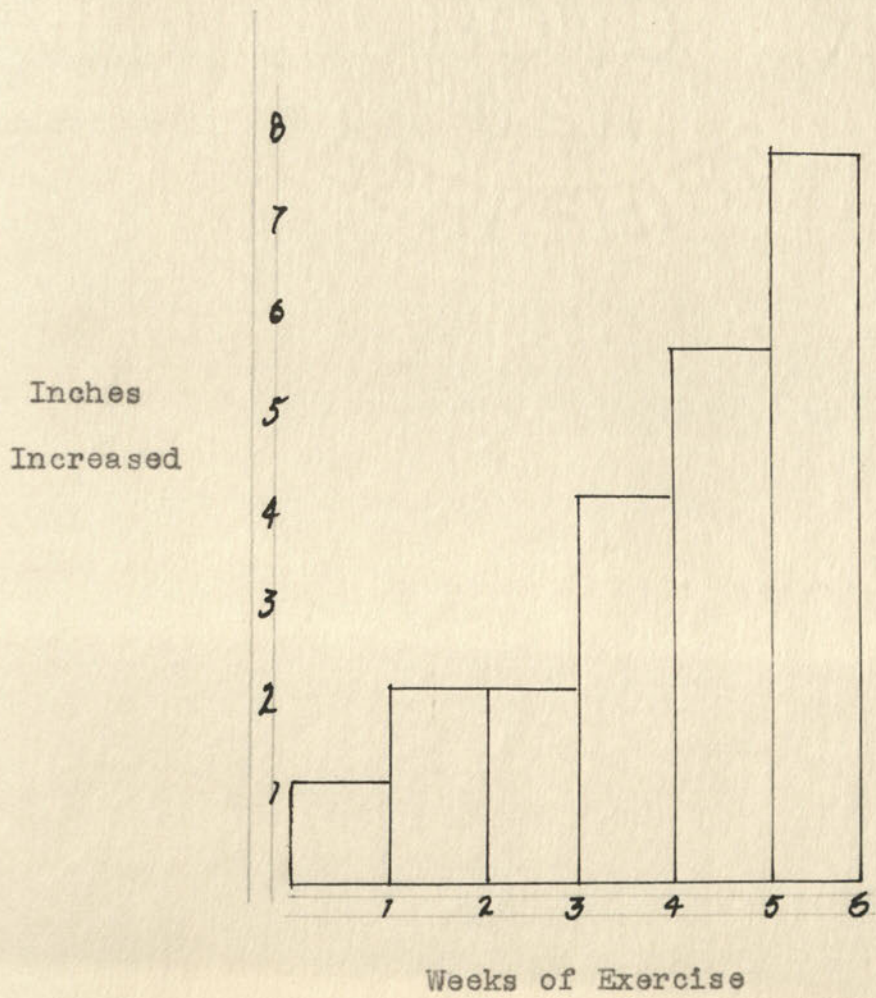
TABLE IV

PROGRESS GRAPH OF INCREASE IN VERTICAL
JUMPING ABILITY

Subject No. 3

Subject's jumping ability before exercise program 9 feet
8 inches.

Subject's jumping ability after exercise program 10 feet
4 inches.



Subject No. 3

The subject is a slender looking boy who weighs one hundred forty pounds and stands five feet eight inches tall. The subject is a sprinter on the track team and has fast reaction time. The exercise program increased his jumping ability five inches. A plateau was reached the second and third week and an increase of one inch in fourth but two inches were increased in the fifth. The subject's jumping ability was still increasing, at the end of the sixth week. See Table No. 4 page 15.

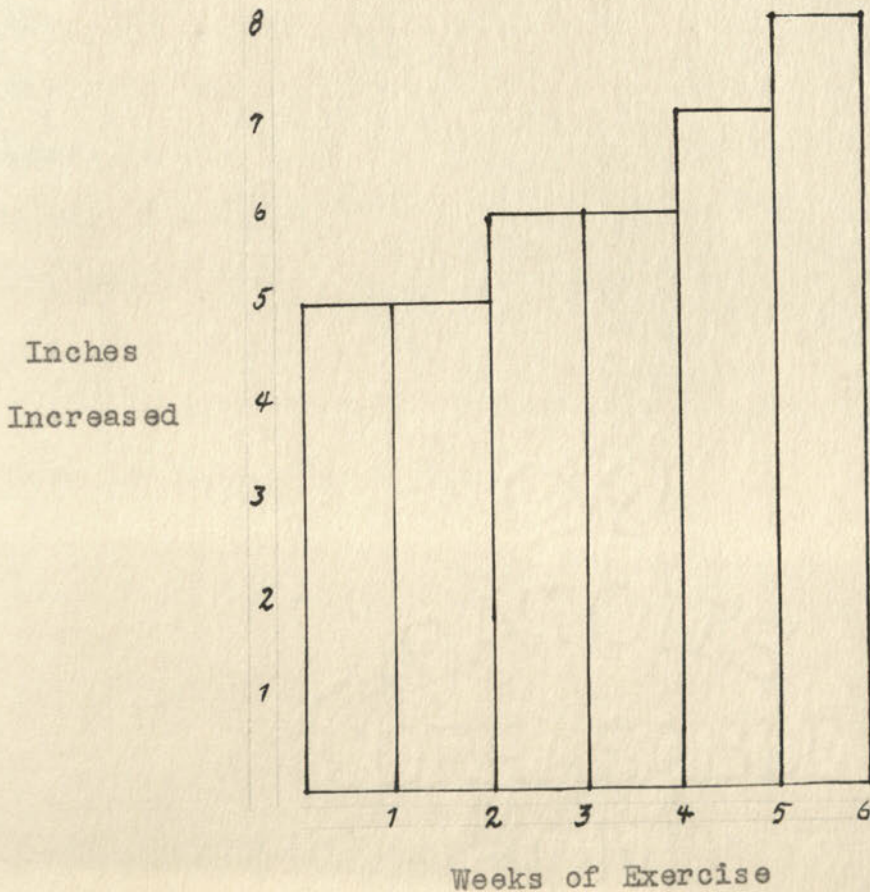
TABLE V

PROGRESS GRAPH OF INCREASE IN VERTICAL
JUMPING ABILITY

Subject No. 4

Subject's jumping ability before exercise program 10 feet
1 inch.

Subject's jumping ability after exercise program 10 feet
9 inches.



Subject No. 4

The subject is a very large and strong boy. He is six feet five inches tall and weighs two hundred and twenty-five pounds. He was a very clumsy boy before he started playing basketball a year ago and had very little jumping ability. He has very powerful legs with which he probably gained in playing his tackle position on the football team but, had little coordination for jumping. The program added three inches to his vertical jumping ability. He reached a plateau the first and second week and the third and fourth week. An increase of one inch was added for the fifth and one inch was added for the sixth week. The subject was still increasing at the end of the six weeks but it is thought he would have increased much more than another inch if the program had continued for a few more weeks because the weights used seemed to have been too light. See Table No. 5 page 17.

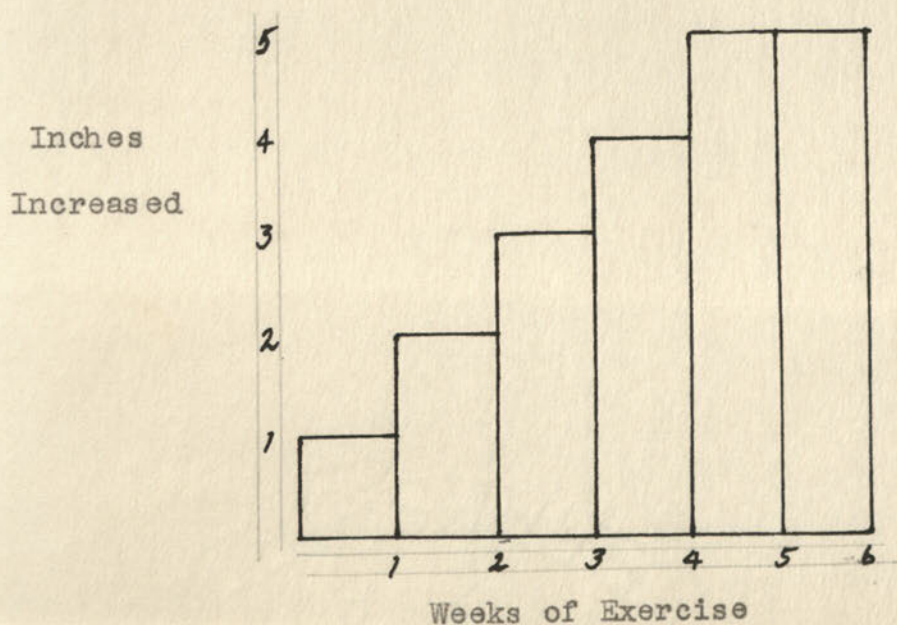
TABLE VI

PROGRESS GRAPH OF INCREASE IN VERTICAL
JUMPING ABILITY

Subject No. 5

Subject's jumping ability before exercise program 9 feet
7 inches.

Subject's jumping ability after exercise program 10 feet.



Subject No. 5

The subject is a well developed athlete, five feet eight inches tall and weighs one hundred and thirty-nine pounds. He is a track man and football player as well as a basketball player. He increased one inch each week for the first five weeks and reached a plateau the fifth and sixth weeks. This could be an indication that the subject had reached his peak in the six week period. See Table No. 6 page 19.

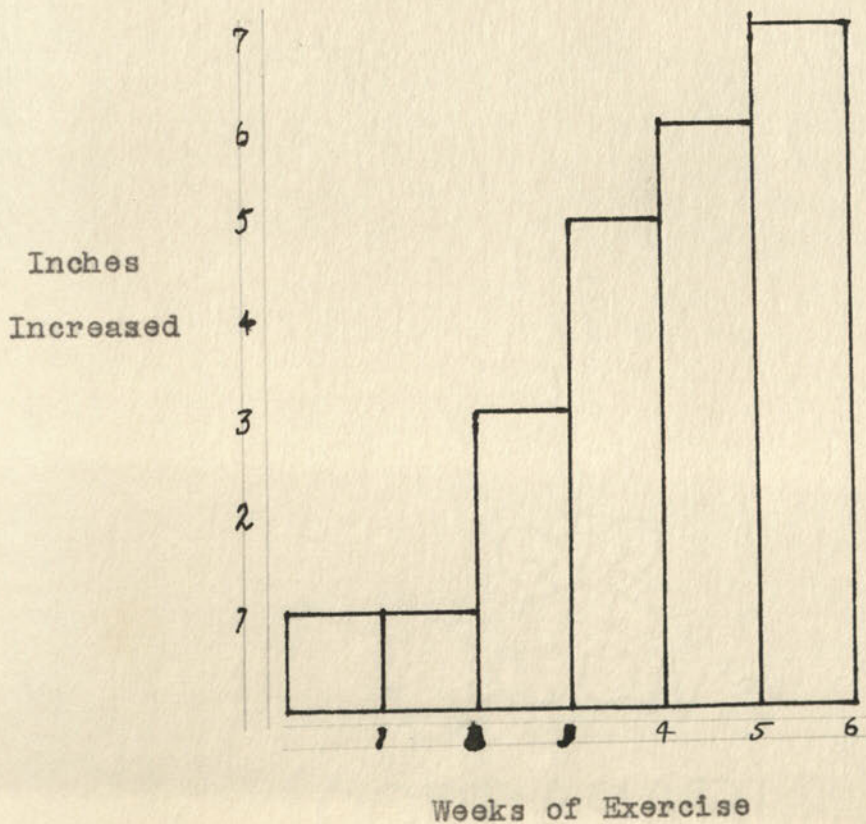
TABLE VII

PROGRESS GRAPH OF INCREASE IN VERTICAL
JUMPING ABILITY

Subject No. 6

Subject's jumping ability before exercise program 9 feet
4 inches.

Subject's jumping ability after exercise program 9 feet
11 inches.



Subject No. 6

The subject is a small built, five feet seven inches tall and weighs one hundred and twenty-one pounds. Basketball is his only sport. He increased one inch the first week, reached a plateau the second week, increased two more inches the third week, two in the fourth and one each in the fifth and sixth. The subject increased his vertical jumping ability seven inches during the six week period and was still improving at the end of the exercise program. See Table No. 7 page 21.

TABLE VIII

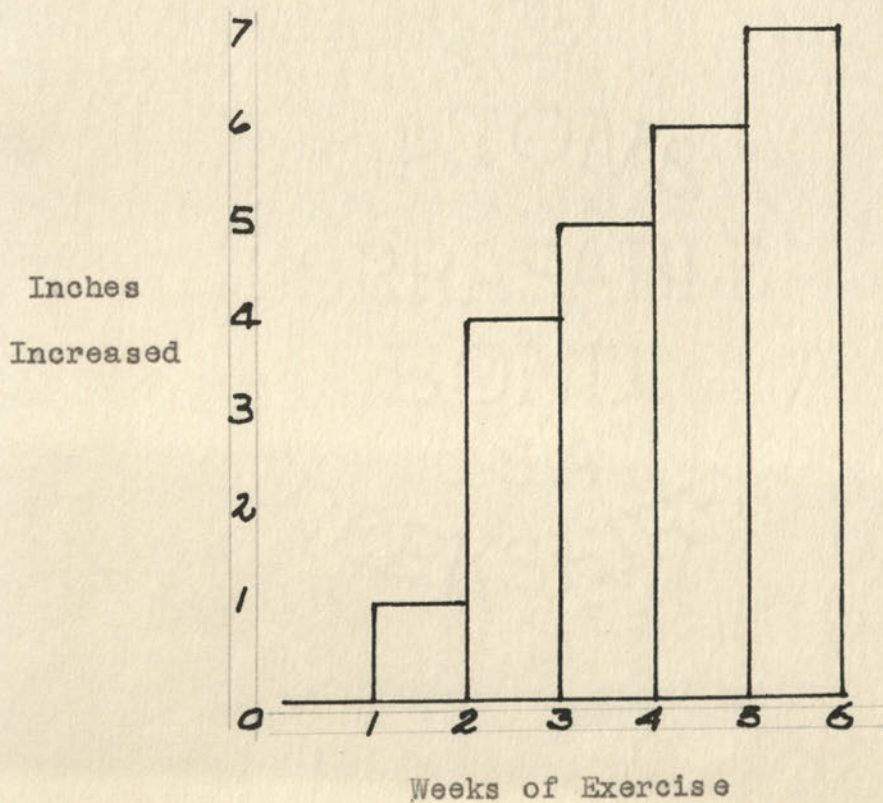
PROGRESS GRAPH OF INCREASE IN VERTICAL
JUMPING ABILITY

Subject No. 7

Subject's jumping ability before exercise program 9 feet
6 inches.

Subject's jumping ability after exercise program 10 feet
1 inch.

7



Subject No. 7

The subject is a well built high school athlete, five feet seven inches tall and weighs one hundred and forty pounds. He is a well developed boy for his size and is a good football player. The subject is a very hard working athlete which shows on his graph. The subject's vertical jumping ability increased one inch the first week, three inches the second and one inch each for the next four weeks. There was an eight inch increase at the end of the six weeks and he was still improving. A longer exercise program probably would allow this boy to continue to improve his vertical jumping ability. See Table No. 8 page 23.

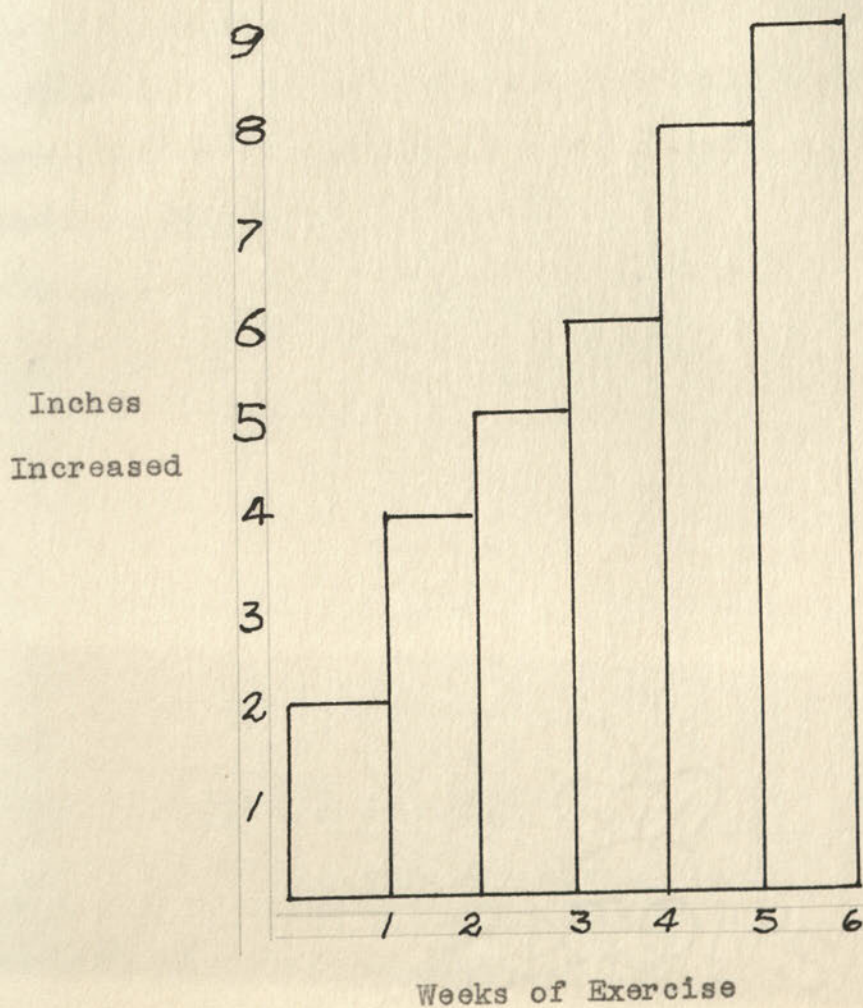
TABLE IX

PROGRESS GRAPH OF INCREASE IN VERTICAL
JUMPING ABILITY

Subject No. 8

Subject's jumping ability before exercise program 9 feet
4 inches.

Subject's jumping ability after exercise program 10 feet
1 inch.



Subject No. 8

The subject is a small built athlete, five feet seven inches tall and weighs one hundred twenty-nine pounds. He has very fast reaction time, runs on the track team and is a outstanding basketball player for his size. The subject works very hard to compensate for his size. As indicated on the subject's graph the subject increased three inches the first, three inches the second, one inch the third and fourth weeks, two more inches the fifth and one the sixth week. The subject indicated that a continuation of the exercise program might have led to still more increased jumping ability. See Table No. 9 page 25.

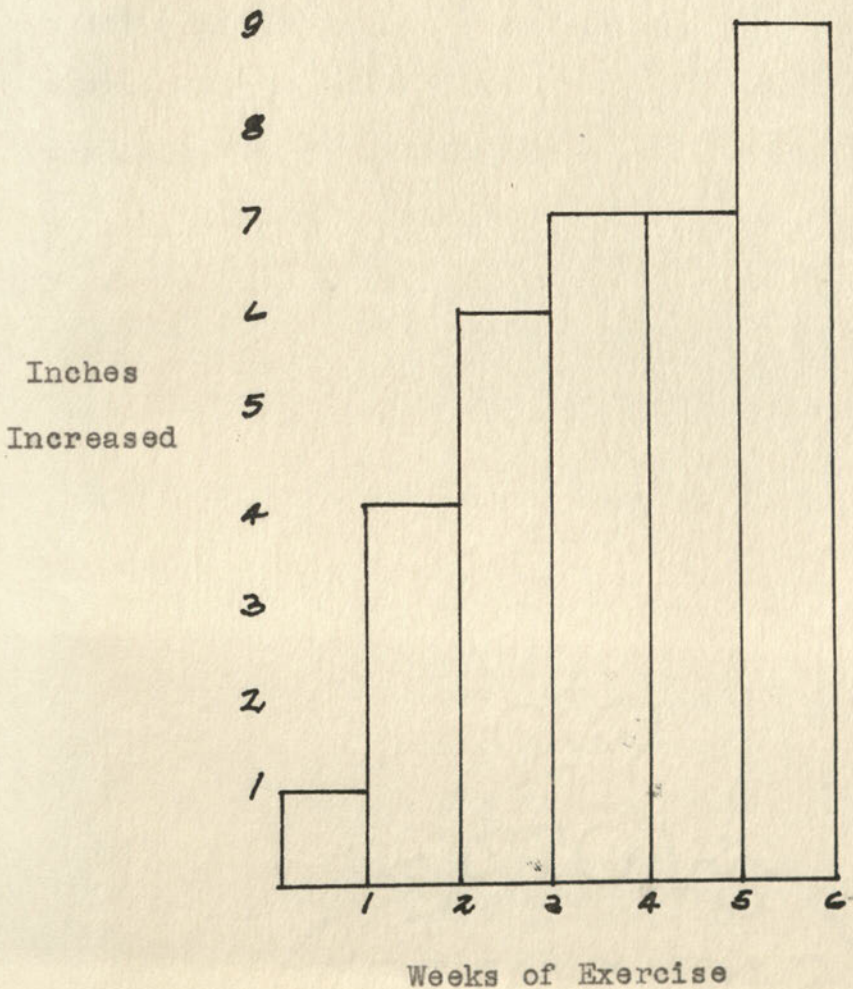
TABLE X

PROGRESS GRAPH OF INCREASE IN VERTICAL
JUMPING ABILITY

Subject No. 9

Subject's jumping ability before exercise program 9 feet
6 inches.

Subject's jumping ability after exercise program 10 feet
3 inches.



Subject No. 9

The subject is a slender built type athlete, five feet eleven inches tall and weighs one hundred and forty-two pounds. Basketball is his only sport. The subject showed a two inch increase the first week, three inches the second week, two inches the third, reached a plateau the fourth and fifth and two inches the final week making a total of nine inches for the six week period. Continuance of the program more than likely is also indicated for this subject. See Table No. 10 page 27.

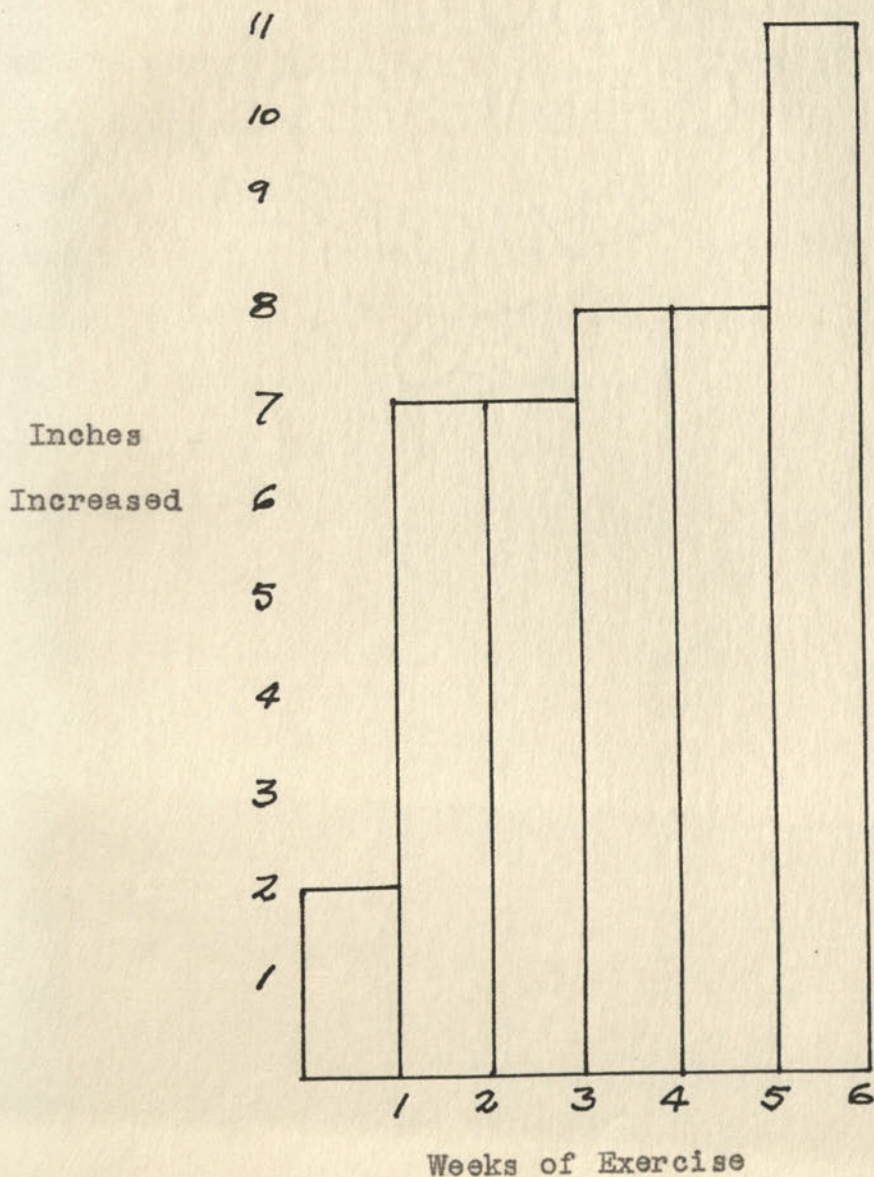
TABLE XI

PROGRESS GRAPH OF INCREASE IN VERTICAL
JUMPING ABILITY

Subject No. 10

Subject's jumping ability before exercise program 9 feet
4 inches.

Subject's jumping ability after exercise program 10 feet
2 inches.



Subject No. 10

The subject is the most unusual of the ten subjects. The subject was crippled from a childhood foot injury. He is a slender built athlete, five feet nine inches tall and weighs one hundred and twenty-nine pounds, who walks with a slight limp. He has a strong determination to become a good athlete. As shown by his graph he showed the greatest increase in vertical jumping ability of all the subjects used in the program. The first week showed an increase of three inches, the second week showed an unusual eight inch increase which was followed in a plateau the third week, increased another inch the fifth week and increased three more inches the sixth week which made a total increase of twelve inches for the six week exercise program thus indicating that a continuance of the program might have led to still more increased jumping ability. See Table No. 11 page 29.

Chapter V

SUMMARY

A study to determine if vertical jumping ability could be increased through a weight training exercise program was conducted. The exercise program was conducted three days per week, for six consecutive weeks. At the end of six weeks it was found that the ten subjects had increased their jumping ability a total of seventy-nine inches. The difference between the mean of the groups jumping ability at the start of the study and the mean of the groups jumping ability at the end of the study was statistically significant above the .001% level.

Chapter VI

CONCLUSIONS

1. It was definitely established that the weight training program used in this study definitely increased vertical jumping ability. This fact was statistically significant at the .001% level.

2. The results indicated that continuation of this type of program would probably lead to further increase in vertical jumping ability.

RECOMMENDATIONS

1. That a exercise program of the type used in this study be continued until the jumping ability of all subjects does not increase for at least three consecutive weeks.

2. That a weight training program for this same purpose be instituted in which the weights used in the program were progressively increased.

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