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## **Experimental report of light weighted shoes**

Research title:

Energy consumption of 30-minute walk  
with light weighted shoes

Reporter

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### Research Purpose:

Investigation of energy consumption in putting on light weighted shoes (manufactured by Miyata corporation, Muscle Trainer, one shoe for male: 1.4 kg, shoe for female: 1.2 kg) and continuing treadmill walking for 30 minutes and description of difference of exercise intensity between treadmill walking and walkway walking

### Research Method:

Testee: 6 Young men and women in total (3 men and 3 women). Figure 1 shows the physical features of testees.

#### Trial

##### (1) Treadmill walking

30-minute treadmill walking was performed at a speed of 100 to 110 meter/min by men and 80 to 90 meter/min by women, respectively, and then their oxygen intake and heart rate were measured.

##### (2) Walkway walking

Testees walked in level ground at a quick pace for 2 kilometers and then their heart rate and walking pace were measured.

#### Measuring Item

##### (1) Oxygen intake

In treadmill walking, oxygen intake was measured every minute using the gas analyzer (manufactured by Minato Medical Science Co., Ltd), and consumed calorie at 30-minute walk was estimated as 5 kcal of energy consumption per one liter of oxygen.

##### (2) Heart rate

Heart rate at treadmill walking and walkway walking was recorded every minute using the heart rate monitor (manufactured by Polar), and the difference in exercise intensity between treadmill walking and walkway walking was compared on the basis of the change of heart rate at walking.

### Result

## 1) Oxygen intake at treadmill walking

### (1) Result in all testees

Figure 1 shows the change of oxygen intake per minute at treadmill walking in men and women severally, on the basis of the test results of 3 men and 3 women. In men, the oxygen intake was about 1500 ml/min in the first half of treadmill walking when their walking speed was 100 meter a minute and reached about 2000 ml/min in the latter half when their walking speed was about 110 meter/min. Meanwhile, in women, the oxygen intake was about 1200 ml/min in the first half of walking when their walking speed was 80 meter/min and reached about 1300 ml/min in the latter half when their walking speed was 90 meter/min.

Figure 2 shows energy consumption into which this oxygen intake per minute was converted. In men, energy consumption was about 8 kcal per minute in the first half of walking and about 10 kcal a minute in the latter half of walking, respectively. In women, energy consumption was about 6 kcal a minute in the first half and about 7 kcal a minute in the latter half, respectively.

Then, based on these results, the first half of treadmill walking was defined as about 10 minutes from 5 minutes later to 15 minutes later since walking started, and the latter half of walking was defined as 10 minutes from 20 minutes later to 30 minutes later since walking started. The average oxygen intake per minute and the energy consumption per minute were estimated in each time. This estimation is shown in Table 2.

Men's energy consumption reached 10.1 kcal/min in treadmill walking, whose speed was 110 meter/min. If they had walked for 30 minutes at this speed, their energy consumption would have reached 303 kcal/min or more.

### (2) Result in individual testee

Figure 3 and 4 show the change of the oxygen intake in treadmill walking in 3 male testees and 3 female testees, each. When the first half and the latter half of treadmill walking are compared, it is found that men's oxygen intake tended to remarkably increase due to their increase of walking speed. Meanwhile, women's increase of oxygen intake was less remarkable in comparison with men. It is considered that men walked at 110 meter/min close to the limit speed, and their oxygen intake increased remarkably, meanwhile, women walked at slower speed than the limit speed, and their oxygen intake didn't increase so much.

And, in both men and women, remarkable individual variation was shown in oxygen intake during treadmill walking. It seems that this was affected by individual difference of not only physique such as height and weight but also discipline among testees.

## 2) Comparison of heart rate at treadmill walking and walkway walking

Table 3 shows the time required and the average walking speed when 3 men and 3 women performed walkway walking for 2 kilometers. Men's walking speed ranged from 113.4 to 120.7 meter/min and the average speed of 3 men was 118.5 meter/min. Women's walking speed ranged from 97.7 to 105.1 meter/min and the average speed of 3 women was 100.7 meter/min. In both men and women, the average walking speed of walkway walking was higher than that of treadmill walking.

Figure 5 and 6 shows the comparison of the change of heart rate in treadmill walking and walkway walking in men and women severally, based on the experimental result of 3 men and 3 women. Men's heart rate was about 120 per minute in walkway walking, about 110 per minute in the first half of treadmill walking, and about 130 per minute in the latter half, respectively. Although the walking speed of walkway walking was higher than that of treadmill walking in the latter half, their heart rate in walkway walking was lower. Women's heart rate was about 130 per minute in walkway walking, about 115 per minute in the first half of treadmill walking, and about 130 per minute in the latter half, respectively. In women, although the walking speed of walkway walking was higher than that of treadmill walking in the latter half, their heart rate changed scarcely.

It seems that these results were affected by the difference of walking operation and muscular workload against lower limbs between treadmill walking and walkway walking. More investigation is required in this regard.

Figure 7 to 12 show the variation of heart rate of 3 male testees and 3 female testees at treadmill walking and walkway walking. In both male testee and female testee, when the speed of walkway walking was about 10 meter/min higher than that of treadmill walking, the heart rate at walkway walking and treadmill walking was nearly the same. As shown in Figure 7, the walking speed of the male testee R.G. was 113 meter/min at walkway walking, and his heart rate was nearly the same as that at treadmill walking of 100 meter/min. As shown in Figure 8, the walking speed of the male testee T.S. was 121 meter/min at walkway walking, and his heart rate was nearly the same as that at treadmill walking of 110 meter/min. As shown in Figure 9, the walking speed of the male testee C.K. was 116 meter/min at walkway walking, and his heart rate was remarkably lower than that at treadmill walking of 110 meter/min and a little higher than that at treadmill walking of 100 meter/min.

In women, similar trend is shown. As shown in Figure 10, the walking speed of the testee I.A. was 98 meter/min at walkway walking, and her heart rate was nearly the same as that at treadmill walking of 90 meter/min. The walking speed of the testee R.T. was 105 meter/min at walkway walking, and his heart rate was a little higher than that at treadmill walking of 90

meter/min. The walking speed of the testee H.S. was 99 meter/min at walkway walking, and her heart rate was nearly the same as that at treadmill walking of 90 meter/min.

In conclusion, in every testee, when the speed of walkway walking was about 10 meter/min higher than that of treadmill walking, the heart rate during walkway walking and treadmill walking was nearly the same. It seems that this result was affected by the difference of walking operation and muscular movement of lower limbs between treadmill walking and walkway walking. More investigation is required in this regard.

## Conclusion

The purpose of this study is the investigation of energy consumption in putting on light weighted shoes (one shoe for male: 1.4 kg, shoe for female: 1.2 kg) and performing 30-minute treadmill walking and the description of difference of exercise intensity between treadmill walking and walkway walking. The conclusion is as follows.

- 1) When men put on light weighted shoes and performed treadmill walking at 110 meter/min close to the limit speed (quick pace) for 30 minutes, their energy consumption reached 300 kcal or more.
- 2) When women put on light weighted shoes and performed treadmill walking at 90 meter/min close to the limit speed (quick pace) for 30 minutes, their energy consumption was about 200 kcal.
- 3) The heart rate at treadmill walking and walkway walking was compared. When the pace at walkway walking was about 10 meter/min higher than that at treadmill walking, both heart rates were nearly equal. In conclusion, even if the pace at walkway walking is equal to that at treadmill walking, the exercise intensity at walkway walking is lower.

**Effects of Walking Program with Light-weighted Shoes  
in Middle and High-aged Women**

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## Abstract

The purpose of this study is the investigation of the physical effects of the walking program with light weighted shoes in middle-aged women. The testees are 5 female university students and 4 middle and high-aged women. The walking program with light weighted shoes (one shoe: 1.2 kg) for at least 3000 steps or for at least 30 minutes every day was continued continually for 8 weeks. The heart rate in 10-minute walking at 80 meter/min was measured, and the difference of rating of exercise intensity at walking between with light weighted shoes and with usual sports shoes (one shoe: 400 gram) was observed. The physical and muscular effects of this program were estimated, on the basis of 7 items of physical fitness tests and 6 items of muscular tests before and after the walking program.

In conclusion, the heart rate at walking with light weighted shoes was 10 to 20 % higher in comparison with walking with usual sport shoes. The effects of all items of physical fitness tests and muscular tests were not improved before and after the program on the average. However, the forward bending with standing and maximal leg flexor of almost all the testees were improved. This study suggested that walking with light weighted shoes increase energy consumption and 8-week walking program with light weighted shoes improve waist's flexibility and thigh's flexor in middle and high-aged females.

## 1. Preface

Lately, light weight training is popular among young and middle and high-aged people on ground that training with light weight in hands or ankles such as dumbbell exercise and weight walking increase muscle and energy consumption. However, it seems that its physical effect has not been verified with scientific data.

There are some reports of exercise intensity and energy consumption for training with light weight in hands, wrists or ankles. However, the reports of the physical effects of continual light weight training for fixed time, including Blessing's report of aerobics dancing, are very few.

When light weight training is performed continually in daily life, weight in both hands restricts both hands' movement and functions, and putting on and off weight in wrist or ankle is complicated and troublesome. Meanwhile, if shoe used at walking becomes weight, this problem will be solved.

In this study, special light weighted shoes which have metal particles with fixed weight in the sole were manufactured for experiment. Walking program with light weighted shoes was continued every day for 8 weeks. Young and middle and high-aged women were selected as testee of the program. The program's effect on their physical strength and muscular power was investigated.

## 2. Method

### 2.1 Testee

4 middle- and high aged housewives who participate in weekly exercise class for health (hereafter, referred as housewife group) and, for comparison, 5 healthy female university students who don't take part in special sports usually (hereafter, referred as student group) as testee.

We explained the main point of this experiment such as the measurement of physical strength and the walking program and its accompanying risk to the testees, and then they agreed to the experiment. Table 1 shows the physical features of the testees.

### 2.2 10-minute walking test

To know exercise intensity by walking with light weighted shoes (weight: 1.2 kg, referred as weighted shoes), 10-minute walking test in which walking at fixed speed is performed for 10 minutes was performed in advance of walking program. In this test, light weighted shoes or usual sports shoes (weight: 400 g, referred as usual shoes) were used, and the change of the testees' heart rate was measured.

The change of heart rate in 10-minute walking at 80 meter/min in the running course of a gymnasium (course length: 110 meter) was measured with the heart rate monitor (manufactured by Polar, VantexXL type). Walking speed was kept up by tracing the light of pace maker positioned in the course.

The change of heart rate in 10-minute walking test was also measured after the walking program.

### 2.3 Light-weight walking program

In walking program with the light weighted shoes (hereafter, referred as light weight walking program), walking of at least 30 minutes per day, or walking of at least 3000 steps per day was performed in usual life every day for 8 weeks. Minimal walking time and walking step per day was made 30 minutes and as 3000 steps, respectively, by referring to Hamazaki's report that walking of 30 minutes or 3000 steps is equivalent to about 100 kcal.

Total step per day in light weight walking program was measured using the pedometer (manufactured by Yamasa, AS-150W type) mounted in testee's waist and the testees recorded the time for which they mounted the pedometer.

The program was performed for 8 weeks from the middle of May to the middle of July.

### 2.4 Decision of physical effect

The physical effect of light weight walking program was measured about the following items before and after the program.

(1) Shape measurement: height, weight, body fat percentage

(2) Physical fitness test: grasping power, back strength, forward bending with standing, standing on one leg and shutting one eye, vertical jump, breathing capacity, estimated maximum oxygen intake

(3) Muscular test: shoulder press, pull down, chest press, rowing, leg extension, leg curl

Body fat percentage was measured with impedance method. Estimated maximum oxygen intake was measured on the basis of the estimation of maximum loading test with the cycle ergometer (manufactured by Combi corporation). Muscular test was performed using hydraulic muscular measuring instrument (manufactured by HYDRA, total energy).

The physical effect was decided with the relevant student test using the difference of average measured values of the test items before and after the walking program.

### 3. Result

#### 3.1 10-minute walking test

Figure1 shows the change of the average heart rate at 10-minute walking test with usual shoes and weighted shoes in the student group. The value for usual shoes and weighted shoes (first half) was the one before the walking program, and the value for weighted shoes (latter half) was the one after the 8-week program.

The average heart rate at walking was 100 to 105 per minute for usual shoes and about 120 per minute for weighted shoes, respectively. Well, the increase rate was about 20 per minute (15 to 20 %). The average heart rate for weighted shoes was about 110 to 115 per minute after the program, and decreased by 5 to 10 per minute (4 to 8 %) in comparison with the one before the program.

Figure 2 also shows the similar trend in the housewife group. The housewife group's average heart rate was about 105 per minute for usual shoes and 115 per minute for weighted shoes, respectively. Well, the increase rate was about 10 per minute (10 %). The average heart rate for weight shoes was about 105 per minute after the program and decreased by about 10 per minute (10 %) in comparison with the one before the program.

If the data of Health Science Center is used as index, the exercise intensity of walking with weighted shoes before the program was equivalent to 40 to 50 % of the maximum oxygen intake in the student group, and equivalent to 50 to 60 % of the maximum oxygen intake in the

housewife group, respectively.

### 3.2 Amount of exercise for light weighted walking

The average step number and wearing time a day for weighted shoes in the student group and the housewife group is as follows. The student group's step number was an average of 6500 or more a day and the housewife group's one was an average of about 3800 a day, respectively. Well, the student group's step number was noticeably larger ( $p < 0.05$ ). The student group wearing time was an average of about 5 hours a day and the housewife group's one was an average of about 1 hour a day, respectively. Well, the student group's wearing time was noticeably more ( $p < 0.05$ ). The student group's average step number and wearing time a day was remarkably higher in comparison with the housewife group, because the student group always wore the weighted shoes to go to university.

### 3.3 Result of physical fitness test

Table 2 shows the result of the physical fitness tests in the student and housewife group before and after light weight walking program.

In both the student group and the housewife group, there was not much difference, on the average, in the result of the items such as body fat percentage, grasping power, back strength, forward bending with standing, standing on one leg and shutting one eye, vertical jump, breathing capacity, and estimated maximum oxygen intake before and after the program. However, as shown in Figure 3, the result of forward bending with standing was higher after the program in comparison with the result before the program in all the testees of the student group and the housewife group. And, there was much difference among individuals in the measured value of forward bending with standing in both groups.

### 3.4 Result of muscular test

Table 3 shows the result of the muscular tests in the student and housewife group before and after light weight walking program.

In both the student group and the housewife group, there was not much difference, on the average, in the result of the items such as shoulder press, pull down, chest press, rowing, leg extension, leg curl, before and after the program.

However, as shown in Figure 4, the result of leg curl was higher after the program in comparison with the result before the program in all the testees of the student group and the housewife group excluding the testtee M.K. in the housewife group. And, there was also much difference among individuals in the measured value of leg curl.

#### 4. Consideration

It is known that energy consumption of walking with light weight in hands or wrists is higher than that of walking without weight.<sup>1,2)</sup> Meanwhile, according to some reports, as for walking with light weight in both hands or wrists, walking with both hands extended doesn't cause the change of energy consumption, but walking with elbows bent by 90 degrees and both hands waved increases energy consumption.<sup>3,4)</sup>

In walking with weight in hands or wrists, waving hands influences on energy consumption much. However, it seems that walking with weighted shoes in this study is unlikely to cause the change of energy consumption by the difference of walking style in comparison with walking with weight in hands or wrists.

According to the result of 10-minute walking test in this study, the average heart rate at walking with weighted shoes was higher by 10 to 20 per minute in comparison with walking with usual shoes and the increase rate was 10 to 20 %.

Bruce performed the experiment mentioned below.<sup>8)</sup> 7 female testees walked at various speeds with sports shoes (average weight: 514 ± 50 g ) or military leather shoes (average weight: 1,371 ± 104 g) and then their oxygen intake was measured. According to his report, oxygen intake at walking with leather shoes noticeably increased in comparison with walking with sports shoes, and the increase rate of energy consumption was 1.0 % per weight increase of 100 g.

We can't discuss the increase rate of the average heart rate at walking with weighted shoes as the same term as the case of oxygen intake. However, the weight addition of about 800 g in usual shoes increased exercise intensity by 10 to 20 %.

According to the result of 10-minute walking tests before and after light weight walking program, the 8-week walking program decreased the average heart rate at walking with weight shoes by 4 to 8 % in the student group and by 10 % in the housewife group, respectively. Taking the result of the other physical fitness tests into consideration, it is considered that this decrease of heart rate is not the physical effect of the walking program but the effects such as testee number, measurement method, and practice of measurement.

If the data of Health Science Center is used as index,<sup>7)</sup> the exercise intensity in the light weight walking program in this study was estimated to be equivalent to 40 to 50 % of maximum oxygen intake in the case of the student group and 50 to 60 % of maximum oxygen intake in the case of the housewife group, respectively.

According to the guide of ACSM (American College of Sports Medicine),<sup>9)</sup> when healthy adults perform even low-intensity exercise, whose intensity is equivalent to about 50 % of maximum

oxygen intake, for 30 minutes a day 3 times a week, their oxygen-energy is improved or maintained.

According to Davison and Grant,<sup>10)</sup> many current reports suggest that consecutive low-intensity exercise such as walking be effective for health.

Taking these reports into consideration, the exercise intensity in the light weight walking program in this study was equivalent to about 50 % of maximum oxygen and was low. However, it is suggested that the long continuation of this exercise improve the efficiency of oxygen-work.

According to the results of physical fitness tests before and after light weight walking program in this study, there was not much statistical difference on the average in all items, because it seems that testee number was small and there was much difference among individuals in the measured value.

However, in all the testees, the result of forward bending with standing was higher after the program in comparison with the result before the program.

The main purpose of forward bending with standing is the measurement of the flexibility of dorsal muscles, and it is said that the relaxation of erector spinae muscle and gluteus maximus muscle at measurement trends to effect on the result much.<sup>11)</sup> In terms of electromyogram, it is found that strong electric discharge occurs in dorsal muscles in waist at walking to control trunk's excessive movement toward sincipita every time both legs land on a ground.<sup>12,13)</sup> And, according to some reports, repetitive light contraction of muscles in low limbs such as pedaling bicycle pushes blood in muscles in low limbs to vein side by muscular pump function and prompts the circulation of the blood in the entire body.<sup>14,15)</sup>

Taking these reports into consideration, walking with light weighted shoes causes more strong repetitive contraction in dorsal muscles in waist. As the result, it is considered that muscular blood flow in dorsal muscles increases, and then prompts muscular extension and recovery from weariness, and muscle becomes more flexible.

According to some reports, the failure of flexibility in waist is much related to backache not only in middle and high-aged people but also in young people.<sup>16,17)</sup> Sawada<sup>18)</sup> performed the program mentioned below. The testees were the housewives who suffer from functional disorders of their organs. They performed the physical treatment such as walking, jogging, and swimming for a fixed time. According to his report, as the result, their basic physical strength such as flexibility was recovered and the functional disorders of their organs decreased. Taking these reports considered, it is considered that walking program with light weighted shoes improves the flexibility of dorsal muscles in waist and is effective for the prevention of backache and recovery from backache.

In this study like the physical fitness tests, there was not much statistical difference in the results

of all the items of the muscular tests before and after the light weight walking program, because it is possible that load by walking program with light weighted shoes of 1.2 kg was too little to enhance maximum muscular power.

However, the physical effect was found only in the item of leg curl in all the testees excluding one testee. The purpose of leg curl test is the measurement of the maximum muscular power of leg flexor including biceps femoris.

According to the electromyogram of low limbs in at walking,<sup>19)</sup> in the latter half of swing phase when leg is separated from a ground, strong electric discharge is found in biceps femoris.

In the latter half of swing phase, a leg is swung forwards and a knee reaches maximum extension position before a leg lands a ground.

According to Worrell's report,<sup>20)</sup> when a knee reaches maximum extension position, biceps femoris is contracted strongly eccentrically to control forward waving of a leg. Well, it suggested that light weighted shoes increase the inertia which is generated when forward waving of a leg is controlled, and then the eccentric load against biceps femoris.

Taking these reports into consideration, the light weight walking program in this study increased the maximum muscular strength of thigh flexors, because it is considered that the light weighted shoes increased the inertia which was generated when waving of leg is controlled, and increased eccentric load against biceps femoris.

According to Kaneko's report,<sup>21)</sup> as for aged people's walking, the pace of aged people's walking is slow, not because their step frequency decreases, but because their step length is reduced. Aged people's step length is reduced, because it is considered that the muscular power of biceps femoris to resist inertia which is generated when waving of leg is controlled becomes weak against eccentric load.

According to Okamoto's report,<sup>22)</sup> when aged people walks, the upper part of their body is bent largely, so continual strong electric discharge occurs in gluteus maximus muscle and biceps femoris when a leg is supported at walking. In other words, it is suggested that strengthening of gluteus maximus muscle and biceps femoris reduce the angle of forward bending of upper body at walking.

Taking these reports into consideration, it is considered that light weight walking program enhances the muscular power of leg flexors and then leads to the prevention of low pace at walking and poor posture at walking.

In the light weight walking program in this study, the student group's average step number and wearing time at walking with light weighted shoes was better in comparison with the housewife group, meanwhile, in the physical effect of the walking program, there was scarcely difference in both groups, because it is considered that the housewife group made efforts to walk with quick steps to decide walking time and walk fixed steps in short time and the student group

walked at slow pace regardless of their step number and wearing time. More investigation is required in this regard.

## 5. Conclusion

This study is as follows. The testees were female university students and middle and high-aged housewives. The special shoes for training with light weight (weight: 1.2 kg) in which metal particles are paved were manufactured for trial. In this walking program, the testees put on the light weighted shoes, and then walked at least for 30 minutes or 3000 steps per day. The walking program was continued every day for 8 weeks and then the physical and muscular effects were investigated.

In conclusion, on the basis of the average heart rate at walking, it was found that the exercise intensity at walking with light weighted shoes increased by about 10 to 20 % in comparison with walking with usual sports shoes. As the physical effect of 8-week light weight walking program, the forward bending with standing and maximal leg flexor of almost all the testees including university students and housewives was improved. Taking these effects into consideration, it is suggested the walking program with light weight shoes increase energy consumption at walking and the consecutive execution of this program lead to the effect of the improvement of the flexibility of dorsal muscles in waist and the muscular power of leg flexors.

< 図表の訳 >

No	日本語	英語
< 表 1 >		
1	表 1	Table 1
2	群	Group
3	被験者	Testee
4	年齢 (歳)	Age
5	身長	Height
6	体重	Weight
7	体脂肪率	body fat percentage
8	学生群	Student group
9	平均値	Average
10	標準偏差	Standard deviation
11	主婦群	Housewife group
< 図 1 >		
1	図 1 学生群の 10 分間歩行テスト中における心拍変動の比較	Figure 1. Heart rate of student group in 10-minute walking test
2	心拍数 (拍数 / 数)	Heart rate (per minute)
3	安静時	Standstill
4	時間 (分)	Time (minute)
5	普通シューズ	Usual shoes
6	荷重シューズ (前)	Weighted shoes (First half)
7	荷重シューズ (後)	Weighted shoes (Latter half)
< 図 2 >		
1	図 2 主婦群の 10 分間歩行テスト中における心拍変動の比較	Figure 2. Heart rate of housewife group in 10-minute walking test
2	心拍数 (拍数 / 数)	Heart rate (per minute)
3	安静時	Standstill
4	時間 (分)	Time (minute)
5	普通シューズ	Usual shoes
6	荷重シューズ (前)	Weighted shoes (First half)
7	荷重シューズ (後)	Weighted shoes (Latter half)
< 図 3 >		
1	図 3 各被験者の軽荷重歩行プログラム前後における立位体前屈の比較	Figure 3. Forward bending with standing of testee before and after light weight walking

		program
2	立位体前屈	Forward bending with standing
3	プログラム前	Before program
4	プログラム後	After program
5	学生	Student
6	主婦	Housewife
< 図 4 >		
1	図 4 各被験者の軽荷重歩行プログラム前後におけるレッグカールの比較	Figure 4. Leg curl of testee before and after light weight walking program
2	脚屈曲力	Leg bending
3	プログラム前	Before program
4	プログラム後	After program
5	学生	Student
6	主婦	Housewife
< 表 2 >		
1	表 2 学生群と主婦群の軽荷重歩行プログラム実施前後における体力テストの結果	Table 2 Result of physical test of student and housewife group before and after light weight walking program
2	体脂肪率	Body fat percentage
3	握力	Grasping power
4	背筋力	Back strength
5	体前屈	Forward bending
6	閉眼片足 (秒)	Standing on one leg and shutting one eye (second)
7	垂直跳	Vertical bending
8	肺活量	Breathing capacity
9	学生群	Student group
10	主婦群	Housewife group
11	実施前	Before
12	実施後	After
13	平均値	Average
14	群	Group
15	プログラム	Program
16	( ml/kg/分 )	( ml/kg/minute )
< 表 3 >		

1	表3 学生群と主婦群の軽荷重歩行プログラム実施前後における筋力テストの結果 (kg)	Table 3 Result of muscular test of student and housewife group before and after light weight walking program (kg)
2	ショルダープレス (腕押上げ)	Shoulder press
3	プルダウン (腕引き上げ)	Pull down
4	チェストプレス (腕押し)	Chest press
5	ローイング (腕引き)	Rowing
6	レッグエクステンション (腕伸展)	Leg extension
7	レッグカール (脚屈曲)	Leg curl
8	学生群	Student group
9	主婦群	Housewife group
10	実施前	Before
11	実施後	After
12	平均値	Average
13	群	Group
14	プログラム	Program