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## Differences in Self-Esteem, Body Composition and Lower Extremity Muscle Strength based on The Type of Physical Labor in Middle-Aged Women in Their 50s

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### Abstract

*This study was to find out the differences in self-esteem, body composition, and muscle strength of middle-aged women, and nine physical labor groups were selected as beautification workers at D University in Cheonan, and a total of 17 were selected as non-physical labor groups were 8 full-time housewives living in Cheonan. After selecting the subjects, the subjects arrived 30 minutes before the start of the experiment and completed the self-esteem questionnaire. After taking the stability, the measurement was carried out in the order of body composition, grip strength, and isokinetic muscle function, and the independent sample t-test was conducted. First, middle-aged women's self-esteem according to the type of physical labor was high in the physical labor group in relation to others among the sub-factors. Second, there was no significant difference in body composition according to the physical labor patterns of middle-aged women. Third, there was no significant difference in lower limb isokinetic muscular strength according to the types of physical labor of middle-aged women. Third, there was no significant difference in lower limb isokinetic muscular strength according to the types of physical labor of middle-aged women. The self-esteem according to physical labor is caused by the sense of belonging in the workplace, and the difference between body composition and muscular strength is insignificant. Therefore, it is necessary to introduce a physical activity program to promote self-esteem due to aging and prevent physical deterioration regardless of occupation.*

**Keywords:** Middle-Aged Women, Manual Labor, Self-Esteem, Body Composition, Isokinetic Muscular Strength

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## 1. INTRODUCTION

Middle-aged age is a time when activities are active due to the nature of development, and it is a time when the task of raising children and having a great influence on society, and the family economy is stabilized to pursue hobbies and leisure time as an adult, and to form a personal familiar relationship with the spouse [1].

However, physically after the age of 40, aging is remarkable, reproductive function decreases, leading to menopause, and psychosocial and social changes in life are experienced, which not only show various physical symptoms but also psycho-emotional symptoms such as depression, anxiety, and worthlessness, and cause various health problems [2].

Self-Esteem(SE) refers to the degree to which individuals praise or criticize themselves, indicating whether they feel competent and important, and believe that they are successful and valuable. In other words, it can be said that it is the value of an individual's own judgment about himself.

Changes in body composition appear not only in old age but also in middle age, and muscle mass gradually begins to decrease by 1-2% at the age of 40. The amount of fat decreases after the age of 45, and in particular, the decrease in muscle mass increases from the 50s and decreases by 12-15% over the next 10 years [3]. The decrease in muscle mass is known to be caused by increased oxidative stress, decreased mitochondrial biosynthesis, and decreased sexual hormones [4].

Skeletal muscles tend to decrease by about 1% every year in our body over the age of 30, but after the age of 65, the functional ability of muscles such as muscle strength and power gradually decreases, and the decrease in muscle mass accompanied by a decrease in muscle function due to aging is called sarcopenia [5].

Exercise is recommended to maintain and promote women's health in middle age when chronic diseases and various health problems increase, and it is meaningful to improve physical ability through exercise and prepare for retirement life, and it is necessary to prevent musculoskeletal function decline through exercise. Middle-aged women must maintain their health by reducing body fat and increasing muscle mass through systematic and regular exercise and increasing the body's basic metabolic rate to boost their metabolism [6].

The main cause of physical changes in middle age is the decrease in ovarian hormone (estrogen, progesterone), which causes many physiological changes such as menopause and anemia, and leads to a psychological decrease in desire for achievement and concentration. Such changes lead to loneliness and depression along with osteoporosis due to decreased bone density and circulatory disorders due to decreased physical strength. Therefore, careful health care is required physically and psychologically for the health of middle-aged women.

Through the development, industrialization, and automation of modern science and technology, human life has changed, and the types of jobs are also increasing in the number of jobs that do not require much movement rather than those that require a lot of movement.

Compared to active female workers, women with insufficient physical activity are reported to have a higher incidence of adult diseases such as obesity, and disease factors are highly related to blood cholesterol and cardiopulmonary health, and lack of physical activity in women working in situations is reported to be the main cause of obesity and adult diseases [7, 8]. For women, physical activity has been reported to suppress the development of coronary artery disease, diabetes, high blood pressure, and colorectal cancer and to keep mental health, cardiopulmonary function, bones, muscles, and joints healthy, especially by strengthening muscles and reducing body fat, enabling weight control, and providing happiness, confidence,

and pride by reducing anxiety and depression [9].

As can be seen in many previous studies, the introduction of automatic devices brought about by the development of mechanical civilization showed changes in the quality of housework, but changes in housework hours are insignificant.

Women's domestic activities do not have a meaningful exercise effect, and rather, they cause various side effects by reducing actual physical activity rather than positively affecting women's health, so planned and purposeful physical activity is required.

Previous studies in Korea on middle-aged women focused mainly on middle-aged women's sense of crisis, depression and self-identity, menopause and menopause symptoms, stress and mental health, social support and life satisfaction [10, 11]. On the other hand, it was found that middle-aged women's self-perceived sense of crisis is not higher than expected, and there is a difference in the level of perception of crisis depending on individual characteristics.

Middle-aged women, as wives and mothers, play a pivotal role in providing psychological stability to family members, so the psychological stability of middle-aged women has an important meaning in terms of social life. Therefore, the problem of how middle-aged women cope with and solve temporal changes according to their life cycles affects not only individuals but also the families and surroundings of the parties, so it is necessary to establish a positive self-identity of middle-aged women and support them to wisely overcome physical changes caused by aging.

Accordingly, this study aims to compare the SE, body composition, and muscle strength of middle-aged women according to the type of manual labor to increase the SE and social awareness of middle-aged women and use them as basic data for promoting the mental and physical health of middle-aged women.

## 2. EXPERIMENTS

### 2.1 Subject

The subjects of this study were nine beautification workers in the D University building in Cheonan, a physical labor group, and eight full-time housewives living in Cheonan, a total of 17 people were selected. It was conducted for those who explained the purpose and procedure of the study to the subjects, were familiar with the contents of the study, voluntarily expressed their intention to participate, and signed the consent to participate in the study. In order to achieve reliable results during the study period, it was taught to refrain from physical activity above medium intensity a day before body composition and strength evaluation, and it was guided that it could be stopped at any time by the individual intention of the subject during the evaluation. The characteristics of the study subjects are shown in Table 1.

**Table 1. Physical characteristics of subjects**

Group	Age(yr)	Weight(kg)	Height(cm)	BMI
WG(n=9)	61.67±7.68	59.77±9.24	154.56±3.68	23.78±5.78
NWG(n=9)	58.63±3.96	65.33±10.32	160.38±5.32	25.26±2.51

M±SD, WG: Working Group, NWG: Non-Working Group

## 2.2 Measurement Procedure

### 2.3.1 Self-Esteem Questionnaire

As a result of factor analysis of the sub-areas of SE consisted of a total of 25 questions in four areas: self-respect (5 questions), relationship with others (5 questions), leadership and popularity (6 questions), and SE (9 questions). Table 2 Each question used Likert's 5-point scale. As a result of analyzing the reliability, the Cronbach's  $\alpha$  value of SE is 0.752, and the sub-factor is self-respect ( $\alpha=0.625$ ), relationship with others ( $\alpha=0.650$ ), leadership and popularity ( $\alpha=0.776$ ), SE ( $\alpha=0.692$ ) appeared respectively.

**Table 2. Composition of the questionnaire**

Category	Question	Chronbach's $\alpha$
Self-Respect	1, 2, 3, 7, 15	0.625
Relationship with Others	5, 6, 8, 10, 20	0.650
Leadership and Popularity	9, 14, 18, 19, 24, 25	0.776
Self-Esteem	4, 11, 12, 13, 16, 17, 21, 22	0.692

### 2.3.2 In-Depth Interviews with Self-Esteem

In order to supplement the questionnaire, the research subjects according to physical labor participation were asked to declare factors that positively affect the sense of belonging, competence, and value that constitute SE in the form of personal interviews are shown in Table 3.

**Table 3. Composition of in-depth interview questions**

Key Questions	
Self-Esteem Formation Factor	Career and social life experience
	Relationships with family and co-workers and people around you
	What my family and co-workers think about me
	Awareness of relationships and roles around oneself
	Trying to overcome difficult experiences at work and at home
	The driving force of life
	Changes after employment
	About the difficulties you feel at home and at work
	One's self as a member of one's family or workplace
	Meaning of work in one's family or workplace
Goal or goal in life	

### 2.3.3 Body Composition

A body composition analyzer (Inbody 430, Korea) was used to evaluate body composition. In order to minimize errors in the test results, fasting was performed for 12 hours before measurement, and when measuring before and after, the same clothes were worn and all metals worn on the body were removed. When measuring, the inspector took off his socks, matched his feet with the measurement foot sensor, held both handles lightly, and did not move or speak during the inspection. After the measurement was completed, data from height, weight, body fat percentage (kg), body fat percentage (%), and BMI were used, and muscle mass and weight of the limbs were used to determine the skeletal muscle index (SMI), an indicator of

sarcopenia.

### 2.3.4 Isokinetic Muscle Function

The measurement dynamometer direction was set to 90°, the dynamometer tilt to 0°, the seat direction to 90°, and the seat back tilt to 70-85° to evaluate the constant speed muscle function. The dynamometer and seat were adjusted, the subject's lateral femoral condyle was matched to the center of the dynamometer, and the lever arm was fixed with a strap by adjusting the shin pad to a point 2cm above the ankle joint from the knee joint, which is the strength point. Before the examination, the extent and reference angle of the knee were set, gravity correction was performed, and the examination was repeated five times at 60°/sec.

### 2.3 Statistical Analysis

For the data processing of this study, the average and standard deviation of variables were calculated using the IBM SPSS statistics (ver 22.0) statistical program. A factor analysis was conducted to find out the factor structure inherent in quality of life, SE, and life satisfaction. The principal component analysis (PCA) and Varimax methods were performed, and the factor loading was .50 or higher, indicating each factor well. Independent t-test verification was used to find out the difference in SE, body composition, and isokinetic muscle strength according to physical labor types, and the statistical significance level was  $\alpha = .05$ .

## 3. Results

### 3.1. Self-Esteem

#### 3.1.1 Self-Esteem Questionnaire

SE was significantly higher in the manual labor group in relation to others ( $p=.011$ ). Table 4 shows the mean and standard deviation of SE and independent t-test results according to whether middle-aged women work or not.

**Table 4. Difference of self-esteem**

Category	WG	NWG	t-value	<i>p</i>
Self-respect	13.33±1.87	14.75±1.98	-1.516	0.150
Relationship with others	20.22±1.79	17.00±2.78	2.879	0.011
Leadership and popularity	18.78±1.56	18.00±1.60	1.012	0.328
Self-regard	19.00±0.87	19.50±1.93	-0.705	0.492
Total	71.33±1.80	69.25±4.86	1.200	0.249

M±SD, WG: Working Group, NWG: Non-Working Group

#### 3.1.2 In-Depth Interview of Self-Esteem

The contents summarized by interviewing the factors that have a positive effect on the SE of the subjects are shown in Table 5.

**Table 5. Factors that form self-esteem**

Category	Group	Factor
Sense of belonging	WG	That I'm a member of the company
		When you know it
		When I can recognize that I am a member of the family
	NWG	When neighbors and friends make me feel like a precious person
		When I can recognize that I am a member of the family
		When neighbors and friends make me feel like a precious person
Sense of competence	WG	When you can tell your co-workers about your experience and knowledge
		When you feel healthy compared to your peers
		When my family relies on my help
	NWG	When you feel your child is growing into a right and capable person
		When you give help to people around you
		When you give help to people around you
Sense of value	WG	When my family relies on my help
		When you feel your child is growing into a right and capable person
		When I realize that my family thinks about me and likes me
	NWG	When my co-workers compliment me
		When my neighbors and friends give me compliments
		When I realize that my family thinks about me and likes me
		When my family worries about me
		When my neighbors and friends give me compliments

M±SD, WG: Working Group, NWG: Non-Working Group

### 3.2. Body Composition

Table 6 shows the average and standard deviation of body composition and independent t-test results according to whether middle-aged women work or not. There was no significant difference between groups in the sub-items of body composition, such as weight, BMI, fat mass, body fat percentage, and SMI.

**Table 6. Difference of body composition**

Category	WG	NWG	t-value	p
Weight (kg)	59.77±9.24	65.33±10.32	-1.172	0.259
BMI (kg/m <sup>2</sup> )	23.78±5.78	25.26±2.51	-0.671	0.512
Lean Body Mass (kg)	38.54±4.12	44.45±12.23	-1.369	0.191
Body Fat (%)	34.99±5.04	36.03±4.42	-0.448	0.661
SMI (%)	25.59±1.83	25.96±1.15	-0.493	0.629

M±SD, WG: Working Group, NWG: Non-Working Group

### 3.3. Isokinetic Muscle Function

<Table 7> shows the mean and standard deviation and independent t-test results for the BW peak torque per body weight during constant muscle contraction of the knee joint according to the physical labor of middle-aged women. The peak torque per weight did not show any significant difference between groups in Extension and Flexion exercises. The average power showed no significant difference between groups in the Extension and Flexion exercises. The average power showed no significant difference between groups in the

Extension and Flexion exercises.

**Table 7. Difference of Isokinetic muscle function**

Category	Movement	WG	NWG	t-value	p
Maximum strength per body weight (%)	Extension	133.18±33.17	130.98±28.51	0.146	0.886
	Flexion	70.34±15.78	66.30±13.22	0.569	0.578
Average power (%)	Extension	66.67±17.13	67.15±20.67	-0.053	0.959
	Flexion	38.74±12.66	38.00±15.30	0.110	0.914
Total work (kg)	Extension	66.67±17.13	67.15±20.67	-0.053	0.959
	Flexion	38.74±12.66	38.00±15.30	0.110	0.914

M±SD, WG: Working Group, NWG: Non-Working Group

#### 4. DISCUSSION

This study attempted to find out the differences in SE, body composition, and muscle strength in the forms of manual labor of middle-aged women, and based on in-depth interviews and measurements. SE recognizes one's own values, abilities, and importance, and the higher the level of SE, the more progressive one is in everything, the better interpersonal relationships, and pride and pride in oneself [12]. Previous research said that among the components of SE, belonging is accepted and valued by other members of a group, and that people with high SE develop a smooth social life and an enterprising and energetic life because they think all their lives are valuable and rewarding, and act confidently [13].

As a result of this study, the manual labor group scored significantly higher in relationships with others, which is believed to have been obtained through relationships with various people through workplaces other than families. On the other hand, factors such as self-respect, leadership, popularity, and SE did not differ from non-physical labor groups, which are related to the loss of role of middle-aged women, especially because their children's departure reduces their value and realizes that they inefficiently achieve their set goals through menopause and middle-aged awareness. Therefore, middle-aged women can gain confidence in their relationships with others through work, but it is believed that it is difficult to avoid the loss of SE caused by individual and social changes that appear as they age.

For women, middle age is a period of physical and mental decline and increases in weight and body fat due to low physical activity and decreased estrogen secretion, and decreases in muscle mass and muscle strength [14]. In particular, reduction in physical activity due to sedentary life and lack of exercise is known to be a major cause of degenerative changes caused by aging or chronic diseases [15].

On the other hand, simple labor workers may have a lower risk of developing metabolic syndrome because they have more physical activity than sit-down workers [16]. As a result of this study, there was no significant difference in body composition between the manual and non-physical labor groups, but body weight, BMI, and body fat percentages tended to be low. This is a result of reflecting the work characteristics of the physical labor group with high physical activity, and another study also reported that manual labor workers have higher physical activity than office workers, reducing the incidence of metabolic syndrome [17, 18]. It is also believed to be related to the fact that field workers generally show higher oxygen intake than office workers [19].

Previous reported that the amount of physical activity of environmental beautification workers for

physical workload in various labor-intensive occupations was 10,260 MET·min, significantly higher than the 500-1,000 MET·min recommended by the American Society of Sports Medicine (ACSM) [20]. On the other hand, the skeletal muscle index (SMI) showed that the work intensity of the manual labor group is different from the training form for muscle hypertrophy, suggesting that it is not enough to prevent a decrease in muscle mass due to aging.

Physical changes in middle age lead to a decline in muscle strength and inherently receptive sensory function, and weakening lower limb muscle limits activities such as walking, standing up in a sitting position, and climbing stairs closely related to daily life, and increases the risk of falls due to reduced balance ability [21, 22].

Muscular strength can vary when exposed to a high-physical environment, and previous study investigated the physical strength of the elderly living in rural and urban areas and reported that women living in rural areas had significantly higher muscle strength, which was believed to be due to the need for muscle strength to perform repeated movements such as lifting and carrying objects through manual labor [23].

In this study, there was no significant difference in average power and total day quantity, which indicates peak torque, muscle power, and strength retention ability, which is consistent with the results of previous study who reported that there was no difference between groups in strength, quickness, balance, and flexibility of production workers and office workers [24]. This means that the type of work involving manual labor does not reach the strength and quantity that can prevent the decline of muscle strength factors, and regardless of occupation, it is believed that the introduction of physical activity programs to prevent physical deterioration caused by aging is required.

## **5. Conclusion**

This study sought to find out the differences in SE, body composition, and muscle strength according to the physical labor types of middle-aged women, nine physical labor groups were selected as nine beautification workers at D University in Cheonan, and a total of 17 non-physical labor groups were selected as eight full-time housewives living in Cheonan. After selecting subjects, a SE questionnaire was filled out and in-depth interviews were conducted before the experiment began, and after stabilizing, measurements were conducted in the order of body composition and isokinetic muscle function, and the following results were obtained.

First, middle-aged women's SE according to the type of manual labor was high in the physical labor group in relation to others among the sub-factors.

Second, there was no significant difference in body composition according to the type of manual labor of middle-aged women.

Third, there was no significant difference in lower limb isokinetic muscle strength according to the type of manual labor of middle-aged women.

In summary, SE according to the type of manual labor stems from a sense of belonging in the workplace, and the difference between body composition and muscle strength is insignificant, so it is believed that the introduction of physical activity programs to improve SE and prevent physical deterioration due to aging regardless of occupation is required.



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