Taekwondo Training and Obesity

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Taekwondo training is an effective exercise that can prevent or positively improve obesity. In addition, Taekwondo has value as a lifestyle sport that can contribute to the promotion of human health, not just bounded in the field of martial arts and sports.

Taekwondo | body composition | obesity | Kukkiwon

1. Introduction

Insufficient physical activity was reported as the fourth most important risk factor among the causes of death worldwide [1]. For this reason, Korea has set physical activity goals for all age groups through the 3rd National Health Promotion Plan (HP2020) and is creating various policies and environments to promote physical activity [2]. According to the Korea Centers for Disease Control and Prevention report in 2019, the rate of aerobic exercise among adolescents increased by 3.0% *p* from 10.9% in 2009 to 13.9% in 2018. On the other hand, the rate of aerobic exercise among adults over the age of 19 and older decreased by 9.8% from 58.3% in 2014 to 48.5% in 2017, and the rate of walking among adults over the age of 19 and older decreased by 6.7% *p* from 45.7% in 2007 to 39.0% in 2017 [3]. However, according to the study of Guthold et al. [4], a 2016 survey of 298 schools in 146 countries found that 81.0% of 11–17 year olds were not getting enough physical activity. On the other hand, in the case of Korea, 94.2% of adolescents showed insufficient amount of physical activity, which made Korea recognized as the country with the most insufficient amount of physical activity for adolescents in the world. Since such a decrease in physical activity can cause a decrease in physical strength and muscle mass [5] and an increase in body fat mass, thereby causing metabolic diseases [6], efforts to increase physical activity are required.

Taekwondo is a traditional martial art from Korea and is recognized as a global martial arts and sport with more than 100 million practitioners in 210 countries worldwide [1]. Taekwondo as an exercise has positive effects on the psychological and physiological areas for the growth and development of children and adolescents. In addition, Taekwondo training prevents or positively improves obesity, dyslipidemia, diabetes, hypertension, cerebrovascular, and cardiovascular diseases in adults and the elderly [7][8][9][10]. In addition, it is expected to improve various physical strengths, including aerobic capacity, muscle strength, muscular endurance, flexibility, speed, and agility through the physiological effects of Taekwondo practice [11][12][13][14]. For this reason, Taekwondo is considered suitable as an essential exercise for improving the physical activity of Koreans and preventing and improving various diseases.

2. Taekwondo Training on Body Composition

Since changes in body composition occur throughout the lifespan due to growth, maturation and aging, as well as factors such as diseases and behaviors, it is a representative indicator for determining the level of body development [15]. Observing changes in body composition is an important factor in determining health, disease, exercise, and nutrition. It is also a very important factor in physique and athletic performance [16].

In general, Taekwondo training in Korea consists of 5 sessions per week, 1 h per session [17]. The training period is about 12 weeks, which we present in **Table 1**. Taekwondo exercise consists of 5 min each of warm-up and cool-down routines, followed by 50 min of exercise including basic Taekwondo movements, Poomsae, and Gyeorugi (fighting simulation) as the main exercises. Most taekwondo training centers apply a similar method. Therefore, the effect of taekwondo training in this study has very suitable conditions for meta-analysis.

Table 1. Characteristics of included studies.

Study	Study Type	Frequency (Day/Week)	Participants	Sex	Taekwondo (*n*, Age)		Control (*n*, Age)		Body Composition Method	Outcome Variable
Choi W, 2000 [18]	Thesis	3/24	Elementary student, 40% body fat ↑	M	9	11.78	9	11.89	Skinfold	% Body fat, BMI, Height, Weight
Lee SH, 2008 [19]	Thesis	5/12	Elementary student	M	8	11.1	8	11.1	BIA	% Body fat, Height, Lean mass, Muscle mass, Weight
Lee SW, 2011 [20]	Thesis	5/12	Elementary student	Mixed	8	11.13	8	10.88	BIA	% Body fat, BMI, Height, Lean mass, WC, Weight
Jung SH, 2012 [21]	Thesis	5/12	Elementary student	M	10	10.2	10	10.3	BIA	% Body fat, BMI, Fat mass, Height, Lean mass,

Study	Study Type	Frequency (Day/Week)	Participants	Sex	Taekwondo (*n*, Age)		Control (*n*, Age)		Body Composition Method	Outcome Variable
										Muscle mass, Weight
Lee SJ, 2014 [22]	Thesis	3/16	Elementary student, 25% body fat ↑	M	10	12.6	10	12.7	BIA	% Body fat, BMI, Weight
Lee SH, 2015 [23]	Thesis	5/12	Elementary student	M	9	7.46	9	7.74	BIA	% Body fat, BMI, Height, Lean mass, Weight
Seo DW, 2019 [24]	Thesis	5/12	Elementary student	M	23	10	22	9.67	BIA	Fat mass, Lean mass, Muscle mass, Weight
An SW, 2004 [25]	Thesis	5/12	Adolescent, 30% body fat ↑	M	10	ND	10	ND	BIA	% Body fat, Height, Lean mass, Weight, WHR
Shu DK, 2008 [26]	Thesis	5/12	Adolescent. first menstruation	M	9	12.18	9	12.73	BIA	% Body fat, BMI, Fat mass, Height, Lean mass, Weight
Jung HC, 2014 [27]	Thesis	3/16	Adolescent	M	15	13.9	15	13.9	DXA	% Body fat, BMI, Fat mass, Height,

Study	Study Type	Frequency (Day/Week)	Participants	Sex	Taekwondo (*n*, Age)		Control (*n*, Age)		Body Composition Method	Outcome Variable
										Lean mass, WC, Weight
Kang MG, 2014 [28]	Thesis	3/12	Adolescent, 30% body fat ↑	F	10	ND	10	ND	BIA	% Body fat, BMI, Weight
Moon DS, 2007 [29]	Journal article	5/12	Elementary student	M	12	12.35	12	12.42	BIA	% Body fat, BMI, Height, Lean mass, Weight, WHR
Kim WK, 2009 [30]	Journal article	5/12	Adolescent men, 20% body fat ↑	M	10	14.7	10	15.1	BIA	% Body fat, BMI, Height, Lean mass, Weight, WHR
Kwon YC, 2010 [31]	Journal article	3/12	Elementary student, 25% body fat ↑	Mixed	12	11.92	12	12.5	BIA	% Body fat, BMI, Fat mass, Height, Lean mass, WC, Weight, WHR
Lee SH, 2011 [32]	Journal article	4/10	Adolescent	M	6	16.8	9	16.4	BIA	% Body fat, Muscle mass, Weight
Cho WJ,	Journal article	3/12	Elementary student, BMI 25 kg/m^2 ↑	M	12	11.17	12	11.33	BIA	% Body fat,

Study	Study Type	Frequency (Day/Week)	Participants	Sex	Taekwondo (*n*, Age)		Control (*n*, Age)		Body Composition Method	Outcome Variable
2013 [33]										BMI, Weight
Song JK, 2013 [34]	Journal article	3/12	Adolescent	M	12	14	7	13.9	DXA	% Body fat, Fat mass, Height, Lean mass, Weight
Cho WJ, 2014 [35]	Journal article	3/12	Elementary student, BMI 25 kg/m^2 ↑	M	10	11.77	10	11.51	BIA	% Body fat, Weight
Chea SI, 2016 [36]	Thesis	3/12	Middle-aged women, obesity	F	8	39.25	8	39.7	BIA	% Body fat, Weight
Seo DK, 2016 [37]	Thesis	5/12	Middle-aged women	F	13	42.77	13	42.54	BIA	% Body fat, BMI, Lean mass, Weight
Han SY, 2007 [38]	Journal article	5/14	Middle-aged women, no menopause	F	7	41	6	38	BIA	% Body fat, BMI, Lean mass, WHR
Kim KT, 2010 [39]	Journal article	3/12	Adult	M	10	27.3	10	27.4	BIA	% Body fat, Lean mass, Muscle mass, Weight
Lee KK, 2011 [40]	Journal article	3/12	Middle-aged	F	12	41.44	12	42.16	DXA	% Body fat, Fat mass, Lean

Study	Study Type	Frequency (Day/Week)	Participants	Sex	Taekwondo (*n*, Age)		Control (*n*, Age)		Body Composition Method	Outcome Variable
										mass, Weight
Lee KK, 2015 [41]	Journal article	3/12	Middle-aged women, menopause	F	20	54.3	20	53.1	DXA	% Body fat, Lean mass, WC, Weight, WHR
Joo SE, 2017 [42]	Journal article	3/12	Middle-aged women, 30% body fat ↑	F	15	40.1	15	40.2	BIA	% Body fat, Fat mass, Height, Lean mass, Weight, WHR
Lee KS, 2017 [43]	Journal article	3/8	Middle-aged	M	7	40.85	7	40.71	BIA	% Body fat, BMI, BMI, Fat mass, Weight, WHR
Jung MK, 2018 [44]	Journal article	3/24	Middle-aged women, menopause & obese	F	8	61.05	9	59.89	BIA	% Body fat, Fat mass, Lean mass, WC, Weight, WHR
Lee JK, 2019 [45]	Journal article	3/12	Middle-aged women, 30% body fat ↑	F	12	50.9	12	50.3	BIA	% Body fat, Muscle mass
Kim NS, 2018 [46]	Journal article	13/2	University student	M	6	21.3	10	22.1	BIA	% Body fat, Fat mass, Lean mass, Weight

Study	Study Type	Frequency (Day/Week)	Participants	Sex	Taekwondo (*n*, Age)		Control (*n*, Age)		Body Composition Method	Outcome Variable
Kim NS, 2018 [47]	Journal article	3/12	University student	M	5	21	9	22	BIA	% Body fat, Lean mass, WC, Weight, WHR
Chea SI, 2011 [48]	Thesis	3/12	Elderly women	F	8	69.53	8	70	BIA	% Body fat, BMI, Weight
Kang HJ, 2014 [49]	Thesis	3/12	Elderly women	F	11	69.4	13	70.4	DXA	% Body fat, Fat mass, Height, Lean mass, Weight
Shin JD, 2009 [50]	Journal article	3/12	Elderly women	F	10	69.7	10	71.7	BIA	% Body fat, BMI, Fat mass,
Moon DS, 2010 [51]	Journal article	3/12	Elderly women	F	15	72.13	15	75.07	BIA	% Body fat, BMI, Height, Lean mass, Weight
Shin JD, 2010 [52]	Journal article	3/12	Elderly women, 30% body fat ↑	F	7	70.86	7	71.68	BIA	% Body fat, Height, Lean mass, Weight
Cho WJ, 2012 [53]	Journal article	3/12	Elderly women, 30% body fat ↑	F	13	69	13	68.62	BIA	% Body fat, Weight
Lim YR,	Journal article	4/12	Elderly women, over	F	15	ND	15	ND	BIA	% Body fat, Fat

Study	Study Type	Frequency (Day/Week)	Participants	Sex	Taekwondo (*n*, Age)	Control (*n*, Age)	Body Composition Method	Outcome Variable
2017 [54]			Weight					mass, Muscle mass, Weight

As a result of analyzing the effect of Taekwondo training on changes in body composition, statistically significant differences were found in body weight, BMI, WC, body fat mass, body fat percentage, lean mass, and muscle mass, excluding height. Especially in the case of students, body weight and body fat percentage decreased significantly, and lean mass and muscle mass also tended to increase. In the elderly, a significant decrease in body fat percentage and an increase in muscle mass were found.

According to ACSM guidelines, exercise intensity 40–70% VO_2R (oxygen uptake reserve) is recommended for overweight and obesity management [55]. Taekwondo's basic movements, kicks, and Poomsae movements have an exercise intensity of 84% HRmax and 56.8~82.2% VO_2max [56]. Taekwondo competition is a high-intensity exercise with an exercise intensity of 10 METs [57]. As such, Taekwondo exhibits anaerobic exercise patterns during matches and competitions and aerobic exercise patterns during taekwondo aerobics, Poomsae, sparring steps, basic movements, and moving kicks.

Therefore, the type of exercise and intensity of Taekwondo has positive effects on reducing body weight and body fat and increasing lean mass. In addition, there is a disadvantage that long and tedious exercise time is required to obtain meaningful exercise effects with general aerobic exercise such as walking or running [58]. In contrast, Taekwondo is an interval training type that alternates high- and low-intensity exercise repeatedly. In addition, Taekwondo gives interest and has higher exercise effects within the same amount of exercise time than other exercise types such as walking or moderate running [59]. Therefore, the exercise program using Taekwondo will positively improve obesity, the most severe health issue in Korea, and contribute significantly to preventing chronic diseases such as cardiovascular disease.

3. Conclusions

Taekwondo training at a frequency of five times per week for more than 12 weeks positively improved the obesity factor. Taekwondo training is an effective exercise that can prevent or positively improve obesity. In addition, Taekwondo has value as a lifestyle sport that can contribute to the promotion of human health, not just bounded in the field of martial arts and sports.

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