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The effect of an 8-week corrective exercise program on the body image of women with hyper kyphosis

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Abstract

Background: Hyper kyphosis is a common postural issue that affects many women, often leading to negative body image.

Aim: The purpose of this research was to investigate the impact of an 8-week corrective exercise program on the body image of women with hyper kyphosis.

Materials and Methods: The research method used in this study was quasi-experimental. The study population consisted of female students aged 18 to 26 years with hyper kyphosis at Shahid Rajaee University. Participants were randomly assigned to either the experimental group (n=20) or the control group (n=20). Hyper kyphosis was measured using a flexible ruler, while body image was assessed using the Body-esteem Scale for Adolescents and Adults. The questionnaire had a reliability coefficient of 0.83 as measured by Cronbach's alpha. After 8 weeks of corrective exercise, both the experimental and control groups completed the questionnaire again. The control group did not receive any training during this time. The data were analyzed using the mixed ANOVA method with SPSS-26 software at a significance level of 95%.

Results: The results of the mixed ANOVA analysis showed that the main effect of the training group and the interaction between the group and test stages were significant in the post-test stage for the dependent variable of total body image (F=6.82, *P*=0.013), appearance (F=6.72, *P*=0.014), attitude (F=8.81, *P*=0.005), and kyphosis angle (F=18.91, *P*=0.000). However, there was no significant effect of training on weight satisfaction.

Conclusion: The results of this study indicate that eight weeks of corrective exercise significantly reduced the hyper kyphosis angle (*P*=0.01), resulting in an improvement in the subjects' posture and a decrease in deformity. This improvement in appearance led to an increase in satisfaction with their appearance, as demonstrated by improvements in their body image.

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1. Introduction

Individuals everywhere in the world, irrespective of their nationality, culture and language, have an attitude towards their physical appearance and create an image of their body in their mind [1]. This image is called a body image [1]. Body image is associated with a person's specific relationship with their body, particularly with a person's set of beliefs, thoughts, perceptions, feelings, and activities related to their physical appearance [1]. The body image is divided into internal and external components [2]. The physical image from the inner perspective consists of the evaluation and the individual's view of the physical appearance from within [2]. However, the external vision refers to the perception of the individual as a social being and in relation to others. External evaluation involves comparing and evaluating in social terms or the mindsets of the general public towards a person's body [1, 2]. When individuals judge their bodies, both internally and externally, they can create a positive or negative body image. This is carried out by comparing yourself with others and ultimately results in a negative or positive body image [3]. People with a negative body image are often dissatisfied with their bodies [4].

Addressing physical attractiveness and appearance is far more important for women than men, and, on the other hand, it has been shown that women are more affected by social pressures and gender roles in terms of personality [5].

Body image, like any other psychological aspect, is an evolutionary part of every human personality, and in many cases of obvious deformity, the individual may suffer from disorders and weakness [3]. Hyper kyphosis is one of the postural deformities that creates physical problems for people and causes mental disorders and negative body image in people [6]. This deformity is indicative of an abnormal increase in the thoracic region. The person in this case has a hump, rounded shoulders, and a forward head [7].

Complications of hyper kiphosis include physical deformity, short stature, decreased spinal mobility, back pain, possibly reduced respiratory capacity, and consequently and ultimately poor body image among these individuals [7].

Hosseini, Alizadeh and Farokhi (2015) conducted research comparing the body image of people with hyper kyphosis and healthy individuals, which showed that the body image was weaker in individuals with hypokyphosis [6].

Babekir, Crawford and Durrani (2007) studied 35 people with Schuermann kyphosis above 60 degrees in terms of depression, and it was found that 1 in 4 people was depressed. It is worth mentioning that depression can be one of the complications of negative body image [8].

Canales et al. (2010) studied 34 people with poor posture and depression, including hyper kyphosis, head forward, and scapular inequalities, and 37 in the control group, and found out that the body image among abnormal people is seemingly weaker than in the control group [9].

Cognitive-behavioral therapies and medication have been among the oldest treatments for body image disorders [10]. Due to the fact that these methods are time-consuming and extremely expensive, and also taking their heavy side effects into account, exercise and physical activity as a treatment are considered significantly important [11].

A problem that may be associated with a negative body image caused by hyper

kiphosis is the deformity of the spine and trunk, which leads to dissatisfaction with the appearance of the body. In this regard, various recommendations regarding the correction of posture, such as braces, behavioral therapy and surgery, have been presented [3, 6].

Meanwhile, corrective exercises appears to be one of the most cost-effective and beneficial methods [12]. Research on body image and physical activity has been performed on non-Kyphotic individuals, but so far, no research has been conducted on women with this deformity (hyper kyphosis). So, the researchers decided to examine the effect of 8 weeks of corrective exercises on women with hyper kyphosis to determine the effect of corrective exercise on body image and its subscales among these individuals.

2. Materials and Methods

2.1. Participant

A total of 40 women in the age group of 18 to 26 years were included in the study. The inclusion criteria were hyper phyphosis (thoracic kyphosis greater than 42 degrees) [13].

2.2. Instrument

A flexible ruler was used to measure and determine the angle of the thoracic kyphosis. For this purpose, the participants were placed in a natural and completely comfortable standing position so that the legs were next to one another and at a short distance from each other and the body weight was evenly distributed on the legs. In this case, the spinous process of the second and twelfth vertebrae of the subject's back were marked and a flexible ruler was placed on the subject's body precisely according to the curvature of the back and the distance between the points. The ruler arc was then transferred from the back of the person to the paper without any change and its curvature was drawn. By connecting the two ends of this curvature, a line called L was drawn, and by dividing this line into two equal parts, a vertical line was drawn from the middle of the line L to the middle of the curvature, which was called the H line. The lengths of the two lines L and H were measured and calculated by placing the numbers in the formula for the mentioned angle [13].

Body image was measured by the body-esteem scale for adolescents and adults [14]. This questionnaire is used for individuals over 12 years old and its questions have internal consistency (89%) and reliability (88%) [14]. the questionnaire has 23 items and three subscales of satisfaction with appearance, attitude of others, and weight and has been prepared on a Likert scale from zero (never) to 4 (always) [14]. The validity of this questionnaire has been reported in Iran by Hosseini, Alizadeh and Farokhi (2015) [6]. The reliability of the questionnaire in the samples in the present study using Cronbach's alpha was 0.83.

2.3 Procedure

This research is quasi-experimental. The population of this study consists of female students with hyper kyphosis at the Shahid Rajaei University of Tehran. The statistical sample of the present study consists of 40 female students with hyper kyphosis who voluntarily participated in the study based on inclusion and exclusion criteria. Then they were randomly assigned to two groups (20 experimental and 20 control). In this study, individuals with specific physical abnormalities such as skin burns, overt disability and amputation, spine surgery, and a body mass index of below 20 and above 25 were excluded from the study [1]. Moreover, wearing braces for treatment and

continuous exercise at least 2 times a week or more than 3 hours per week were two of the exclusion criteria [11, 14].

The experimental group performed a corrective exercise program for 8 weeks and had 3 sessions per week. Each training session started with 10 min of warm-up, then corrective exercises, including stretching and strength exercises for hyper kyphosis were performed (Figure 1). The overload and duration of the exercise were increased gradually. The control group did not perform any exercise during the study period. All subjects completed the body image questionnaire before and after 8 weeks.

After collecting the data, its normality was evaluated by the Kolmogorov-Smirnov test. The Mix ANOVA method was used for statistical analysis. For this purpose, using the manual programming method in SPSS software in the GLM section, pairwise comparisons using the Bonferroni test were used. All statistical calculations were performed using SPSS-26 software at a significant level of P=0.05.

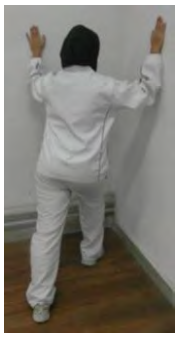
3. Results

Two members of the experimental group did not continue the exercises until the end of the training protocol and were excluded from the study. The final participants were 18 in the experimental group and 20 in the control group (38 in total). The mean and standard deviation of the research variables are shown in Table 1.

The results of the mixed ANOVA showed that the main effect of the test (between pre-test and post-test) as well as the effect of group interaction with the test were significant, but the main effect of the group was not significant. As a result, due to the significance of the interactive effects, the main effects were ignored and the simple effects analysis method was used to examine the differences. This is shown in Table 2.

Strengthening (isometric)
3 set
6 to 12 sec

Stretching
3set
5 to 15 sec



Stretching
3set
5 to 15 sec

Strengthening (isometric)
3 set
6 to 12 sec

Strengthening
3 set
6 to 12 repetitions

Strengthening
3 set
6 to 12 repetitions

Figure 1. Corrective exercise

Table 1. Mean and standard deviation of both group (experimental n=18, control n=20)

V		Mean	Std. Deviation	Mean	Std. Deviation	
Total body image	Experimental	49.11	13.75	56.22	9.50	7.1
	Control	48.15	14.91	47.85	14.71	-0.3
Appearance	Experimental	22.33	6.97	25.11	5.34	2.7
	Control	21.95	5.26	21.50	5.14	-0.4
Attitude	Experimental	10.55	3.25	12.66	2.27	2.1
	Control	9.50	5.26	7.95	4.47	-1.5
Weight	Experimental	16.22	6.85	17.66	5.64	1.4
	Control	17.85	8.19	18.45	7.60	0.6
Kyphosis angel	Experimental	56.99	10.56	47.84	7.71	-9.1
	Control	58.73	9.71	58.37	8.90	-0.3

Tables 2. Mixed ANOVA (experimental n=18, control n=20)

	Effect	Sum		Sequate			Partial
Total body image	Time	219.74	1	219.74	5.76	0.022*	0.13
	Group	412.63	1	412.63	1.26	0.268	0.15
	Time×Group	260.16	1	260.16	6.82	0.013*	0.03
Appearance	Time	25.66	1	25.66	3.50	0.070	0.08
	Group	75.57	1	75.57	1.31	0.260	0.15
	Time×Group	49.35	1	49.35	6.72	0.014*	0.03
Attitude	Time	1.49	1	1.49	0.20	.652	0.006
	Group	157.82	1	157.82	6.19	.018*	0.19
	Time×Group	63.49	1	63.49	8.81	.005*	0.14
Weight	Time	15.63	1	15.63	1.61	0.212	0.04
	Group	506.33	1	506.33	3.24	0.080	0.07
	Time×Group	29.21	1	29.21	3.01	0.091	0.08
Kyphosis angel	Time	428.79	1	428.79	22.13	0.000*	0.38
	Group	711.70	1	711.70	4.64	0.038*	0.34
	Time×Group	366.27	1	366.27	18.91	0.000*	0.11

The results of the mixed ANOVA showed that the main effect of the training group and the effect of group interaction with test stages in the post-test or dependent variable measurement of total body image (F (1,36)=6.82, *P*=0.013, η^2=0.03), appearance (F=6.72, *P*=0.014, η^2=0.03), attitude (F=8.81, *P*=0.005, η^2=0.14) and kyphosis angel (F=18.91, *P*=0.001, η^2=0.11) were significant, but the effect of training on weight satisfaction was not significant (F=3.01, *P*=0.091, η^2=0.08).

Paired comparisons with the Bonferroni adjustment test revealed that total body image (MD= 8.372, *P*=0.047), appearance satisfaction (MD= 2.778, *P*=0.004), attitude (MD= 2.11, *P*=0.024), and kyphosis angel (MD= -9.15, *P*=0.000) were significantly better after the test than before. Thus, it can be said that the experimental group showed an improvement in all dependent variables except the weight subscale in the body image questionnaire.

4. Discussion

The studies goal was investigating the effect of 8weeks corrective exercise on women body image suffering hyper kyphosis. The results of the body image with mixed ANOVA method show a significant difference. That means that 8 weeks of corrective exercise has improved

the overall body image in women with hyper kyphosis. The results of the present study are consistent with similar research in this field by Head et al. (2012) [15] and Bezalel et al. (2019) [16].

It is better to discuss the reasons for the effect of physical training on the body's image. Factors in increasing body image following physical exercises can be related to increasing physical fitness and observing the estimation of goals, in which case, the person sees the abilities of their body and this will increase self-esteem and consequently improve body image [17]. Facing and interacting with others ultimately leads to social experiences and improved health behaviors such as sleep and proper nutrition [18]. Regular physical exercise also reduces anxiety, stress, and depression and ultimately improves the quality of life [11]. These factors can, in turn, improve a person's sense of self-satisfaction and, as a result, their body image.

Theorists of the Bem self-perception theory state with regards to this issue that different postures of a person have a feedback effect on his mental and emotional states [19]. As a result, it can be stated that inappropriate posture around the back, shifting the shoulders forward, shifting the head forward, and finally disagreeable appearance have provided the person with negative feedback, resulting in physical dissatisfaction and, ultimately, a poor body image in these people. People with abnormalities will experience more anxiety about their appearance [3]. For these people, appearance is one of the most important issues that significantly affects their social relationships [20]. The present study observes that corrective exercises significantly reduced the level of thoracic kyphosis in these individuals, whereas the appearance of these individuals was somewhat closer to normal and their deformity was reduced. As a result, they were more satisfied with their appearance and improved their body image.

Physical changes in people with hyper kyphosis cause their mental image of their body to change, and as a result, they perceive themselves to be a/a (abnormal) difference from their peers. This can eventually lead to negative judgments about how others view themselves. This case has also been mentioned by Hossein, Alizadeh and Farokhi (2015). In their research, one of the psychological problems of people with hyper kyphosis is that these people are worried about the attitude of others towards their bodies. But when this apparent difference is reduced (for example, with corrective exercises as observed in this study), sensitivity to the attitudes of others towards these people is likely to decrease [6]. In some cases, the person with the deformity tries to hide their disorder from others. For instance, by covering themselves or even shunning certain communities (such as swimming pools).

Failure to appear in the aggregation may reduce stress in the short term, such as anxiety, but in the long term may have many negative effects on physical satisfaction and will lead to a poor body image [21]. Corrective exercises in this study were carried out in group training, which provides social support for women [22] and presence in the aggregation reduces a person's sensitivity to the attitudes of others [1] and it is probably also one of the reasons for improving the satisfaction of others' attitudes in the present research samples.

The corrective exercises in this study were progressive and followed the overload principle, in which the person gradually

increased the amount of time he spent doing the exercise and objectively observed his progress. As a result, a person's self-perception of his physical abilities and fitness is very effective in improving his body image. For example, an objective assessment of physical function, such as the amount of weight recorded or the training time that increases with exercise [23].

Training in front of a mirror is another factor in improving body image. In the present study, the samples practiced in a gym that was surrounded by a mirror. The reason for this is to examine your body carefully and also to learn about changes that have taken place in your body over time, due to exercise.

Finally, according to the research of Delinsky and Wilson (2006), this reason can improve people's body image [24]. One of the benefits of corrective exercise is the improvement of anomalies in people, which can be considered as the most important reason for improving their body image. This is also consistent with Harter 1985's competence motivation theory, based on which the perception of competence increases motivation to participate and continue physical activity [25]. This phenomenon causes people to participate in corrective exercises with higher motivation and incentives, which will improve their physical condition as much as possible. These elements also help to improve the body's image. Increasing social pressure on women to have an attractive and agreeable appearance has led to the fact that one of the important goals of women in participating in physical activities not only is to increase their health but also enhance their physical attractiveness [26, 27]. As a result, participating in activities that improve the physical posture of women can have a positive effect on improving the body image of women with hyper kyphosis [15].

People with hyper kyphosis have some side effects of spinal deformities such as pain, respiratory disorders, heart disorders, premature fatigue, low spinal flexibility and sleep problems [28, 29]. In previous research, people with hyperkyphosis have been found to have less life satisfaction because this abnormality limits some of their activities.

These physical complications cause the person, in addition to physical dissatisfaction, to decline in terms of physical function and suffer from these problems [30], and as a result, he is dissatisfied with his body's physical function and suffers from low body esteem. Corrective exercises for the aforementioned cases, such as reducing pain or improving respiratory condition [30, 31], can lead to satisfaction with body function in these people, and this may have also improved body image in the aforementioned research samples (Of course, such cases should be considered specifically). In the study of the effect of corrective exercise on weight satisfaction, the results showed that there was no significant difference in the weight satisfaction of women with hyperkiphosis before and after 8 weeks of corrective training. The lack of effect of corrective exercises on the weight of individuals (as observed in the present study) as well as the normal body mass index of the subjects may have led to such a result.

5. Conclusions

According to previous research (on the effect of physical activity on body image) and also the result of this research, it can be stated that corrective exercises can probably improve the overall body image and its subscales in women with hyper kiphosis and can be used as a practical method to

improve the body image among these individuals.

Conflict of interest

The authors declared no conflicts of interest.

Authors' contributions

All authors contributed to the original idea, study design.

Ethical considerations

The authors have completely considered ethical issues, including informed consent, plagiarism, data fabrication, misconduct, and/or falsification, double publication and/or redundancy, submission, etc. The participants were informed about the purpose of the research and its implementation stages; they were also assured about the confidentiality of their information. Moreover, they were allowed to leave the study whenever they want, and if desired, the results of the research would be available to them.

Data availability

The dataset generated and analyzed during the current study is available from the corresponding author on reasonable request.

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