Evaluation of the Effects of Motivational Intervention with Walking Exercise on Waist-to-Hip Ratios of College Students

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Abstract

Waist-to-hip ratios (WHRs) are anthropometric measurements that help medical professionals evaluate an individual's quality of health. Research has shown that people with a larger waist circumference than hip circumference have a higher risk for medical conditions such as cardiovascular disease. Thus, lower WHRs may decrease the risk of developing a serious medical condition. Previous studies have shown that simple exercise, even walking, can have a positive effect on weight loss. This study was designed to see if motivation to increase walking exercise would decrease WHRs in college students. During the course of four weeks, 32 California Polytechnic State University, Pomona students were given pedometers to track their daily steps. The participants had their waist and hip measurements taken at the beginning and end of the study. Other body composition measurements and diet records are being evaluated separately by Lauren Meeks, a master's student in the Department of Human Nutrition and Food Science. The intervention group received daily motivational emails to encourage participants to walk more, while the control group did not receive these emails. There were no statistical differences between the motivated and non-motivated groups for WHRs. However, paired t-tests (SPSS version 20) determined a significant waist-to-hip ratio difference (P=0.012) between all participants from the baseline to the end of study (mean ratio loss of 0.05), and a significant (P=0.003) average waist reduction of 3.55cm per participant. Although the motivational emails had no significant effect on the outcome of WHRs, the participants as a whole had a significant decrease. Based on our results, we concluded that walking an average of 8395 steps for 4 weeks may decrease cardiovascular risk factors by decreasing WHRs.

Introduction

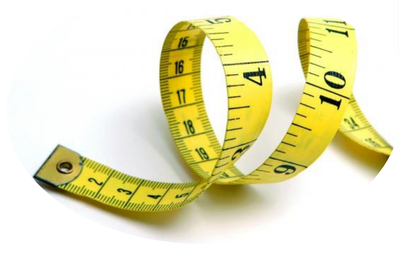
There has been a great deal of research done to evaluate the use of waist-to-hip ratios (WHRs) as an indicator for certain health conditions. In 2007, one study found significant associations with cardiovascular disease (CVD) incidence and WHRs and waist circumference (WC); thus the study recommended these measurements be incorporated into CVD risk assessments[2]. Furthermore, a more recent study published in 2015 concluded that WHRs and WC are better predictors for hypertension in Korean people than body mass index (BMI)[3]. One can infer from these studies then that an intervention, like exercise, that decreases WHRs and WC also lowers the risk for developing CVD conditions. The concept that exercise is a component of a healthy lifestyle is widely accepted. However, research is used to understand what types of exercise assist with particular physiological benefits. Recent research has shown obese women who used a pedometer saw significant decreases in body composition and measurements including WC compared to those who did not use a pedometer[4]. However, research on body composition effects while using pedometers with healthy individuals is scarce. This type of research could prove important when understanding the role exercise could have in prevention of certain medical conditions, including CVD. For many, college is the last stop before adulthood. Since many diseases affected by lifestyle choices present in the adult stage of life, interventions during college may be key for the prevention of such diseases.

Objective

The purpose of this study was to evaluate if motivation to increase walking exercise would decrease waist-to-hip ratios in college students.

Materials and Methods

The design of this experiment was single-blinded, where the participants were not aware if they were a part of the control or intervention group. This study was approved by California Polytechnic State University, Pomona's Institutional Review Board (IRB). To be included in the study, participants must have been a current student of the university, been between the ages of 18-45 years, been healthy with no known chronic diseases, had no injuries that would be exacerbated by walking, and female students could not be pregnant or planning to become pregnant. Participants would be excluded from the study if the student had hip, leg, knee, ankle, or foot injuries, was pregnant, was on a diet plan, or consumed alcohol on a regular basis. All participants were randomly put into the two experimental groups using a trusted randomizing generator website. The intervention group received daily motivational emails that encouraged walking throughout the course of the study, while the control group did not. Of the 41 participants who applied and were accepted into the study, nine dropped out. Of the nine, five participants had no baseline data gathered, and four dropped out after week one. The data collected pertinent to this study included waist and hip measurements using a tape measure and recording daily steps with a pedometer. World Health Organization protocols were followed for collecting waist and hip measurements[1]. These measurements were taken at the beginning of the study (baseline) and after four weeks (end). Our data was then evaluated using the Statistical Package for the Social Sciences (SPSS) version 20 with the significant value set at p<0.05.



Results

Intervention vs. Control Statistics

	Group	N	Mean	Std. Deviation	Std. Error Mean
Difference in waist	Motivated	21	-3.4286	7.30973	1.59511
	Not	11	-3.7727	3.75076	1.13090
Difference in E-B Hip	Motivated	21	-.4286	5.03559	1.09886
	Not	11	-.5000	1.96214	.59161
Difference In E-B WHR	Motivated	21	-.0445	.11538	.02518
	Not	11	-.0617	.09472	.02856

Table 1. Average differences in waist, hip, and waist-to-hip ratios evaluated between motivated and non-motivated groups.

Paired Samples Test

Intervention + Control Statistics		Paired Differences: 95% Confidence Interval of the Difference Upper	Lower	t	df	Sig. (2-tailed)
Pair 1	Average E- B WHR	-.01169	-.08919	-2.655	31	**.012**
Pair 2	Average E- B Hip	1.05953	-1.96578	-.611	31	.546
Pair 3	Average E-B Waist	-1.29421	-5.79954	-3.211	31	**.003**

Table 3.Test results for significance of differences in waist, hip, and waist-to-hip ratios between baseline and end for all participants.

Intervention vs. Control Statistics		Levene's Test for Equality of Variances: F	Sig.	t-test for Equality of Means: t
Difference in waist	Equal variances assumed	1.697	.203	.146
				.176
Difference E-B Hip		2.954	.096	.045
				.057
Difference in E-B WHR		.093	.763	.425
				.452

Table 2. Test results for significance of differences in waist, hip, and waist-to-hip ratios between motivated and non- motivated groups.

Paired Samples Test

Intervention + Control Statistics		Paired Differences: Mean	Std. Deviation	Std. Error Mean
Pair 1	Average E-B WHR	-.05044	.10748	.01900
Pair 2	Average E- B Hip	-.45313	4.19554	.74167
Pair 3	Average E- B Waist	-3.54688	6.24804	1.10451

Table 4. Average differences in waist, hip, and waist-to-hip ratios between baseline and end for all participants.

Discussions

The results of this study show no significant difference in waist-to-hip ratios between the intervention group and the control group. The Levene's Test for Equality of Variances revealed no significant differences between the two groups. Thus, with the variances equal, it allowed us to use the 'equal variances assumed' p-values for our report. The significant values when comparing waist, hip, and waist-to-hip ratio differences are 0.203, 0.096, and 0.763 respectively. None of these values meet the requirement of p<0.05; therefore, these values are not considered significant. However, when evaluating all of the participants using a Paired Samples Test, there was a significant difference between waist-to-hip ratios from baseline to end. The significant value for the participants' waist-to-hip ratio was p=0.012, which is much less than the p<0.05 requirement. Furthermore, comparing the difference in waist measurements to the difference in hip measurements, the significance is associated with the waist difference and not the hip difference (p=0.003 and p=0.546 respectively). While all measurements showed a mean loss, the greatest loss was seen in waist circumference. On average, participants lost 3.5 cm from their waists. All participants walked an average of 8395 steps per day.

Conclusion

This study has shown that providing motivation to increase walking exercise did not decrease waist-to-hip ratios. We concluded walking an average of 8395 steps for 4 weeks may decrease cardiovascular risk due to the overall significant decrease in waist-to-hip ratios because the loss occurs significantly in the waist verses the hip.

Further studies are needed to deduce if there were other external or internal motivation factors that were affected during the study and not evaluated that contributed to the overall significant decrease in waist-to-hip ratios.

References

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Acknowledgments

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