Comparison of cinnamon extract to metformin effects upon insulin resistance, apolipoprotein B/apolipoprotein A1 ratio, and body mass index of obese adolescent girls with polycystic ovary syndrome: A double-blind, placebo-controlled trial

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Abstract

Background: Polycystic ovary syndrome (PCOS) is one of the most common endocrinopathies, affecting 5-10% of population. Insulin resistance, apolipoprotein B/apolipoprotein A1 ratio, and body mass index commonly increase in obese PCO patients and are considered as the indicators of the disease. On the other hand, metformin and cinnamon are generally believed to control these endocrinopathies.

Materials and Methods: In a prospective, double-blind, randomized, placebo-controlled clinical trial, 112 adolescent girls (12.6-17 years old) with PCOS were treated with cinnamon extract (500 mg twice daily), metformin (500 mg twice daily), or placebo, at the outpatient paediatric endocrine clinic of a university children's hospital in Tehran for 1 years.

Results: Cinnamon and metformin differed from placebo in significantly decreasing insulin resistance: both homeostasis model insulin resistance index ($p < 0.005$) and quantitative insulin sensitivity check index ($p < 0.01$), and also apolipoprotein B/apolipoprotein A1 ratio. There was no significant difference between cinnamon and metformin effects on these indexes, however, both of them slightly but significantly decreased body mass index compared to placebo ($p < 0.05$).

Conclusion:
Cinnamon administration can be considered as an effective treatment for reduction of insulin resistance and weight in obese adolescent girls with polycystic ovary syndrome.

Key words: cinnamon, metformin, polycystic ovary syndrome

Background

Polycystic ovary syndrome (PCOS) is one of the most common endocrinopathies.Insulin resistance indexes and obesity are common among the PCO patients.

Objective

To compare the effects of cinnamon with those of the metformin on insulin resistance, apolipoprotein B/apolipoprotein A1 ratio, and body mass index of obese adolescent girls with polycystic ovary syndrome

Methods

on 112 PCO Iranian girls 12.6-17 y/o with a BMI more than 95% for sex and age. Blood hormone assays and utrasonographies were performed to confirm the diagnosis, for follow up , and to rule out other disorders.

Methods

- **By random allocation 112 PCO girls were divided in to 3 groups:**
  - **1. cinnamon group: taking 500 mg cinnamon tablets twice daily**
  - **2. metformin group : taking 500 mg metformin tablets twice daily**
  - **3. control group: taking 500 mg placebo tablets twice daily**
  - **Each case was treated for two years.**
  - **Follow up:**
- **Every 3 months: Physical exam, Body Mass Index (BMI)**
- **Apolipoprotein B/apolipoprotein A1 ratio was messured before & after Rx**
- **Every 3 months insulin resistance indexes: Homeostasis Model Insulin Resistance Index (HOMA-IR) and Quantitative Insulin Sensitivity Check Index (QUICKI) were calculated.**

Table 1. Pretreatment variables in study groups

Variables of study	Study Groups,		
	Cinnamon	Metformin	Control
	Mean (SD)	Mean (SD)	Mean (SD)
No.	37	37	38
Age *year*	14.9 (1.8)	15.1 (1.7)	15.1 (1.9)
BMI	>95%	>95%	>95%
QUICKI*	0.298(0.08)	0.292(0.06)	0.288(0.010)
HOMA-IR**	4.93 (0.15)	5.09 (0.12)	5.05(0.08)
apoB/apoA1	0.69(0.08)	0.70(0.10)	0.71(0.11)

Analysis

Data were analyzed by paired T-test, ANOVA, Tukey, Wilcoxon and Kruskal-Wallis tests using the SPSS program.

Table 2. HOMA-IR and apoB/apoA1* differences in study groups

study group	HOMA-IR - before	HOMA-IR - after	Difference	*P* .Value*	apoB/apoA1 - before	apoB/apoA1 - after	Difference	*P.* Value*
	Mean (SD)	Mean (SD)	Mean (SD)		Mean (SD)	Mean (SD)	Mean (SD)	
cinnamon	4.93 (0.15)	2.71 (0.11)	2.22 (0.04)	<0.001	0.69 (0.08)	0.48 (0.10)	0.21 (0.02)	<0.01
metformin	5.09 (0.12)	2.80 (0.15)	2.29 (0.03)	<0.001	0.70 (0.10)	0.45 (0.11)	0.25 (0.01)	<0.01
control	5.05 (0.08)	4.61 (0.13)	0.44 (0.29)	0.04	0.71 (.012)	0.59 (0.13)	0.12 (0.01)	<0.05

Results

- **Cinnamon and metformin differed from placebo in significantly decreasing insulin resistance: both homeostasis model insulin resistance index ($p < 0.001$) and quantitative insulin sensitivity check index ($p < 0.001$)**
- **Cinnamon and metformin differed from placebo in significantly decreasing apolipoprotein B/apolipoprotein A1 ratio ($p < 0.01$).**
- **There was no significant difference between cinnamon and metformin effects on these indexes,**
- **however, both of them slightly but significantly decreased body mass index compared to placebo ($p < 0.05$).**

Discussion/Conclusion

Cinnamon administration can be considered as an effective treatment for reduction of insulin resistance and weight in obese adolescent girls with polycystic ovary syndrome.

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