Monascus rice powder co-supplemented with coenzyme Q_{10} improves serum lipids and LDL-lag time on hypercholesterolemia subjects.

Shih-Wen Hsu[1#], Yi-Ting Lin[1], Hui-Ting Yang[2], Ching-Chien Chang[1], Ming-Jer Shieh[1], and Shih-Yi Huang[1*]

[1]School of Nutrition and Health Sciences,Taipei Medical University,Taipei, Taiwan.

[2] Department of Medical Nutrition, I-Shou University, Kaohsiung, Taiwan.

Abstract

Recent studies showed a possibly interruption of monacolins, byproducts of *Monascus* rice powder, on coenzyme Q10 biosynthesis. Thus, a clinical trial was conducted to investigate lipid-lowering and antioxidative effects of combined red yeast rice extract and coenzyme Q10 (CoQ10) supplementation on hypercholesterolemia subjects. 37 subjects were recruited and were randomly divided into three groups such as *Monascus* rice powder 250 mg (M), equivalent to monacolins 6 mg; *Monascus* rice powder 250 mg plus CoQ10 15 mg (MQ), and *Monascus* rice powder 500 mg plus CoQ10 30 mg (HMQ) by different doses supplementation. The supplementations administrated for 6 weeks, blood samples were collected every two weeks for cholesterol and low density lipoprotein (LDL) lag time determination. Results showed that all of the groups had lower serum total cholesterol (19.6%, 32.7%, and 19.6% decrease from baseline, $p<0.05$) and LDL cholesterol concentration (28.6%, 42.3%, and 29.0% decrease from baseline, $p<0.05$) after three weeks of supplementation. Moreover, there were no alterations on high density lipoprotein (HDL) cholesterol level of all subjects. In LDL-lag time, the data displayed a significant slower production of conjugated dienes in all groups after six weeks of supplementation. However, in CoQ10 supplementing groups, the effect sustained after ceasing supplementation for two weeks. The results reconfirmed the lipid-lowering effects of monacolins and 250 mg *Monascus* rice powder, (equivalent to monacolins 6 mg) supplementation didn't affect the LDL oxidative process through disruption of CoQ10 metabolism. Furthermore, addition of at least 15 mg CoQ10 could significantly enhance LDL antioxidative capacity in hypercholesterolemia subjects.

Subjects and Methods

37 subjects were recruited and were randomly divided into three groups such as *Monascus* rice powder 250 mg (M), equivalent to monacolins 10 mg; *Monascus* rice powder 250 mg plus CoQ10 15 mg (MQ), and *Monascus* rice powder 500 mg plus CoQ10 30 mg (HMQ) by different doses supplementation. The supplementations administrated for 6 weeks, blood samples were collected every two weeks for cholesterol and low density lipoprotein (LDL) lag time determination. The final results were presented as mean ± SD. Student's *t* test was used for statistically analysis.

Results

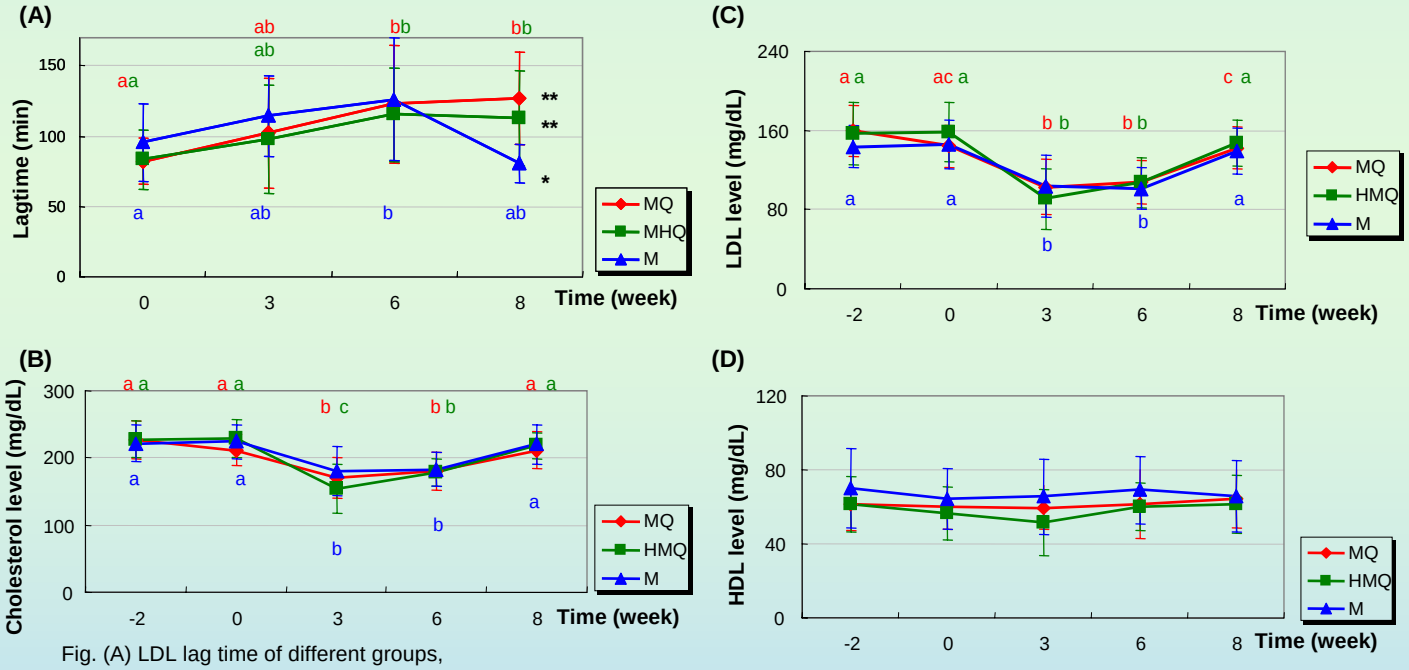

Fig. (A) LDL lag time of different groups,
Fig. (B) Cholesterol concentrations of different groups,
Fig. (C) LDL concentrations of different groups,
Fig. (D) HDL concentrations of different groups,
"a, b, c" represented significant differences with different time periods；"*,**" represented significant differences within groups, $p<0.05$.

Discussion

Recent studies showed the active compound of *Monascus* rice powder, Monacolin K, could inhibit hydroxymethyl glutaryl coA reductase (HMG CoA reductase) which are the key enzyme of internal cholesterol synthesis in our body. The present results showed that daily intake of 250mg *Monascus* rice powder (equivalent to 6mg of monacolins) significantly lowered serum total and LDL cholesterol concentration ($p<0.05$) and remained normal after three weeks of supplementation. Besides, there were no alterations on high density lipoprotein (HDL) cholesterol level of all subjects.

In LDL-lag time, the data displayed a significant delayed production of conjugated dienes in all groups after six weeks of *Monascus* rice powder supplementation. However, in CoQ_{10} supplementing groups, the effect sustained after empty intervention for two weeks. The results reconfirmed the lipid-lowering effects of *Monascus* rice powder and the supplementation didn't accelerate LDL oxidation through disruption of CoQ_{10} metabolism. Furthermore, addition of at least 15 mg CoQ_{10} could significantly enhance LDL antioxidative capacity in hypercholesterolemia subjects.

Conclusion

Daily supplemented with 250 mg of *Monascus* rice powder and 15 mg of CoQ_{10} for six weeks could not only significantly regulate serum total and LDL cholesterol concentration in subjects with hypercholesterolemia but also delayed LDL oxidation. The combination might assist to decrease the risk of atherosclerosis progress and to prevent the incidence of cardiovascular disease.