Alternative Treatment with Red Yeast Rice to Reduce Hyperlipidemia

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**Abstract**

- First line treatment of cardiovascular disease is lifestyle modification followed by the pharmacologic intervention of HMG-CoA reductase inhibitors or statins.
- Statins are commonly associated with intolerable side effects such as myalgia leading to medication non-compliance.
- RYR preparations claim to inhibit cholesterol synthesis without causing myalgia.
- RYR preparations have naturally occurring monacolins such as monacolin K which is chemically identical to lovastatin.
- RYR is not regulated by the FDA leading to questionable manufacturing practices producing varying ingredient composition.
- The purpose of this study is to investigate the role RYR in hyperlipidemia treatment compared to statins by evaluating efficacy, side effects, and the potential to reduce medication non-compliance in adults.
- Clinicians potentially could recommend RYR as an alternative treatment to hyperlipidemia in patients unable to comply with statin treatment to decrease cholesterol levels and reduce the progression of atherosclerosis.

**Literature Review**

- Statins reduce lipid levels when lifestyle modifications are not adequate.
- RYR has been utilized in China since the Tang Dynasty in 800 AD.
- Liu et al. (2006) assessed the safety concerns of not only the lack of regulation allowing for varying amounts of monacolin and potential byproducts including citrinin but also the potential for consumers to unknowingly consume levels of monacolin exceeding the upper safety limit of 0.58%.
- Over the counter RYR has flourished in popularity with claims of being an alternative treatment to reduce hyperlipidemia.
- MOA: RYR is a competitive inhibitor of 3- hydroxy-3-methylglutaryl-coenzyme A (HMG-CoA) reductase, the rate-limiting enzyme involved in cholesterol biosynthesis.
- RYR preparations are not strictly regulated by the FDA leading to questionable manufacturing practices producing varying ingredient composition.
- RYR supplements are not strictly regulated by the FDA due to lack of standardization, long-term side effects, narrow test populations, and secondary cardiovascular prevention.
- RYR is not practical in healthcare setting due to lack of FDA regulation allowing for varying amounts of monacolin and potential byproducts including citrinin.
- Current FDA approved pharmacologic lipid modifying agents include niacin, statins, bezafibrate, and fenofibrate for the treatment of hypertriglyceridemia and secondary cardiovascular prevention.

**Discussion**

- Childrens et al. (2013) summarized RYR utilization has increased in popularity exponentially due to the publics, fish oil with all trials resulting in the reduction of total and LDL cholesterol that was superior or equal to placebo.
- RYR comes with variations that do not have equal potency due to varying active potentials just as statins do not have equal potency when compared to each other.
- Clinical literature comparing RYR with other lipid modifying agents.
- Becker et al. (2008) compared RYR to simvastatin reflecting significant LDL reduction without significant differentiation between the two groups.
- Becker et al. (2009) compared RYR to pravastatin reflecting 9/22% in LDL reduction between test groups.
- Becker et al. (2013) compared tolerability of pravastatin to RYR with 67% in RYR group reporting pain and 68% in the pravastatin group therefore similar tolerability.
- Pathophysiologic changes and supplements: Randomized primary prevention trial.
- The meta-analysis conducted by Liu et al. (2006) evaluated RYR supplements (Cholestin, Xuezhikang, and Zhibi) vs placebo, reflecting the three RYR variations significantly reducing total cholesterol levels compared when placed on placebo over 12 weeks.

**Applicability to Clinical Practice**

- RYR has potential to reduce hyperlipidemia as reflected in short duration trials but at this time can not be recommended due to lack of standardization, long-term side effects, narrow test populations, and secondary cardiovascular prevention.

**References**

- **PATHOPHYSIOLOGY OF HYPERLIPIDEMIA**
  - HDL cholesterol transfers cholesterol to cells in tissues and is equal to the risk of atherosclerosis in producing coronary disease (Papadakis, Tursky, & McPhee, 2011).
  - RYR preparations claim to inhibit cholesterol synthesis without causing myalgia.
  - The RYR has been utilized in China since the Tang Dynasty in 800 AD.
  - Liu et al. (2006) assessed the safety concerns of not only the lack of regulation allowing for varying amounts of monacolin and potential byproducts including citrinin.

**Summary**

- Studies are needed to determine if RYR supplement in the treatment of hyperlipidemia is a comparable treatment option to statins in efficacy, side effects, and safety to potentially reduce medication non-compliance.

**Research Questions**

- In patients with hyperlipidemia does RYR supplement as compared to statin treatment provide efficacious hypolipidemic results?

**Figure 1: Red Yeast Rice**

- RYR has potential to reduce hyperlipidemia as reflected in short duration trials but at this time can not be recommended due to lack of standardization, long-term side effects, narrow test populations, and secondary cardiovascular prevention.

**Figure 4: Atherosclerosis**

- Current FDA approved pharmacologic lipid modifying agents include niacin, statins, bezafibrate, and fenofibrate for the treatment of hypertriglyceridemia and secondary cardiovascular prevention.

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- UND Physician Assistant Program faculty for their relentless commitment to graduate students.

**Figure 3: RYR supplements (Cholestin, Xuezhikang, and Zhibi) vs placebo. Adapted from "Chinese Medicine" (2006). Retrieved from http://dx.doi.org.ezproxy.library.und.edu/10.1016/j.ahj.2013.03.019 reflecting RYR significantly reducing total cholesterol levels.

**Figure 2: Adapted from ApplPharmacology by Barrial, Wachter, & Martin, 2011 reflecting the effects of RYR and statins on cholesterol biosynthesis.**

**Figure 1: Red Yeast Rice**

- Pathogenesis: Disruption of atherosclerosis leading to coronary heart disease (Papadakis, Tierney, & McPhee, 2011).
- Atherosclerosis is a chronic inflammatory process involving the formation of atheromatous lesions (Papadakis, Tierney, & McPhee, 2011).

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