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# **UNIVERSIDADE ESTADUAL PAULISTA “JÚLIO DE MESQUITA FILHO”**

**PRISCILA MANFIO QUEIROZ**

## **IMPACTO DA DIETA HIPERCALÓRICA NO TECIDO CARDÍACO E DA SUPLEMENTAÇÃO COM NARINGENINA: PARÂMETROS METABÓLICOS E ESTRESSE OXIDATIVO**

**Dissertação apresentada à Faculdade de  
Medicina, Universidade Estadual Paulista  
“Júlio de Mesquita Filho”, Campus de  
Botucatu, para obtenção do título de Mestre  
em Fisiopatologia em Clínica Médica.**

**Orientadora: Profa. Dra. Ana Angélica  
Henrique Fernandes**

**BOTUCATU**

**2018**

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Palavras-chave: Dieta hipercalórica; Estresse oxidativo; Metabolismo energético ; naringenina.

*“Quando tudo tiver parecendo ir contra você, lembre-se que o avião decola contra o vento, e não a favor dele”.*

**Henry Ford**

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## RESUMO

**Introdução:** A dieta ocidental rica em carboidrato e lipídio promove o desenvolvimento da síndrome metabólica. Alterações do metabolismo energético provocadas por um desbalanço redox em virtude de dieta hipercalórica, gera danos oxidativos e deficiência no sistema enzimático antioxidante, intensificando fatores de risco e eventos que levam à doença cardiovascular. Os flavonoides são compostos de origem vegetal com propriedades antioxidante e antiaterogênico. O objetivo do estudo foi avaliar as alterações metabólicas séricas e cardíacas em ratos submetidos a dieta hipercalórica e tratados com naringenina. **Material e Métodos:** Foram utilizados 32 ratos *Wistar* machos, distribuídos em 4 grupos: (C) Controle, (N) naringenina, (H) hipercalórico, (HN) hipercalórico tratado com naringenina. Os grupos (C e N, n=16) receberam dieta padrão enquanto que os grupos (H e HN, n=16) receberam dieta hipercalórica durante 30 dias. Após este período iniciou-se o tratamento com naringenina 50mg/kg (grupos N e HN) durante 43 dias à intervalos de 7 dias via intra gástrica. Ao final do experimento, os animais foram anestesiados para eutanásia. Foram coletadas duas porções de tecido cardíaco e amostra sérica para análise de perfil lipídico, glicemia, metabolismo energético, estresse oxidativo e glicogênio cardíaco. **Resultados:** O grupo (HN) tiveram uma diminuição na ingestão hídrica e ingestão alimentar, peso final, ganho de peso e glicemia. Não houve diferença significativa no peso inicial entre os grupos. Houve uma melhora no grupo (HN) no perfil lipídico, metabolismo energético e estresse oxidativo com exceção do glicogênio, proteínas totais, e atividade da catalase que não apresentaram diferença significativa. **Conclusão:** O consumo de dieta hipercalórica causou dislipidemia, hiperglicemia, prejudicou o metabolismo energético e provocou consequentemente o estresse oxidativo no miocárdio. A análise da glicemia e perfil lipídico demonstrou que a suplementação de naringenina foi eficiente em atenuar esses parâmetros em animais submetidos à dieta hipercalórica. A oxidação exacerbada de ácidos graxos e o estresse oxidativo no tecido cardíaco, provocados pela dieta hipercalórica, foram controlados pela administração de naringenina.

**Palavras-chave:** Naringenina, Dieta hipercalórica, Metabolismo energético, Estresse oxidativo



## ABSTRACT

**Introduction:** Western diet rich in carbohydrates and lipids is an important role in metabolic syndrome development. Energy metabolism alterations caused by redox unbalance due to high fat diet, generated oxidative damage and deficiency in the antioxidant enzyme system, increasing risk factors and events that lead to cardiovascular disease. Flavonoids are natural compounds with antioxidant and antiatherogenic properties. This study assessed serum and cardiac metabolic alterations in rats fed with high fat diet and treated with naringenin. **Material and Methods:** We used 32 male *Wistar* rats, divided into 4 groups: (C) control, (N) naringenin, (H) high fat diet, (HN) high fat diet treated with naringenin. Groups (C and N, n=16) received standard diet whereas the groups (H and HN, n=16) received high fat diet during 30 days. After this period, the rats were treated with naringenin 50mg/kg (groups N and HN) during 43 days and at 7 days interval by gavage. Animals were anesthetized and led to euthanasia. Two cardiac tissue portions were collected as well as blood serum to evaluate lipid profile, glycemia, energy metabolism, oxidative stress and cardiac glycogen. **Results:** Group (HN) showed a decreased in water and food intake, final body weight, body weight gain and glycemia. There wasn't significant difference in initial body weight between the groups. There was an improvement in group (HN) on lipid profile, energy metabolism and oxidative stress. There wasn't significant difference on catalase activity, cardiac glycogen and total protein. **Conclusion:** It was concluded that high fat diet ingestion lead to dyslipidemia, hiperglycemia, empaired energy metabolism and caused oxidative stress in myocadium. Glycemic analysis and lipid profile showed that the supplementation of naringenin was effective to reduce these parameters in animals induced to high fat diet. The exacerbated oxidation of fatty acids and the oxidative stress in the cardiac tissue induced by high fat diet were controlled by naringenin administration.

**Keywords:** Naringenin, High fat diet, Energy metabolism, Oxidative stress

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## **CONCLUSÕES**

Conclui-se que o consumo de dieta hipercalórica causou dislipidemia, hiperglicemia, prejudicou o metabolismo energético e provocou conseqüentemente estresse oxidativo no miocárdio. A análise da glicemia e perfil lipídico demonstrou que a suplementação de naringenina foi eficiente em atenuar esses parâmetros em animais submetidos à dieta hipercalórica. A oxidação exacerbada de ácidos graxos e o estresse oxidativo no tecido cardíaco, provocados pela dieta hipercalórica, foram controlados pela administração de naringenina.

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