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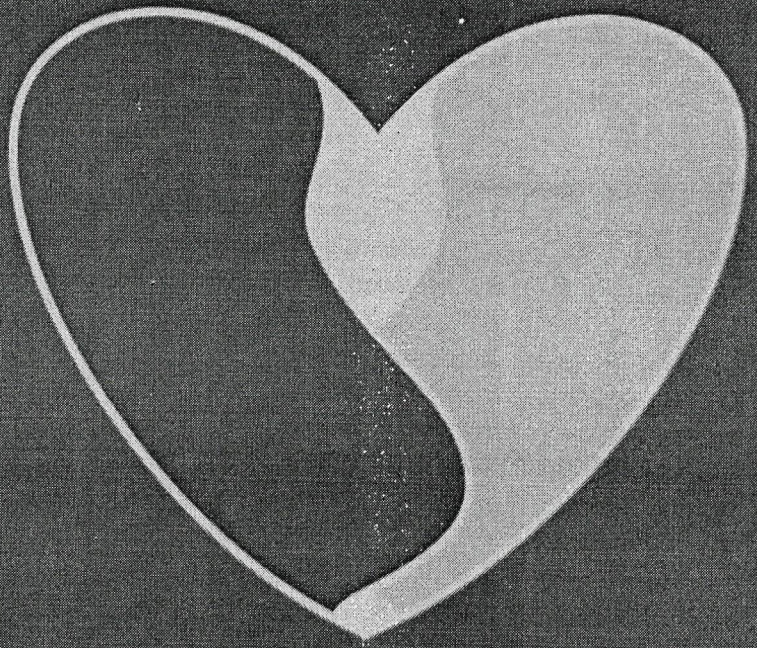

Polyphenol-Rich Juices as a Potential Solution for Preventing Metabolic Syndrome and Related Obesity Disorders

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Upotreba sokova bogatih polifenolima kao potencijalna prevencija razvoja metaboličkog sindoma i poremećaja vezanih za gojaznost

Uvod

Sve veća konzumacija hrane bogate mastima i rafinisanim sećerima, sa niskim sadrzajem dijetetskih vlakana dovela je do globalne epidemije gojaznosti. Skoro 60% odraslih i 30% dece u Evropi ima prekomernu težinu, a ovi procenti i dalje rastu. Ovakva, nezdrava, ishrana jedan je od glavnih faktora za razvoj metaboličkog sindroma, stanja koje vodi ka razvoju kardiovaskularnih bolesti i dijabetesa. Sama gojaznost značajno povećava rizik za razvoj najmanje 13 različitih tipova kancera. Polifenoli, prirodno zastupljeni u bobičastom voću, pokazali su blagotvorna dejstva na dislipidemiju, smanjenje krvnog pritiska, smanjenje akumulacije masti u jetri, inflamaciju i oksidativni stres. Stoga je ova studija orijentisana na prevenciju poremećaja izazvanih nezdravom ishranom upotrebom sokova bogatih polifenolima na animalnom modelu.

Materijal i metode

Četiri grupe pacova (muzjaci, n=8) stavljene su na različite ishrane u trajanju od deset nedelja. Kontrolna grupa je bila na standardnoj ishrani. Druga grupa stavljena je na ishranu obogaćenu sa 25% suncokretovog ulja, 20% fruktoze i 0.1 % holne kiseline (VMF). Treća je uz VMF ishranu pila 20% soka crne ribizle (CR), dok je četvrta bila na VMF ishrani i 20% soku drenjine (D). Pacovima je izmeren krvni pritisak, a nakon žrtvovanja su uzeti i uzorci krvi i jetre. Iz plazme je određena koncentracija glukoze, HDL-a, LDL-a, ukupnog holesterola i triglicerida. Izračunat je procenat visceralnog masnog tkiva u odnosu na telesnu masu i upoređene su krajnje težine životinja. Obojeni tkivni preseci jetre posmatrani su pod mikroskopom. Urađena je i karakterizacija sokova.

Rezultati

Utvrđeno je da je crna ribizla znatno bogatija ukupnim polifenolima u odnosu na drenjinu (1.6g/L prema 0.9 g/L). Ovaj trend zabeležen je i kod pojedinačnih klasa polifenola. U poređenju sa kontrolnom grupom, kod VMF grupe zabeležen je pad HDL-a, porast krvnog pritiska, akumulacija masti u jetri, kao i znatno veći procenat visceralnog masnog tkiva iako nije bilo razlika u krajnjim težinama životinja. Konzumacija oba soka uz VMF ishranu dovela je do pada ukupnog holesterola, ali i do još većeg sniženja HDL-a. Kod CR i D grupa takođe je zabeležen značajan porast visceralnih masnoća u poređenju sa kontrolom, ali je on kod CR grupe značajno niži nego kod VMF grupe. Kod CR grupe zabeležen je i trend smanjenja ukupne telesne mase. Konzumacija oba soka uz VMF ishranu očuvala je strukturu jetre, dok je na jetrama pacova isključivo na VMF ishrani došlo do značajne promene u histološkoj strukturi i arhitekturi pojedinačnih zona.

Zaključak

Suplementacija hladno cedenim sokovima bogatim polifenolima može imati blagotvorne efekte na prevenciju razvoja metaboličkog sindroma kao i prevenciju gojaznosti i razvoja nealkoholne masne jetre.

Introduction

The consumption of high-fat and refined sugar foods has caused a global pandemic of obesity. In Europe, almost 60% of adults and 30% of children are overweight, and these numbers continue to rise. The Western diet is a significant risk factor for metabolic syndrome, leading to cardiovascular disease and diabetes. Obesity alone is a risk factor for at least 13 types of cancer. Polyphenols, naturally found in berries, have shown positive effects on reducing dyslipidemia, inflammation, and oxidative stress. This study aimed to investigate the use of polyphenol-rich juices to prevent the health issues caused by an unhealthy diet in an animal model.

Methods

Four groups of male rats were placed to different diets for ten weeks. The control group received a standard diet, while the second group received a diet enriched with 25% fat, 20% fructose and 0.1% cholic acid (HFF). The third group drank 20% blackcurrant juice (BC) in addition to HFF diet, while the fourth group was on the HFF diet and 20% cornelian cherry juice (CC). The animals' blood pressure was measured, and blood and liver samples were taken after sacrifice. The concentration of glucose, HDL, LDL, total cholesterol and triglycerides was determined from the plasma. The percentage of visceral adipose tissue in relation to body mass was calculated, and the final weights of the animals were compared. Stained liver tissue sections were observed under a microscope. Juice characterization was conducted.

Results

Black currant was found to have higher total polyphenol content compared to cornelian cherry (1.6 g/L vs 0.9 g/L). This trend was also observed for individual polyphenol classes. Compared to the control group, the HFF group had a decrease in HDL, an increase in blood pressure, fat accumulation in the liver, and a significantly higher percentage of visceral adipose tissue, although there were no differences in the final weight of the animals. Consumption of both juices in addition to the HFF diet resulted in a decrease in total cholesterol, which in turn resulted in a higher decrease in HDL. A significant increase in visceral fat was also observed in the BC and CC groups compared with the control group, although the increase remained significantly lower in the BC group compared with the HFF group. A trend toward a decrease in total body mass was noted in the BC group. Both juices helped to preserve the structure of the liver, while significant changes in histological structure and architecture of individual zones were observed in the livers of rats that were only on the HFF diet.

Conclusion

Supplementation with cold-pressed polyphenol rich juices can have beneficial effects on the prevention of the development of metabolic syndrome as well as the prevention of obesity and the development of non-alcoholic fatty liver disease.