"Effect of lignin as a dietary supplement on lipid profile in rats"

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Abstract

Background: Lignin is natural polymer that works as a good lipids adsorbent, which could help in removing ingested food lipids completely with the stool. The conventional extraction process by solvents results in producing a low quality, toxic, and skin irritant lignin. This prevented lignin form being a good treatment for hyperlipidemic patients.
Aim of the study: To evaluate the use of the newly extracted lignin (i.e. AS lignin), obtained from Liquid Hot Water (LHW) pretreatment as a food supplement in hyperlipidemic rats, and to assess the effect of AS lignin on improving the lipid profile (i.e. in serum and feces), on liver toxicity and gut microbiota.
Materials and methods: Hyperlipidemia was induced by giving the rats a high Fat Diet (HFD), which is composed of cholesterol 1% and sheep fat 30% added to the Normal rat Diet (ND). Forty-four male Wister rats were divided into eight groups, group 1 received only ND and group 2 received only HFD for 4 weeks, group 3 received ND with 100 mg of lignin, the rest of groups received HFD with different concentration of lignin (50, 100 and 500 mg), simvastatin and the combination of lignin and simvastatinAll the doses of lignin as well as simvastatin and the combination were given orally for three weeks. Lipids profile were measured simultaneously in serum and feces, which included total cholesterol (TC), triacylglycerol (TAG), and high-density lipoprotein cholesterol (HDL-C). In addition, liver toxicity was measured by alanine transaminase (ALT) commercial kits, and the16s rRNA analysis was performed. By the end of the experiment, all the rats were sacrificed; hearts fats were weighted for all groups. Combination were given orally for three weeks. Lipids profile were measured simultaneously in serum and feces, which included total cholesterol (TC), triacylglycerol (TAG), and high-density lipoprotein cholesterol (HDL-C). In addition, liver toxicity was measured by alanine transaminase (ALT) commercial kits, and the16s rRNA analysis was performed. By the end of the experiment, all the rats were sacrificed; hearts fats were weighted for all groups.
Results: The effect of the tested lignin on improving lipid profile is a dose- dependent. The lowest dose of lignin (i.e., 50 mg) significantly reduced body weight for the rats fed on the HFD. It also, reduced heart fat weight when compared with those given other lignin doses or with rats fed on the ND. In feces lipids profile, lignin 50 mg significantly removed TC and TG outside the body rather than stored in the body organs. In comparison with simvastatin, lignin 50 mg decreased liver toxicity, and it helped in restoring the original gut microbiota**.**
Conclusion: These results appeared that, AS lignin has the potential to be used as a safe diet supplement to improve the lipid profile for the hyperlipidemic patients. It has also the best impact on the body as it decreases liver toxicity, decreases fat storage in body (represented by heart fat weight), and increases lipids excretion with feces. Lignin can be used efficiently without side effects or complications in the liver, as well as without disturb gut microbiota.

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