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Silymarin and Hepatic Health: Insights from Pig (*Sus scrofa*) and Human (*Homo sapiens*) Research

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Abstract

Silybum marianum, commonly known as milk thistle, has long been recognized for its hepatoprotective and gastrointestinal benefits. Its active compound complex, silymarin, comprises flavonolignans such as silybin, isosilybin, silychristin, dihydrosilybin, and silydianin, which possess the capacity to modulate gene expression pathways involved in detoxification and cellular stress responses. Given the herb's ability to counteract the detrimental effects of poor dietary habits, its therapeutic relevance continues to gain traction in both human and veterinary medicine.

This study aimed to evaluate the hepatoprotective effects of *S. marianum* using a porcine model, given the physiological and genetic similarities between pigs and humans. Young pigs (n=154), noted for their immunological responsiveness, were selected to assess the systemic and hepatic impact of silymarin. Following slaughter, comprehensive organ and tissue sampling was conducted, including liver, kidney, heart, pancreas, spleen, pituitary gland, stomach, intestinal segments (duodenum, jejunum, ileum, colon, cecum), and blood serum (collected using heparin and EDTA). Pre- and post-mortem blood samples were obtained via venipuncture from the external jugular vein.

Haematological and biochemical analyses were carried out at the Municipal Hospital Laboratory in Olsztyn. Parameters included complete blood count indices (WBC, RBC, HGB, HCT, MCV, MCH, MCHC, PLT, NEUT, LYM, MONO, EOS, BASO), immunoglobulin profiling (IgA, IgE, IgM, IgG), and metabolic markers (TC, HDL, LDL, TG, GLU) alongside liver function tests (ALT, AST, ALP, BIL, GGTP).

Findings from this study contribute to the mechanistic understanding of silymarin's effects on hepatic health, particularly through its influence on metabolic regulation and immune responses. Moreover, transcriptomic analysis is underway to further elucidate gene expression changes associated with silymarin administration. The use of the pig model not only enhances the translational relevance of these findings but also supports the exploration of silymarin as a complementary strategy in the prevention and management of liver disorders.

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