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Histopathological changes in male Wistar rats maintained on a water-based *Sutherlandia frutescencs* extract

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In this study, a standardized 46-week chronic drinking water toxicity protocol was used to elucidate the toxic potential of *Sutherlandia frutescens* using histopathologic, morphometric and transmission electron microscopic analysis. In this study, the histopathologic changes in the duodenum, heart, kidney, liver, lung, pancreas and spleen of male Wistar rats was evaluated. Fifty-four rats were randomly divided into four groups: Group 1–Normal diet control (ND control), n=7, Group 2–Normal diet + plant extract (ND+p), n=9, Group 3–High fat diet control (HFD control), n=19. Group 4–High fat diet + p (HFD + p), n=19. In the high fat group male Wistar rats were fed ±55 g/day of a specialized high fat diet over a 46-week period to induce obesity and an insulin resistant state. The treatment groups (groups 2 and 4) received a dose concentration of a tea extract of the *S. frutescens* plant in their drinking water daily. This study showed that the consumption of *S. frutescens* significantly reduces weight gain per week in male Wistar rats on a chronic high fat diet ($p \leq 0.001$ vs. HFD control group). *S. frutescens* appears to propagate periportal and centrilobular glycogen storage in rat hepatocytes in the experimental groups as exemplified by a significantly ($p \leq 0.0001$ vs. control groups) increased incidences of Periodic Acid Schiff (PAS) positive staining. *S. frutescens* also reduced intracellular lipid accumulation as made evident by the significantly lower incidence of epicardial adipose tissue (EAT), hepatic steatosis and pancreatic interstitial fat. Obesity was associated with increased fibrotic lesions such as myocardial perivascular fibrosis, centrilobular hepatic fibrosis and pancreatic periductal fibrosis. In this study, pulmonary infection was equally prevalent in all rats. Despite the complex histopathology in all groups' unique histopathology such as a conservative PMNL infiltration, substantial intra-alveolar oedema and focal arterial wall hypertrophy in the control groups was highly suggestive of Sendai viral infection. However, histopathologic evidence in the treatment groups, suggested chronic recurrent viral infection with superimposed *Mycoplasma pulmonis* bacterial infection. The impact of advanced suppurative pulmonary infection was widespread and exemplified by increased lesion incidences of spontaneous murine progressive cardiomyopathy (MCP) and spontaneous chronic progressive nephropathy (CPN) among others. In conclusion, *S. frutescens* administered for 46 weeks to male Wistar rats significantly lowered intracellular lipid accumulation and obesity associated myocardial, renal, hepatobiliary, pulmonary and pancreatic histopathology. Moreover, duodenal, cardiovascular, hepatobiliary, pulmonary, renal, pancreatic and splenic tissue did not show histopathologic evidence of direct plant extract associated carcinogenicity or toxicity.

Speaker Biography

Nicolas John Wickens has completed his Doctorate from the Nelson Mandela University in South Africa. He is a Lecturer of Pathology and Histology in the Department of Medical Laboratory Sciences in the Faculty of Health Sciences. After his pre-med studies at the University of Stellenbosch, he went on to complete a Master's degree in Medical Laboratory Sciences at the Nelson Mandela University, where he was offered a post as Lecturer in the department. During his Doctorate studies, he investigated the histopathology found in male Wistar rats after chronic consumption of an extract of the plant *Sutherlandia frutescencs* which is used in South Africa by the indigenous people to lower blood sugar in patients with type 2 diabetes.

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