The effect of squid extract (loligo sp.) on TNF-α and TGF-β1 serum levels during wound healing in streptozotocin-induced diabetic rats

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Abstrak

Background: Diabetes Mellitus is a chronic disease characterised by elevated levels of blood glucose known as
hyperglycaemia. Diabetes is due to impaired insulin action in the metabolism of glucose and can result in impaired
wound healing. Excessive production of pro-inflammatory cytokines, an increased number of macrophages and
neutrophils, and decreased levels of transforming growth factor ? beta 1 (TGF-β1) serum can be characteristic of
impaired wound healing. This study aims to determine the effects of squid extract on certain wound parameters such as
levels of tumour necrosis factor ? alpha (TNF-α), and TGF-β1 serum and the number of macrophages and neutrophils.
Methods: This was a post-test only, randomized controlled group study that was conducted on male Wistar rats.
Experimental animals were divided into 6 groups; (1) normal wound with standard diet, (2) diabetic wound with
standard diet, (3) diabetic wound with chitosan supplement, (4) diabetic wound given squid extract orally once a day,
(5) diabetic wound given squid extract orally twice a day, and (6) diabetic wound given squid extract orally once every
two days. Levels of TNF-α and TGF-β1 serum were observed using Enzyme-Linked Immunosorbent Assay.
Haematocylin and eosin staining was used to observed macrophage and neutrophil counts. All data was analysed
statistically by one-way analysis of variance. Results: TNF-α serum levels showed a significant decrease ($p < 0.05$) in
subjects that received squid extract orally once every two days. The mean levels of TGF-β1 showed no significant
differences. The mean number of macrophage cells showed a significant decrease ($p < 0.05$) in all treatment groups.
The mean number of neutrophil cells also showed significant decrease ($p < 0.05$) in all treatment groups.
Conclusions:
Squid extract is effective in lowering the TNF-α serum levels and the number of macrophages and neutrophils cells in

Wistar rats. However, there were insignificant findings on increasing levels of TGF-β1 serum. This data suggests that
squid extract is most effective during the inflammatory phase of wound healing which takes places about 2-4 days after
wound creation.