

# DDT, MALE REPRODUCTIVE HEALTH AND THYROID HOMEOSTASIS OF NON-OCCUPATIONALLY EXPOSED MEN FROM A MALARIA AREA IN LIMPOPO PROVINCE, SOUTH AFRICA

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**Background and Aims:** The Persistent Organic Pollutant (POP), dichloro-diphenyl-trichloroethane (DDT), has been used for malaria vector control in Limpopo Province, South Africa, since 1945. POPs are noted for their toxicity, persistence and bio-accumulative characteristics. The Aim of the study was to investigate the association between DDT, as reflected in plasma concentrations, and seminal parameters, possible adverse effects on human sperm genetic integrity, and thyroid homeostasis, while considering related factors.

**Methods:** A cross-sectional study, recruiting 546 young males from three communities in an endemic malaria area where DDT is sprayed annually, was conducted. Blood plasma DDT and its metabolite levels were measured. A semen analyses were performed and sperm chromatin structure assay and Aniline Blue test were used to assess sperm DNA/chromatin integrity in 209 participants. Dietary intake, serum retinol-binding protein (RBP), transthyretin (TTR) and albumin concentrations and liver- and thyroid function were compared between cases with evidence of a body burden of DDT in the circulation and controls.

**Results:** The lipid adjusted DDT mean (+SD) and median concentrations were 109.2 (+106.6) and 83.9 µg/g, respectively; and the lipid adjusted DDE mean (+SD) and median concentrations were 246.2 (+218.5) and 177.8 µg/g, respectively. In addition to effects on seminal parameters, the results point to a weak association between DDT/DDE plasma concentration and the incidence of sperm with chromatin defects. Significantly lower thyroid hormone concentrations were in observed cases ( $p < 0.01$ ). A significant linear trend was observed for S-free T4 and T3 concentrations ( $p < 0.001$ ) and relatively low RBP concentrations were associated with significantly higher DDT and DDE isomer concentrations, and a higher DDE/DDT ratio ( $p < 0.01$ ), which signifies long-term exposure.

**Conclusions:** The results suggest that long-term non-occupational environmental DDT exposure may have a negative impact on seminal parameters, sperm chromatin integrity, and on thyroid function and related parameters of young South African males.