

Insecticidal properties of mugetanol derivatives against vector mosquitoes

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Continuing the search for mosquitocidal properties of essential oils, essential oil compounds and derivatives, mosquitocidal activity of mugetanol has been recognized. The objective of this study is to synthesize derivatives of mugetanol and to evaluate the mosquitocidal activity of those to establish Structure Activity Relationship of compounds.

Acyl (acetate, chloroacetate, dichloroacetate, trifluoroacetate, propionate, chloropropionate and pivalate), aryl (benzoate) and methoxy derivatives of mugetanol were synthesized by literature reported procedures. Synthetic derivatives were purified by Dry Column Flash Chromatography wherever necessary. Structures of compounds were elucidated/confirmed by ¹H and ¹³C NMR spectral data. The bioassay against mosquitoes followed the WHO standard protocol.

The mosquitocidal activity of mugetanol or the derivatives has not been previously reported. Analogue synthesis of mugetanol resulted compounds in good yield with enhanced mosquitocidal activity. Among them mugetanyl trifluoroacetate is the most active compound against *An. tessellatus* (LD₅₀ 0.27 µg mL⁻¹) and mugetanyl acetate against *Cx. quinquefasciatus* (LD₅₀ 0.66 µg mL⁻¹). Mortality data also indicated that mugetanyl acetate (LD₅₀ 0.56 µg mL⁻¹), chloroacetate (LD₅₀ 0.77 µg mL⁻¹) and pivalate (LD₅₀ 0.78 µg mL⁻¹) have good activity against *An. tessellatus* and also pivalate against *Cx. quinquefasciatus* (LD₅₀ 1.1 µg mL⁻¹). However, none of the derivatives showed good activity against *Ae. aegypti* with relative to mugetanol (LD₅₀ 0.79 and KD₅₀ 0.36 µg mL⁻¹).

It appeared that esterification with less bulky haloacyl group tends to enhance the activity of mugetanol. Structurally similar derivatives i.e. menthol, thymol and α-terpineol have comparable activity with mugetanol indicating that structural variations of the molecule also contribute to enhance or retain the activity.

This study indicates that the structure characteristic of mugetanol can influence its mosquitocidal properties and clearly, hydroxyl group, its size, shape and especially the position and the aromaticity of the molecule contribute towards the activity.

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