Structure Activity Relationship of Drugs of Abuse

Kersty Axisa, Janis Vella Szijj, Anthony Serracino Inglott
Department of Pharmacy, Faculty of Medicine and Surgery, University of Malta, Msida, Malta
email: kersty.axisa.15@um.edu.mt

AIMS
The study aimed at identifying links between structural modifications and physiological effects, adverse effects and toxicities of synthetic cannabinoids, cathinones and opioids.

METHODS
Literature review identified the functional groups of the external structural backbone of synthetic drugs of abuse in relation to adverse drug reactions, toxicities and physiological effects of amino alkyl indoles, synthetic cathinones and fentanyl analogues.

RESULTS

<table>
<thead>
<tr>
<th>Drug of abuse</th>
<th>Fentanyl</th>
<th>Acetylfentanyl</th>
<th>Ocfentanil</th>
<th>Acryloyfentanyl</th>
<th>Furanylfentanyl</th>
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</thead>
<tbody>
<tr>
<td><strong>Molecular Structure</strong></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td><strong>Lipophilic Character</strong></td>
<td>XLogP=4.0</td>
<td>Lower Lipophilic character than fentanyl (XLogP=3.6)</td>
<td>Lower Lipophilic character than fentanyl (XLogP=3.6)</td>
<td>Higher Lipophilic character than fentanyl (XLogP=4.2)</td>
<td>Higher Lipophilic character than fentanyl (XLogP=4.6)</td>
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<tr>
<td><strong>Duration of Physiological effects</strong></td>
<td>30-60 minutes</td>
<td>Lower duration of effects when compared to fentanyl</td>
<td>Lower duration of effects when compared to fentanyl</td>
<td>Higher duration of effects when compared to fentanyl</td>
<td>Highest duration of effects when compared to fentanyl</td>
</tr>
</tbody>
</table>

Table 1: Table showing drug of abuse, molecular structure, adverse drug reaction and cause for ADR for XLR-11, MDMB-CHMICA, α-PVP and MDPV.

CONCLUSION
The physiochemical changes brought about by structural modifications to produce synthetic drugs of abuse are linked to changes in potencies and changes in types and duration of effects.

Synthetic cannabinoids and synthetic cathinones are linked to increased adverse effects and toxicities. Fentanyl analogues displayed similar effects and toxicities to those of earlier developed opioids but differed in duration of effects.

This study contributes to an explanation of the higher potencies, toxicities and adverse drug reactions associated with the abuse of synthetic drugs.