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# Harmful Residues in salted and smoked Fish

A Thesis Presented

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# Contents

	<b>Page</b>
<b>1. INTRODUCTION .....</b>	<b>1</b>
<b>2. REVIEW OF LITERATURE.....</b>	<b>5</b>
2. 1. Heavy metals.....	<b>5</b>
2. 1. 1. Incidence of heavy metals in fish.....	<b>5</b>
2. 1. 2. Sources of fish contamination with heavy metals.....	<b>8</b>
2. 1. 3. Public health hazards of heavy metals.....	<b>11</b>
2.2. Aflatoxin.....	<b>14</b>
2.2.1. Incidence of Aflatoxin in fish.....	<b>14</b>
2.2.2. Sources of Aflatoxin in fish .....	<b>16</b>
2.2.3. Public health hazards of Aflatoxin.....	<b>19</b>
2. 3. Histamine.....	<b>22</b>
2. 3. 1. Incidence of Histamine in fish.....	<b>22</b>
2.3.2. Sources of fish contamination with histamine.....	<b>24</b>
2.3.3. Public Health hazards of histamine.....	<b>27</b>
<b>3. MATERIAL AND METHODS.....</b>	<b>30</b>
3.1.Collection of samples.....	<b>30</b>
3. 2. Determination of heavy metals.....	<b>30</b>
3. 2.1.Washing procedures .....	<b>30</b>
3. 2.2. Digestion technique .....	<b>31</b>
3. 2.3. Preparation of blank and standard solutions .....	<b>31</b>
3. 2.4. Analysis .....	<b>32</b>
3. 2.5. Quantitative determination of heavy metal residues..	<b>33</b>
3.3. Determination of aflatoxins: .....	<b>33</b>

	<b>Page</b>
3.3.1. Preparation of chemicals:.....	<b>33</b>
3.3.2. Standard Aflatoxin solutions:.....	<b>34</b>
3.3.3. Extraction and clean-up procedures for high-performance liquid chromatography (HPLC) analysis:.....	<b>34</b>
3.3.4. Determination of aflatoxins by HPLC method:.....	<b>35</b>
3.4. Determination of histamine by ELISA.....	<b>36</b>
3.4.1. Intended use and principle of the test:.....	<b>36</b>
3.4.2. Test procedure:.....	<b>36</b>
3.4.3. Preparation of reagents:.....	<b>37</b>
3.4.3.1. Wash Buffer:.....	<b>37</b>
3.4.3.2. Acylation Diluent:.....	<b>37</b>
3.4.3.3. Acylation Reagent:.....	<b>37</b>
3.5. Sample preparation and acylation:.....	<b>37</b>
3.6. Calculation of results:.....	<b>39</b>
3.7. Quality control.....	<b>39</b>
3.8. Calibration.....	<b>39</b>
3.9. Statistical analysis.....	<b>40</b>
<b>4. RESULTS.....</b>	<b>41</b>
<b>5. DISCUSSION.....</b>	<b>61</b>
<b>6. SUMMARY.....</b>	<b>74</b>
<b>7. CONCLUSION AND RECOMMENDATIONS .....</b>	<b>77</b>
<b>8. REFERENCES.....</b>	<b>82</b>
<b>9. ARABIC SUMMARY.....</b>	<b>-</b>

## List of Tables

<b>Table No.</b>	<b>Title</b>	<b>Page No</b>
<b>1</b>	Prevalence of mercury residues in the examined samples of salted and smoked fish.	<b>41</b>
<b>2</b>	Concentrations of mercury residues (mg/Kg) in the examined samples of salted and smoked fish.	<b>42</b>
<b>3</b>	Analysis of variance (ANOVA) of mercury residues in the examined salted and smoked fish.	<b>43</b>
<b>4</b>	Validity of the examined salted and smoked fish based on their mercury residues.	<b>43</b>
<b>5</b>	Prevalence of lead residues in the examined samples of salted and smoked fish	<b>44</b>
<b>6</b>	Concentrations of lead residues (mg/Kg) in the examined samples of salted and smoked fish.	<b>45</b>
<b>7</b>	Analysis of variance (ANOVA) of lead residues in the examined salted and smoked fish.	<b>46</b>
<b>8</b>	Validity of the examined salted and smoked fish based on their lead residues.	<b>46</b>
<b>9</b>	Prevalence of cadmium residues in the examined samples of salted and smoked fish.	<b>47</b>
<b>10</b>	Concentrations of cadmium residues (mg/Kg) in the examined samples of salted and smoked fish.	<b>48</b>
<b>11</b>	Analysis of variance (ANOVA) of cadmium residues in the examined salted and smoked fish.	<b>49</b>
<b>12</b>	Validity of the examined salted and smoked fish based on their cadmium residues .	<b>49</b>

<b>Table No.</b>	<b>Title</b>	<b>Page No</b>
<b>13</b>	Prevalence of arsenic residues in the examined samples of salted and smoked fish.	<b>50</b>
<b>14</b>	Concentrations of arsenic residues (mg/Kg) in the examined samples of salted and smoked fish.	<b>51</b>
<b>15</b>	Analysis of variance (ANOVA) of arsenic residues in the examined salted and smoked fish.	<b>52</b>
<b>16</b>	Validity of the examined salted and smoked fish based on their arsenic residues.	<b>52</b>
<b>17</b>	Prevalence of copper residues in the examined samples of salted and smoked fish.	<b>53</b>
<b>18</b>	Concentrations of copper residues (mg/Kg) in the examined samples of salted and smoked fish.	<b>54</b>
<b>19</b>	Analysis of variance (ANOVA) of copper residues in the examined salted and smoked fish.	<b>55</b>
<b>20</b>	Validity of the examined salted and smoked fish based on their copper residues.	<b>55</b>
<b>21</b>	Prevalence of aflatoxin residues in the examined samples of salted and smoked fish.	<b>56</b>
<b>22</b>	Average concentrations of mycotoxin residues (ug/Kg) in the examined samples of fish products.	<b>57</b>
<b>23</b>	Prevalence of histamine in the examined samples of salted and smoked fish.	<b>58</b>
<b>24</b>	Concentrations of histamine (mg/Kg) in the examined samples of salted and smoked fish.	<b>59</b>

<b>25</b>	Analysis of variance (ANOVA) of histamine in the examined salted and smoked fish.	<b>60</b>
<b>26</b>	Validity of the examined salted and smoked fish based on their histamine contents .	<b>60</b>

## List of Figures

<b>No.</b>	<b>Figure Title</b>	<b>Page</b>
<b>1</b>	Incidence of mercury residues in the examined salted and smoked fish.	<b>41</b>
<b>2</b>	Average concentrations of mercury residues (mg/Kg) in the examined salted and smoked fish.	<b>42</b>
<b>3</b>	Incidence of lead residues in the examined salted and smoked fish	<b>44</b>
<b>4</b>	Average concentrations of lead residues (mg/Kg) in the examined salted and smoked fish.	<b>45</b>
<b>5</b>	Incidence of cadmium residues in the examined salted and smoked fish.	<b>47</b>
<b>6</b>	Average concentrations of cadmium residues (mg/Kg) in the examined salted and smoked fish.	<b>48</b>
<b>7</b>	Incidence of arsenic residues in the examined salted and smoked fish	<b>50</b>
<b>8</b>	Average concentrations of arsenic residues (mg/Kg) in the examined salted and smoked fish.	<b>51</b>
<b>9</b>	Incidence of copper residues in the examined salted and smoked fish	<b>53</b>
<b>10</b>	Average concentrations of copper residues (mg/Kg) in the examined salted and smoked fish.	<b>54</b>
<b>11</b>	Incidence of aflatoxin residues in the examined salted and smoked fish.	<b>56</b>
<b>12</b>	Mean values of aflatoxin residues (ug/Kg) in the examined samples of fish products.	<b>57</b>
<b>13</b>	Incidence of histamine in the examined salted and smoked fish samples	<b>58</b>
<b>14</b>	Average concentrations of histamine (mg/Kg) in the examined salted and smoked fish.	<b>59</b>

## 6. Summary

The present study was carried out to analyze 90 samples of salted and smoked fish for determination of their contents to heavy metals (mercury, lead and cadmium, arsenic, copper), aflatoxin (B1, B2, G1, G2) and biogenic amines (histamine).

### **1-Dermination of heavy metal residues:**

- **Mercury (Hg):**

The obtained results revealed that the mean values of mercury in the examined feisiekh, sardine and herring  $0.92 \pm 0.01$ ,  $0.73 \pm 0.01$  and  $0.48 \pm 0.01$  mg/kg, respectively.

The differences associated with mercury were highly significant among salted and smoked fish ( $P < 0.01$ ).

According to **EOS (2010)** which recommended that the maximal permissible limit for mercury is 0.5 (mg/kg) in fish, the number of accepted samples in the examined feisiekh, sardine and herring were 16, 21 and 22 represented as 53.3%, 70% and 73.3%, respectively.

- **Lead (Pb):**

Regarding to lead, the obtained results revealed that the mean values of examined feisiekh, sardine and herring were  $0.67 \pm 0.01$ ,  $0.51 \pm 0.01$  and  $0.32 \pm 0.01$  mg/kg, respectively.

The differences associated with lead were highly significant among salted and smoked fish ( $P < 0.01$ ).

According to **EOS (2010)** which recommended that the maximal permissible limit for lead is 0.1 (mg/kg) in fish, the number of accepted samples in the examined feisiekh, sardine and herring were 18, 22 and 24 represented as 53.3%, 73.3% and 80%, respectively.



- **Cadmium (Cd):**

The average concentrations of the examined feisiekh, sardine and herring samples for cadmium residues were  $0.21 \pm 0.01$ ,  $0.14 \pm 0.01$  and  $0.10 \pm 0.01$  mg/kg, respectively.

The differences associated with cadmium were significantly different ( $P < 0.05$ ).

**EOS (2010)** recommended that the maximal permissible limit for cadmium is 0.1 (mg/kg) in fish, the number of accepted samples in feisiekh, sardine and herring samples were 20, 23 and 24 represented as 66.7%, 76.7% and 80%, respectively.

- **Arsenic (As):**

The average concentrations of the examined feisiekh, sardine and herring samples for arsenic residues were  $0.26 \pm 0.01$ ,  $0.12 \pm 0.01$  and  $0.07 \pm 0.01$  mg/kg, respectively.

The differences associated with arsenic were high significant differences ( $P < 0.01$ ).

According to **Global Agricultural Information Network "GAIN" (2014)**, the number of accepted samples in feisiekh, sardine and herring samples were 29, 30 and 30 represented as 96.7%, 100% and 100%, respectively.

- **Copper (Cu):**

The average concentrations of the examined feisiekh, sardine and herring samples for copper residues were  $1.74 \pm 0.23$ ,  $2.29 \pm 0.31$  and  $1.12 \pm 0.15$  mg/kg, respectively.

The differences associated with copper were significantly different ( $P < 0.05$ ).

According to **Food Stuffs Cosmetics and Disinfectant Act (2007)**, the samples of feisiekh, sardine and herring samples were all accepted.

### **2-Aflatoxin:**

Aflatoxin (B1) average mean in feisiekh was  $8.96 \pm 0.72$  while aflatoxin (B1, B2, G1, G2) average mean in smoked herring was  $25.38 \pm 1.55$ ,  $9.06 \pm 0.14$ ,  $5.81 \pm 0.43$  and  $2.26 \pm 0.05$ , respectively. Sardine was free from aflatoxin.

### **3-biogenic amine residues (Histamine):**

Concerning the average concentrations of histamine as biogenic amine residue, in the examined feisiekh, sardine and herring fish samples were  $20.76 \pm 0.54$ ,  $15.49 \pm 0.31$  and  $9.82 \pm 0.26$ , respectively.

The differences associated with histamine were highly significant differences ( $P < 0.01$ ).

According to **EOS (2010)** which recommended that the maximal permissible limit for histamine is 20 (mg/100g) in fish, the number of accepted samples in the examined feisiekh, sardine and herring were 14, 19 and 21 represented as 46.7%, 73.3% and 70%, respectively.

Public health significance of these chemical residues and possible sources of fish contamination as well as some recommendations to control or minimize such toxic pollutants were discussed.