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EVALUATION OF AFLATOXINS OCCURRENCE AND EXPOSURE IN CHOCOLATE BARS

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The mycotoxin aflatoxins (AF) B1, B2, G1, and G2 pose a significant threat to food safety, contaminating crops in the field and during storage, and affecting a wide range of raw materials and processed foods. The 2020 EFSA scientific opinion highlights that cocoa contributes significantly to dietary exposure to AFB1 in all age groups. Therefore, it is crucial to investigate their occurrence in these products, commonly consumed by vulnerable populations such as children. Additionally, maximum levels for aflatoxins, recognized as carcinogenic to humans, have not yet been set for cocoa and its derivatives in Commission Regulation (EU) 2023/915.

This study aimed to evaluate the contamination by aflatoxins B1, B2, G1, and G2 in 160 commercial samples of branded dark chocolate bars (54 organic and 106 conventional) and 125 samples of branded milk chocolate bars (13 organic and 112 conventional). Mycotoxins were extracted with methanol: water (80:20), followed by cleanup using immunoaffinity columns. The determination was made by HPLC coupled to photochemical derivatization (PHRED) and fluorescence detection (FLD). Finally, the exposure assessment for AFB1, the most toxic aflatoxin, was conducted using ENALIA surveys.

Sixty-eight out of 160 dark chocolate samples (42.5%) tested positive for total aflatoxins. The incidences were as follows: B1 (63 samples), B2 (25 samples), G1 (10 samples), and G2 (2 samples). The four aflatoxins only co-occurred in one sample. On the other hand, 16% of milk chocolate bars tested positive for total aflatoxins, B1 was detected in 20 samples, B2 and G1 in 2 samples, respectively, and G2 in no sample. The incidence of total aflatoxins was similar in conventional (45.3% in dark and 15.2% in milk bars) than in organic (37.0% in dark and 23.1% in milk bars) samples, with the highest global incidence in dark chocolate.

The MOE values for AFB1 exposure in all age groups exceeded the value of 10,000, suggesting that there is no significant risk related to the consumption of this kind of products, although without ignoring the incidence of aflatoxins in more than 40% of the samples analyzed.

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palabras clave: aflatoxin; chocolate; cocoa; exposure.