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Editorial

Can Lead in Honey be Dangerous for Children Health?

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Abbreviations

IQ: Intelligence Quotient Score; PTWI: Provisional Tolerable Weekly Intake; WHO: World Health Organization; GEMS: Global Environment Monitoring System

Honey consumption in early childhood nutrition is worldwide considered one of the most natural and effective remedies for the health development of all children, and a natural growth enhancer, helping to prevent diabetes mellitus, cancer, asthma, and cardiovascular, neurological, and gastrointestinal diseases. Furthermore, it has been demonstrated to have a therapeutic role in the treatment of disease by phytochemical, anti-inflammatory, antimicrobial, and antioxidant properties [1] and it is indicated for the symptomatic relief of cough [2]. Only recently, the presence of potential unhealthy substances in honey, i.e. heavy metals and pesticides, has been subject of studies in this food, always considered as a cure-all substance [3-5].

Among the possible contaminants in honey, particular attention in our opinion should be devoted to lead. Lead can be considered a ubiquitous pollutant: most developed communities have already adopted policies that eliminated lead from paint and gasoline, but still inhabitants of many countries are still exposed to high lead levels [6]. Exposure to lead is well known to have adverse effects on human health, especially on the nervous system of young children, cardiovascular effects and nephrotoxicity in adults. Children are particularly vulnerable and an elevated blood lead level has been associated with a reduced Intelligence Quotient score (IQ) and reduced cognitive functions [7]. Young adults with histories of childhood lead exposure have been reported to have lowered intellectual function [8] and altered brain structure, suggesting that cognitive impairment persists at least to young adulthood [9]. Recently, an association between greater blood lead levels and a decline in IQ and socioeconomic status from childhood to adulthood was observed with 40% of the association with downward mobility mediated by cognitive decline from childhood [10]. The Joint Food and Agriculture Organization/World Health Organization Expert Committee on Food Additives designed for Pb a provisional tolerable weekly intake (PTWI) of 25 μg kg^{-1} of body-weight [11]. Metal contamination of foodstuffs (i.e. with Cu, Pb, Cd) has become a hot issue in the modern and highly "technologized" world: for example, less than 20 years ago there were no specific maximum residue limit (MRL) values for Pb and Cd in honey, but values of 0.1 mg kg^{-1} for Cd and 1 mg kg-1 for Pb were suggested by some European Authorities [12].

In a recent study [13], results from 72 honey samples obtained from different Italian Regions reported a maximum Pb concentration in honey equal to 370 μg kg-1. Considering a body weight of 70 kg and a 20 g daily honey consumption, these intakes represents 3.0%, of the PTWI for Pb. Therefore, although these honey samples are not and Pb free, the heavy metal intake due to honey consumption are well below the recommended dose and, from this point of view, its consumption can be considered not dangerous for adult human health. On

the other hand, infants and children are more vulnerable to the effects of ingested chemical hazards, because they can influence organ system developments and long latency periods that may occur between exposure and outcomes. Furthermore, children consume more food per unit of body weight than adults do: this value is two times higher in the case of infants. Owing to the scarcity of child specific data on food consumption, WHO's Global Environment Monitoring System/Food Contamination Monitoring and Assessment Program (GEMS/Food) encourages all countries, particularly developing countries, to undertake total infant and children diet studies [14]. In this context, it appears very important to monitor heavy metals levels in food usually consumed by children, like honey. For example, considering the results obtained by the 72 samples analyzed in the abovementioned work and the relatively high lead content also described in other papers [15], particular attention should be devoted to honey samples with high concentration of this element, because they could constitute an important Pb intake source for infant/children. In Sultanoğlu paper, for example, a maximum lead content of 2020 μg Kg^{-1} is reported. Considering an assumption of 30 g day^{-1}, it results that only from honey the lead intake could be of about 60 μg. This value should be considered critical, considering that for children weighting 10 kg, the PTWI is 250 μg, and then, lead assumption by honey in this case could be close to 25% of the PTWI. Bearing in mind the different contributors to lead exposure in the general population, i.e., cereal products, potatoes, cereal grains (except rice), cereal-based mixed dishes and leafy vegetables, tap water and phytotherapic compounds, lead content in honey should be carefully considered and more information should be provided to the final consumers, for example inserting a label containing information about the level of lead determined in each honey batch that present in the market. Furthermore, lead-bearing containers and beehives locations close to areas with a high traffic degree, incinerators or industrial activities, should be avoided.

Conflict of Interest

The Authors declare no conflict of interest.

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