TOXIC METAL IMPURITIES IN CALCIUM SUPPLEMENTING DRUGS – IS IT A CONSEQUENCE OF ANTHROPOGENIC POLLUTION?

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Abstract: Calcium is an important mineral which is essential for most organisms. In humans about 99 percent of the calcium is found in bones and teeth. Due to deficiency of calcium especially in children, women and elderly people, calcium supplements are prescribed by doctors and medical shops in India. The awareness of calcium deficiency also forces people to go for calcium supplements as a non-prescription drug. The source of calcium in the supplements are mostly natural resources especially, oyster shells, dolomite, bone meal, coral calcium and milk. Some of the companies make advertisements about the advantages of using calcium supplements and make big claims about the superiority of using naturally derived calcium. In most of these resources apart from calcium, they contain toxic metal impurities in varying concentrations. These impurities may cause toxic effects rather than benefit from consumption of calcium supplements. The harmful effects are from excess concentration of impurities like magnesium, iron or from toxic metals like lead, cadmium etc. In most of the pharmacopoeia, heavy metal limit test is mentioned which has some limitations in quantifying these metals. So there is a need for the agencies to look for reliable techniques, while making regulations. The calcium supplements available in local market were analyzed for the possible impurities. The study includes supplements containing calcium carbonate, calcium phosphate, calcium from milk etc. Ten metal impurities were determined using ICP MS. The concentrations of some of the metals; Pb, Cd, etc. show similar trend as reported by earlier investigators. The values were compared with some of the specifications laid down by agencies like USP and ECMA. The concentrations of Pb in several calcium supplements (11-25 µg/day) have exceeded the oral Permissible Daily Exposure (PDE) limit. This could be due to contamination of raw materials i.e. see shells by anthropogenic pollution from different sources like industrial effluents and others. The results of our study will be presented and discussed as a part of this invited lecture. The toxicity arising from toxic metals in calcium supplements was first reported 25 years ago. The studies are mostly done in developed countries and there is a need to take up such studies in developing countries also in a comprehensive manner. The government agencies must insisting on the trace and toxic metal impurity profiling by companies that are manufacturing calcium supplements.