

Opinion

# Extensive Exposure of Cadmium (Cd): A Silent Driver of Diabetes Epidemic beyond Testing of Blood Sugar in Pakistan

Abdul Qader<sup>1,\*</sup>, Rabia Khaliq<sup>2</sup> and Muhammad Khawar Hayat<sup>2</sup>

<sup>1</sup>Department of Pharmaceutical Chemistry, Government College University Faisalabad, Faisalabad 38000, Pakistan

<sup>2</sup>Department of Physics, University of Agriculture Faisalabad, Faisalabad 38000, Pakistan

## Article history

Received: 11 December 2025

Revised: 25 December 2025

Accepted: 29 December 2025

Published Online: 31 December 2025

## \*Correspondence:

Abdul Qader

Address: Department of Pharmaceutical Chemistry, Government College University Faisalabad 38000, Pakistan.

Email: [pharmacistqader316@gmail.com](mailto:pharmacistqader316@gmail.com)

**How to cite this article:** Qader A, Khaliq R, Hayat MK. Extensive Exposure of Cadmium (Cd): A Silent Driver of Diabetes Epidemic beyond Testing of Blood Sugar in Pakistan. *Health Dynamics*, 2025, 2(12), 496-497. <https://doi.org/10.33846/hd21204>

## ABSTRACT

The prevalence of diabetes mellitus has been increased and our diagnostic strategies are limited to only body mass index (BMI), blood sugar level and life style changes. This is actually a silent driver which we ignored in diagnosis of diabetes mellitus. The elevated level of blood sugar tells us that our pancreas is struggling while high level of cadmium in urine and blood exhibits why pancreas is struggling. Until, we test blood and urinary cadmium levels we cannot reach the actual cause of high blood sugar level. Thus, we ignore a cause which should actually be removed. Therefore, the concentration of cadmium should not be ignored during the diagnosis of diabetes mellitus especially in big cities of Pakistan where exposure is on its peak level.

**Keywords:** Cadmium; exposure; diabetes mellitus; Pakistan



**Copyrights:** © 2025 by the authors. This is an open access article under the terms and conditions of the Creative Commons Attribution – NoDerivatives 4.0 International (CC BY-ND 4.0) license (<https://creativecommons.org/licenses/by-nd/4.0/>).

In Pakistan physical inactivity and diet are not only the factors that contribute towards diabetes mellitus. The current evidences exhibit that cadmium (Cd) is widely present in our drinking water, food and air, acting as silent driver of diabetes mellitus.<sup>(1,2)</sup> The fact is that Cadmium alters glucose metabolism mainly three well known mechanisms: it disrupts insulin signaling by inhibiting intracellular PI3K/Akt cascades and phosphorylating IRS (insulin receptor substrate). Furthermore, it also reduces insulin secretion by destroying pancreatic beta cells.<sup>(2-4)</sup> Similarly, it induces oxidative stress and mitochondrial dysfunction leading towards impairment of lipid metabolism. Several metabolomic studies reported that high exposure of cadmium is associated with altered amino acids and acylcarnitine profiles.<sup>(5,6)</sup> Several studies have detected the unusual concentration of cadmium in blood of general population such as Jadoon et al., found high level cadmium in blood of inhabitants residing near Hudiara drain in Lahore, Pakistan.<sup>(7)</sup> Furthermore, a similar study conducted by Ahmad et al., also found high concentration in general population of Lahore city.<sup>(8)</sup> Similarly, some studies have also reported a high concentration of cadmium in biological samples of peoples residing in other big cities of Pakistan such as Faisalabad and Karachi.<sup>(9,10)</sup>

The studies conducted in major cities of Pakistan have reported the high level of blood cadmium coming various sources such as textile units, industrial discharge, and battery manufacturing plants, welding and soldering, metal

smelting, phosphate fertilizers and smoking. Yet our public and clinical health protocols test only HbA1c (Glycosylated hemoglobin), lipids and glucose,<sup>(3)</sup> never cadmium. However, if we treat diabetes purely on life style basis then we can manage only symptoms while the cadmium exposure will keep causing them. The health and population department in Pakistan should add an assessment of blood cadmium concentration in diabetes screening.<sup>(11)</sup> Similarly, environmental protection agencies should ensure no-discharge of cadmium into irrigation water, and ensure testing of high-risk food items. In conclusion, we cannot control the prevalence of diabetes epidemic until health regulators don't add cadmium screening in diagnosis of diabetes mellitus.

### Ethical Approval

Not required.

### Competing Interests

All the authors declare that there are no conflicts of interest.

### Funding Information

No funds were received for this study.

## REFERENCES

1. Qader A, Rehman K, Akash MS. Genetic susceptibility of  $\delta$ -ALAD associated with lead (Pb) intoxication: sources of exposure, preventive measures, and treatment interventions. *Environmental Science and Pollution Research*. 2021;28(33):44818-44832. <https://doi.org/10.1007/s11356-021-15323-1>
2. Qader A, Rehman K, Akash MS. Biochemical profiling of lead-intoxicated impaired lipid metabolism and its amelioration using plant-based bioactive compound. *Environmental Science and Pollution Research*. 2022;29(40):60414-60425. <https://doi.org/10.1007/s11356-022-20069-5>
3. Akash MS, Qader A, Rehman K. Insulin resistance susceptibility is associated with BPA exposure. *Metabolism-Clinical and Experimental*. 2022;128:154973. <https://doi.org/10.1016/j.metabol.2021.154973>
4. Rehman K, Qader A, ul Haq ME, Akash MS. Long-term exposure of Bisphenol A impairs metabolism and develop insulin resistance. *Metabolism-Clinical and Experimental*. 2022;128:154974. <https://doi.org/10.1016/j.metabol.2021.154974>
5. Akash MS, Haq ME, Qader A, Rehman K. Biochemical investigation of human exposure to aflatoxin M1 and its association with risk factors of diabetes mellitus. *Environmental Science and Pollution Research*. 2021;28(44):62907-62918. <https://doi.org/10.1007/s11356-021-14871-w>
6. Tariq H, Habib A, Qader A, Shafi A, Rafique S, Afzal Z, Riaz R, Rehman Q. A Mechanistic Approach Elaborating the Association of Heavy Metals-Induced Oxidative Stress with Insulin Resistance Susceptibility. *Journal of Survey in Fisheries Sciences*. 2023;10(1):16357-16362. <https://doi.org/10.53555/sfs.v10i1.2928>
7. Jadoon S, Ali Q, Sami A, Haider MZ, Ashfaq M, Javed MA, Khan MA. DNA damage in inhabitants exposed to heavy metals near Hudiara drain, Lahore, Pakistan. *Scientific Reports*. 2024;14(1):8408. <https://doi.org/10.1038/s41598-024-58655-x>
8. Ahmad SA, Hussain S, Aziz H, Riaz M. Cadmium Investigations in Lahore Soil and Other Regions of Pakistan: Cadmium Concentration in Lahore, Pakistan. *Pakistan Journal of Scientific & Industrial Research Series A: Physical Sciences*. 2022;65(1):64-73. <https://doi.org/10.52763/PJSIR.PHYS.SCI.65.1.2022.64.73>
9. Zeeshan N, Murtaza G, Ahmad HR, Awan AN, Shahbaz M, Freer-Smith P. Particulate and gaseous air pollutants exceed WHO guideline values and have the potential to damage human health in Faisalabad, Metropolitan, Pakistan. *Environmental Monitoring and Assessment*. 2024;196(7):659. <https://doi.org/10.1007/s10661-024-12763-3>
10. Ahmad A, Ahmad I, Khan MA, Munshi AB, Siddiqui I, Anzar O, Anzar A. On-set of cataract and accumulation of Copper, Lead and Cadmium in smokers of Karachi. *Pakistan Journal of Environmental & Analytical Toxicology*. 2015;5:2-7. <https://doi.org/10.4172/2161-0525.1000252>
11. Qader A, Hayat MK, Khaliq R. Exposure of Endocrine Disrupting Chemicals: A Growing Public Health Concern in Faisalabad, Pakistan. *Health Dynamics*. 2025;2(11):476-477. <https://doi.org/https://doi.org/10.33846/hd21106>