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# Effects of heavy metal lead on differential cell counts in occupationally-exposed subjects from Saudi Arabia

Abjal P. Shaik*[1], Abbas H. Alsaeed[1], Asma S. Shaik[1], Abdullah A. Alyousef[1], Vamsee K. Bammidi[2] and Kiranmaye Sampathirao[3]

*[1]Department of Clinical Laboratory Sciences, College of Applied Medical Sciences, King Saud University, Riyadh, Saudi Arabia*
*[2]The Unicare Group, Burton-on-Trent, Staffordshire, United Kingdom*
*[3]Alrewas Surgery, Burton-on-Trent, Staffordshire, United Kingdom*

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**Abstract.** The current observational epidemiological study analyzed blood lead levels (BLLs) in occupationally exposed workers from Riyadh region, Saudi Arabia and correlated them with the alterations in the differential cell populations of the WBC panel (lymphocytes [Lym %], mixed [Mid %] cells, and neutrophils [Neu %]). In addition, we examined the effect of confounding factors and their relation to BLLs. BLLs were estimated using the LeadCare II analyzer and hematological parameters using the ADVIA 120 analyser. An inferential analysis was conducted to detect association between the observations and the subjects' clinical characateristics. A total of 132 male subjects were included in the final analyses. Based on CDC guidelines, the subjects were categorized as Group I (BLL <10 µg/dL; n=118) or Group II (BLL >10 µg/dL; n=14) with average BLLs of 4.4 µg/dL and 18.1 µg/dL, respectively ($p < 0.0001$). The percentages of Mid cells ($p < 0.0001$) and neutrophils ($p = 0.048$), were significantly altered in subjects with High BLL. A regression analysis indicated that subjects > 50 years of age had significantly higher BLLs (53.2 µg/dL) than younger age sub-groups ($p < 0.0001$). Age, education, and profession were significant predictors for lead toxicity. Pb exposure is a major public health issue in Saudi Arabia and calls for further investigations on the cellular and molecular effects on hematological system.

**Keywords**: BLL; confounding factors; differential leucocyte counts; occupational lead exposure

## 1. Introduction

Heavy metal lead (Pb) has been used for several decades in battery manufacturing, smelting, mining, and various other occupations (ChemIDplus 2005). Therefore, lead poisoning can occur through a variety of routes including ingestion, inhalation, or transdermally (Bellinger 2004). In countries like Saudi Arabia, Pb has also been used for non-occupational purposes in traditional folk medicine (Nouioui *et al.* 2016). The Centers for Disease Control and Prevention (CDC 1991) defines a blood lead level (BLL) of >10 µg/dL as elevated and emphasizes the need for clinical intervention.

*Corresponding author, Dr., E-mail: afzalshaik@gmail.com


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