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OMICS Group International is a pioneer and leading science event organizer, which publishes around 400 open access journals and conducts over 300 Medical, Clinical, Engineering, Life Sciences, Phrama scientific conferences all over the globe annually with the support of more than 1000 scientific associations and 30,000 editorial board members and 3.5 million followers to its credit.

OMICS Group has organized 500 conferences, workshops and national symposiums across the major cities including San Francisco, Las Vegas, San Antonio, Omaha, Orlando, Raleigh, Santa Clara, Chicago, Philadelphia, Baltimore, United Kingdom, Valencia, Dubai, Beijing, Hyderabad, Bengaluru and Mumbai.

Impact of metal-loaded industrial dust on the physiology of a model experimental animal

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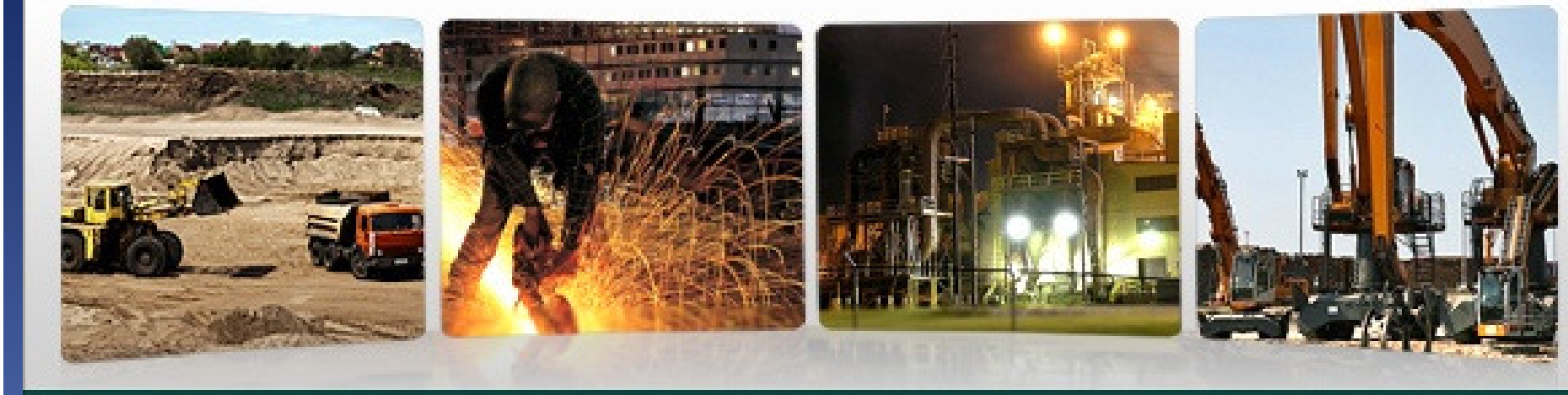
Environmental pollution is a major global concern that poses a serious threat to the health of man and animal.

The development of modern technology and the rapid progress in industrialization are among the foremost factors contributing to environmental pollution.

One of the most fast growing industries in Hail City is the construction industry. 4



حائل

Expanding industrial areas are acknowledged for distributing toxic heavy metals into the environment.

Concrete is the second most used product in the world, after water, and the concrete industry is a key component of both commercial and residential construction.

Comparison of trace element concentrations (mg/Kg) in different brands of Portland cement

Brand	Cr	Ni	Cd	Cu	Co	Zn
Askari	38	20	1	10	12	34
Cherat	24	27	>1	20	9	85
D.G. Khan	53	38	1	16	15	29
Lucky	58	35	3	11	13	25
Best way	48	31	3	11	18	25
Kohat	48	55	3	14	13	29
Pak Cem	67	45	4	18	27	38

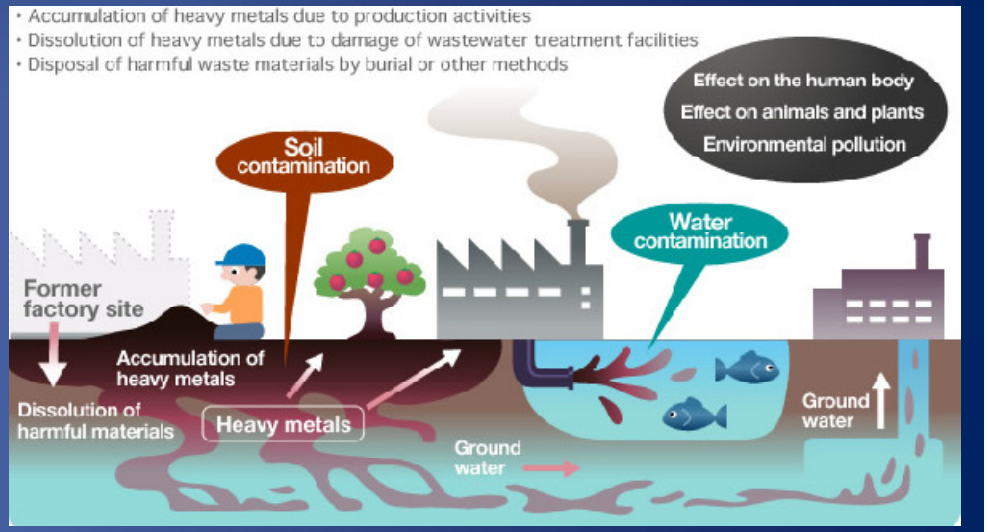
After Wali *et al.* (2012)

This table shows concentrations of trace elements in Portland cement used in concrete industry. Trace elements include Cr, Ni, Cd, Cu, Co and Zn. Therefore this study dealt with two essential and two non essential elements of the referred to roster.

Industrial **polymetal** dust is a widespread urban pollutant of great concern to human and animal health

Metals and metalloids are persistent pollutants that neither biodegrade, nor are they eliminated by incineration processes.

Terrestrial vertebrates have long been reported to bi-oaccumulate heavy metals in different tissues.



Rattus norvegicus

a 2 mL daily dose for 60 days

- C group → H_2O
- D1 group → 0.001 Kg^{-1} body weight
- D2 group → 0.002 Kg^{-1} body weight
- All groups were allowed free access to water and food
- D1 and D2 doses are water suspension of concrete dust

Cd, Pb, Cu and Zn accumulation

- liver
- kidney

Varian Atomic Absorption Spectrometer

Hemogram

- Red blood cell indices
- leukogram

Beckman Coulter Hematology Analyzer

Liver function

- ALT
- AST
- ALP

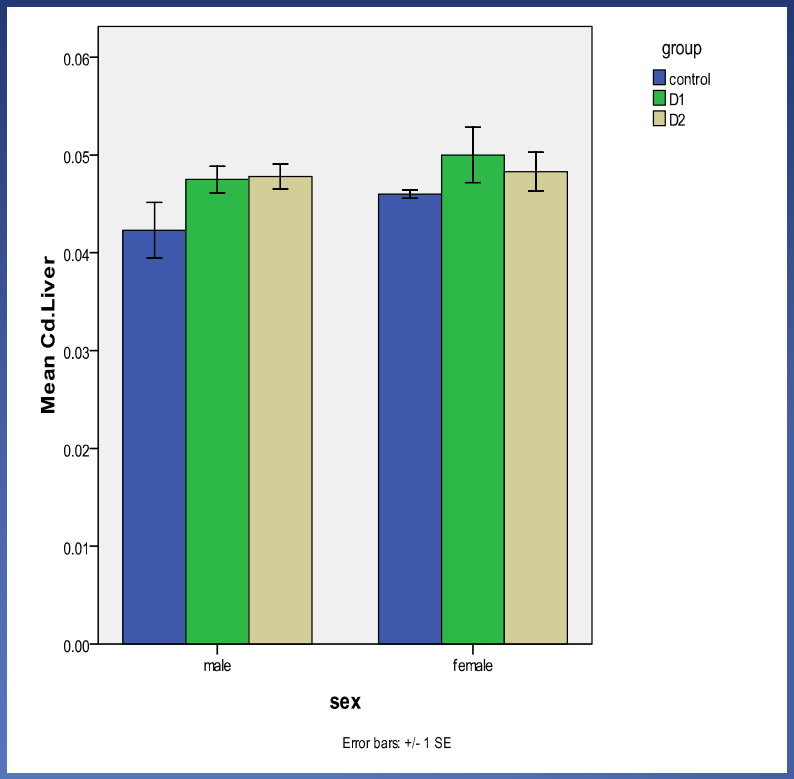
cobas c 311 analyzer

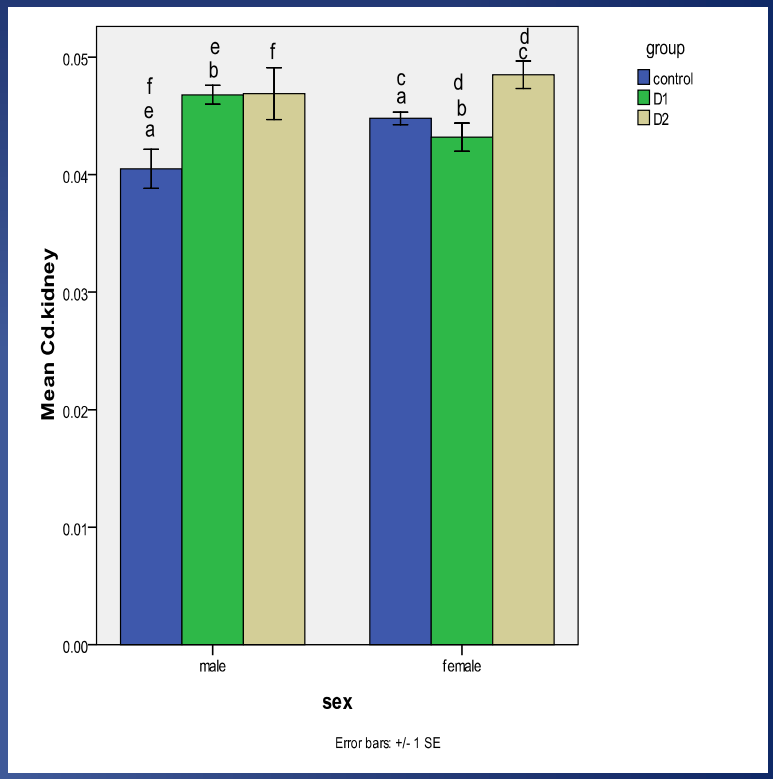
DNA damage

→ Liver DNA concentration

QIAamp DNA Mini Kit

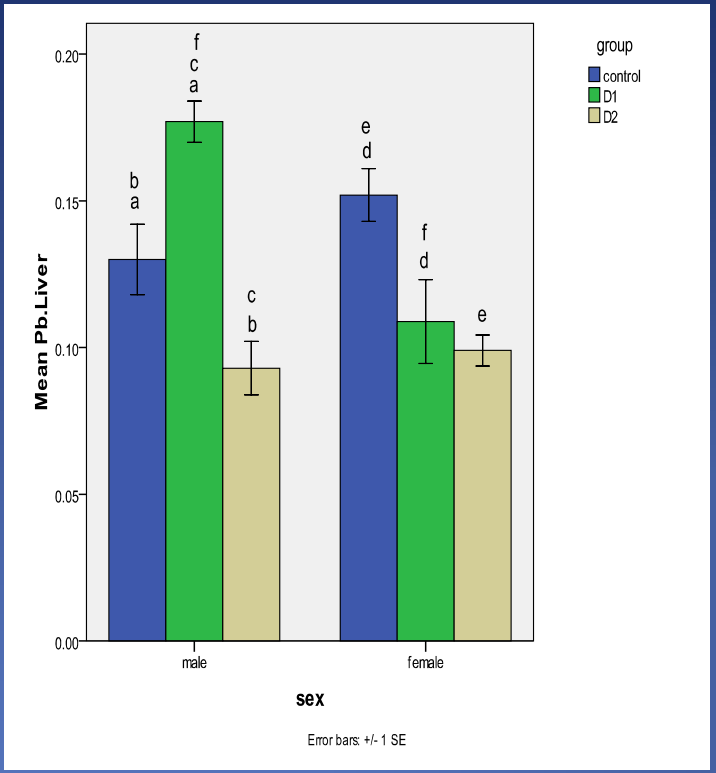
Cd accumulation in the liver and kidneys of both sexes of *Rattus norvegicus*

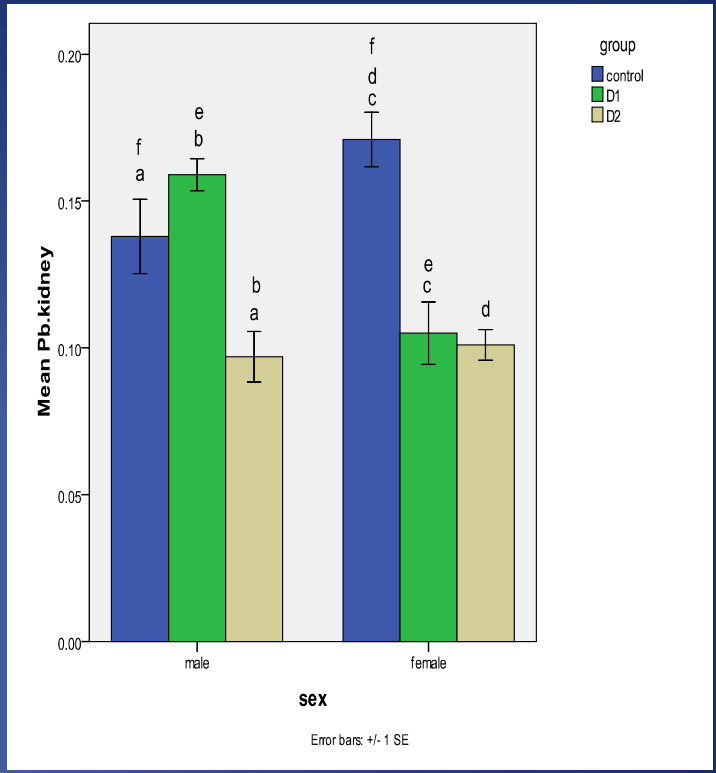




Mean ± SE Cd concentrations (µg g^{-1}) in the liver and kidney of male and female rats (*R. norvegicus*).

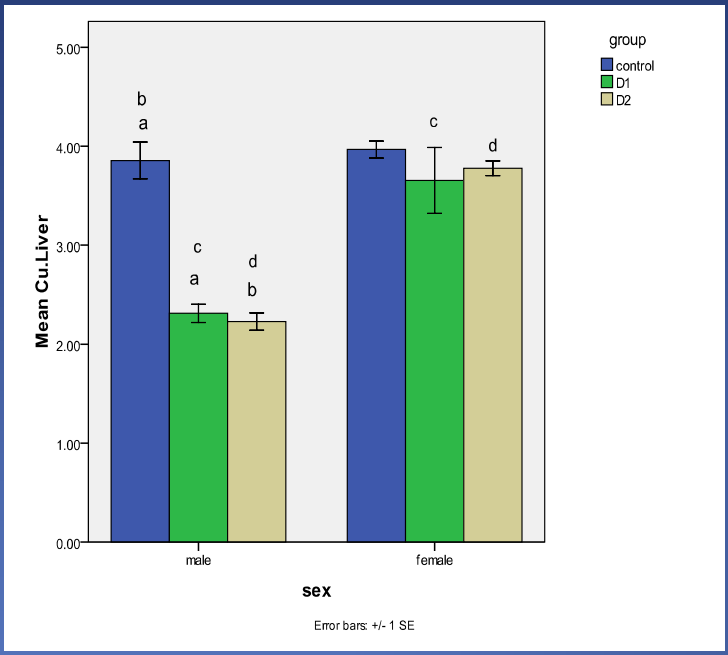
Pb accumulation in the liver and kidneys of both sexes of *Rattus norvegicus*

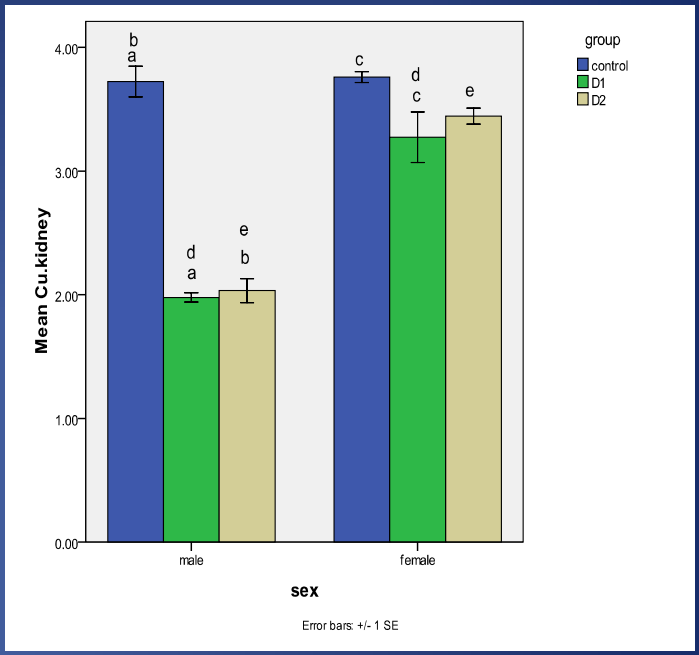




Mean ± SE Pb concentrations (µg g^{-1}) in the liver and kidney of male and female rats (*R. norvegicus*).

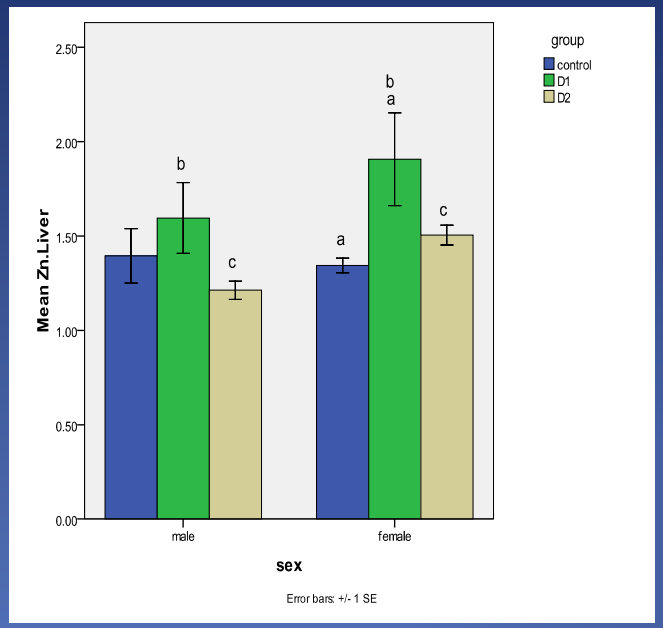
Cu accumulation in the liver and kidneys of both sexes of *Rattus norvegicus*

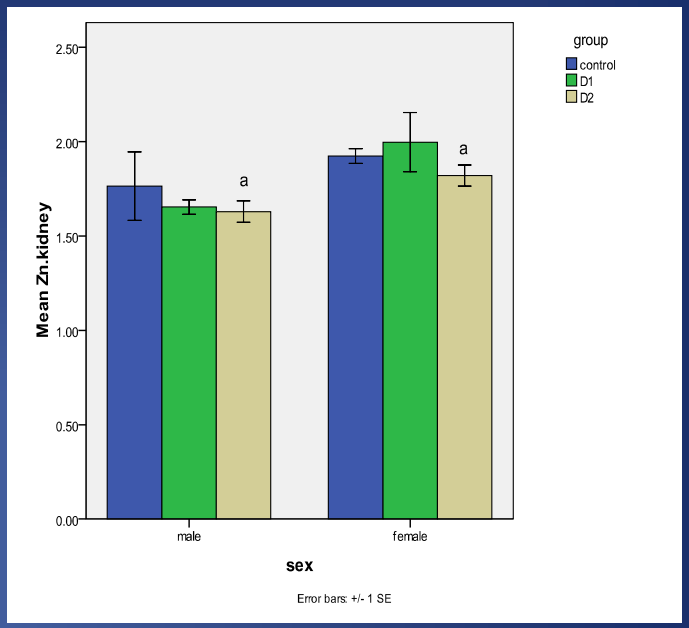




Mean ± SE Cu concentrations (µg g^{-1}) in the liver and kidney of male and female rats (*R. norvegicus*).

Zn accumulation in the liver and kidneys of both sexes of *Rattus norvegicus*





Mean ± SE Cu concentrations (µg g^{-1}) in the liver and kidneys of male and female rats (*R. norvegicus*).

Essential and non essential metal accumulation in the liver and kidneys

higher bioavailability of toxic versus essential metals.

RBCs indices in male rats given doses D1 and D2 of industrial dust compared to control

	C	D1	D2
RBC	8.12 ±0.20	7.81 ±0.89	7.2940 ±0.82
PLT	986.20 ±41.18	859.10 ±46.62	802.20 ±104.14
Hb	14.49 ±0.18	15.6700 ± 0.52	13.2300 ±1.48
MCV	51.90 ±0.46	45.8000 ±5.11	47.3000 ±5.31
MCH	17.83 ±0.16	15.8500 ±1.78	16.3700 ±1.83
MCHC	34.39 ±0.14	31.1100 ±3.46	31.1700 ±3.47
PCV/HCT	42.10 ±0.44	45.4700 ±1.71	38.2500 ± 4.30
RDW	12.15 ±0.22	10.7100 ± 1.23	12.8500 ± 0.93

WBCs differential count in male rats given doses D1 and D2 of industrial dust compared to control

	C	D1	D2
WBC	12.14 ±1.09	16.33 ±1.01	12.99 ±1.83
Neutrophils	2.31 ±0.34	1.88 ±0.43	1.79 ± 0.44
Lymphocytes	7.93 ±0.57	10.79 ± 0.75	8.44 ±1.26
Monocytes	1.40 ± 0.18	1.25 ± 0.28	1.04 ± 0.26
Eosinophils	0.45 ± 0.07	0.55 ± 0.09	0.46 ± 0.08

RBC, Hb, MCV, MCH, MCHC, PCV-HCT, RDW and WBC (red blood cell, hemoglobin, mean corpuscular volume, Mean Corpuscular Hemoglobin , mean corpuscular hemoglobin concentration, packed cell volume-hematocrit, Red cell distribution width and white blood cell)

RBCs indices in female rats given doses D1 and D2 of industrial dust compared to control

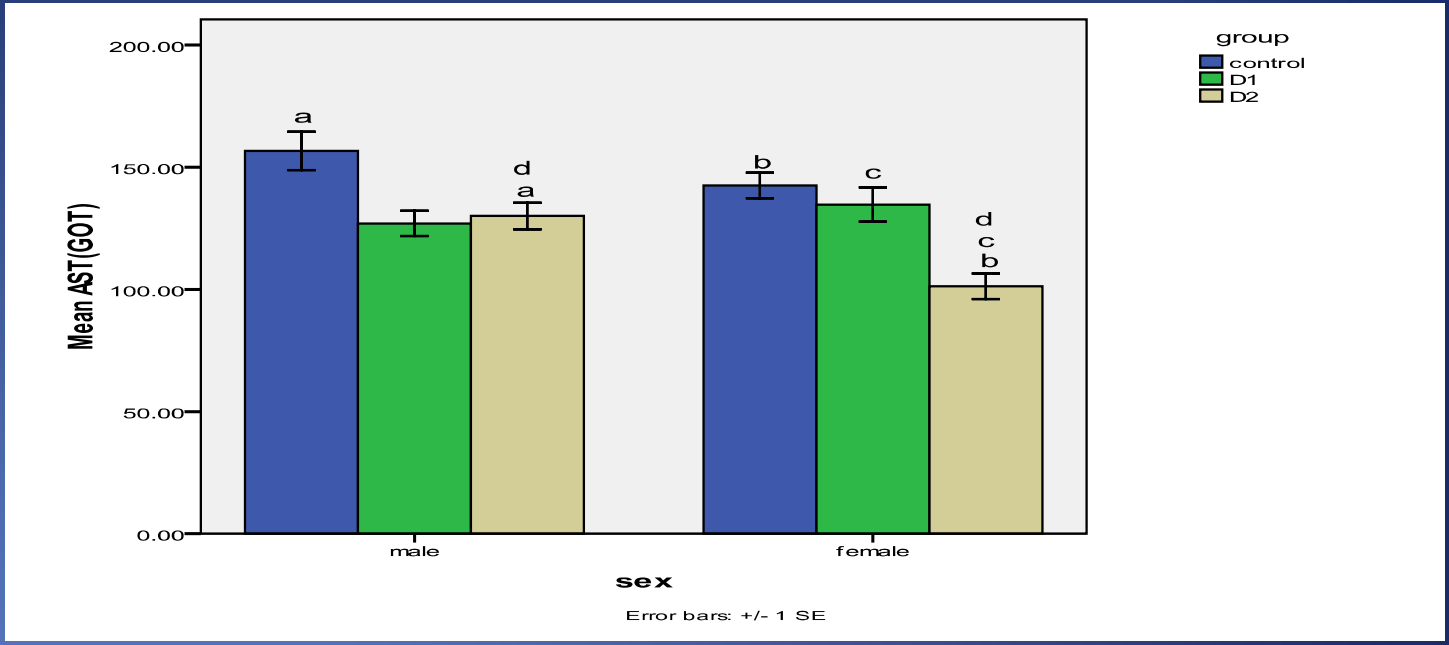
	C	D1	D2
RBC	7.5290 ±0.09	7.84 ±0.17	7.59 ±0.15
PLT	803.00 ±35.09	819.60 ±85.00	954.10 ±39.60
Hb	13.98 ±0.42	14.84 ±0.39	14.0700 ±0.21
MCV	51.90 ±1.59	53.3000 ±0.63	52.4000 ±0 .50
MCH	18.56 ± 0.57	18.91 ± 0.22	18.5700 ± 0.22
MCHC	35.62 ± 0.27	35.41 ± 0.12	35.5200 ± 0.25
PCV/HCT	39.17 ± 1.11	41.88 ± 1.06	39.6200 ± o.61
RDW	10.74 ± 0.31	10.40 ± 0.13	10.7900 ± 0.22

WBCs differential count in female rats given doses D1 and D2 of industrial dust compared to control

	C	D1	D2
WBC	8.71 ± 0.810	5.69 ± 0.90	6.84 ± 0.71
Neutrophils	1.73 ± 0.33	1.01 ± 0.19	1.5570 ± 0.22
Lymphocytes	5.22 ± 0.46	3.42 ± 0.54	4.2690 ± 0.45
Monocytes	0.97 ± 0.18	0.62 ± 0.11	0.7270 ± 0.07
Eosinophils	0.43 ± .08	0.23 ± 0.07	0.2620 ± 0.08

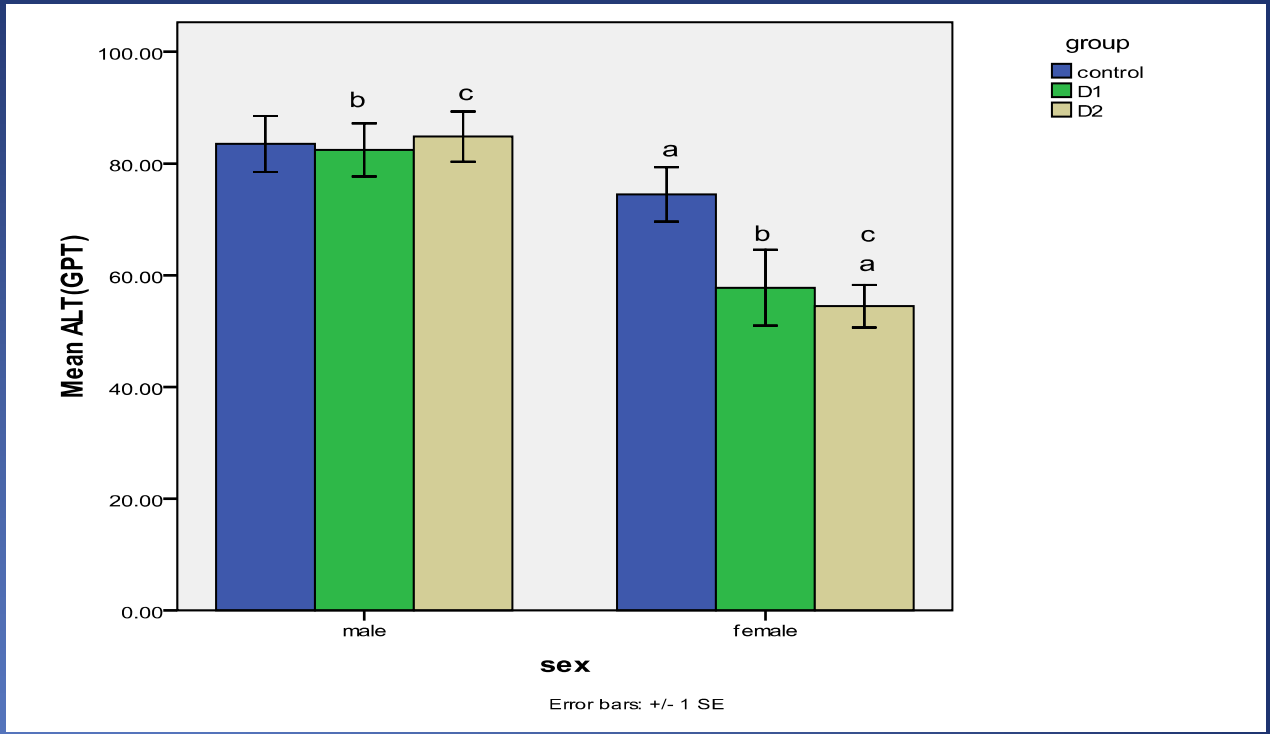
RBC, Hb, MCV, MCH, MCHC, PCV-HCT, RDW and WBC (red blood cell, hemoglobin, mean corpuscular volume, Mean Corpuscular Hemoglobin , mean corpuscular hemoglobin concentration, packed cell volume-hematocrit, Red cell distribution width and white blood cell)

Serum AST activities in both sexes of *Rattus norvegicus*



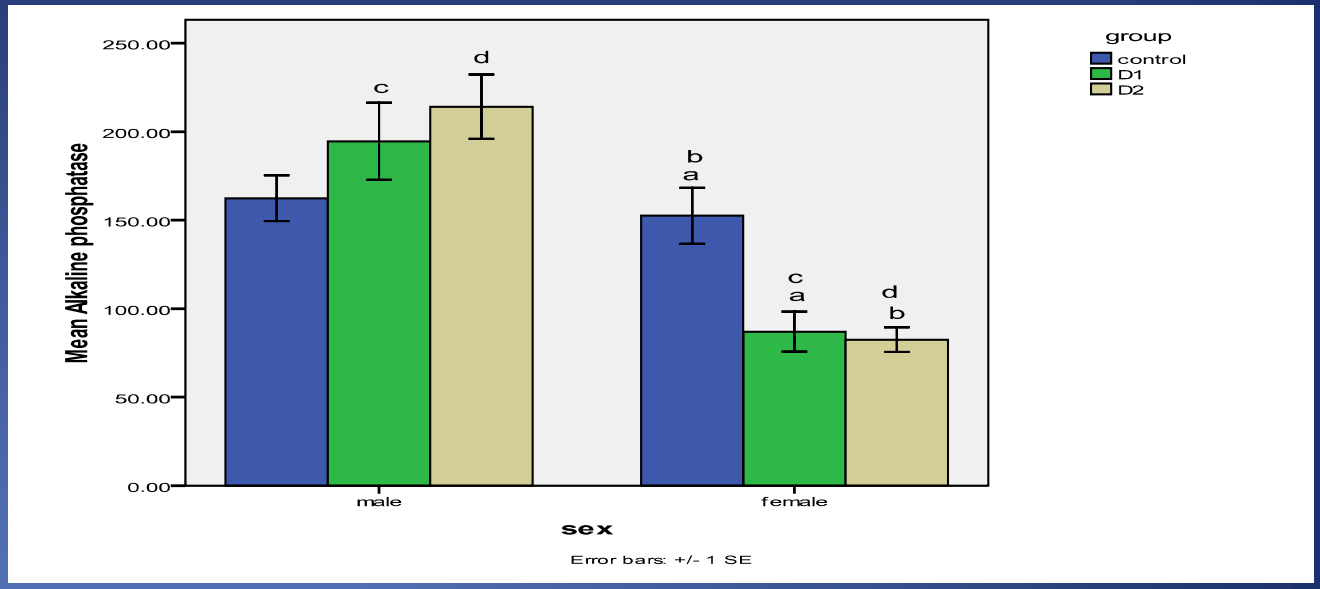
Mean ± SE Serum AST activities (UL^{-1}) in male and female rats (*R. norvegicus*).

Serum ALT activities in both sexes of *Rattus norvegicus*



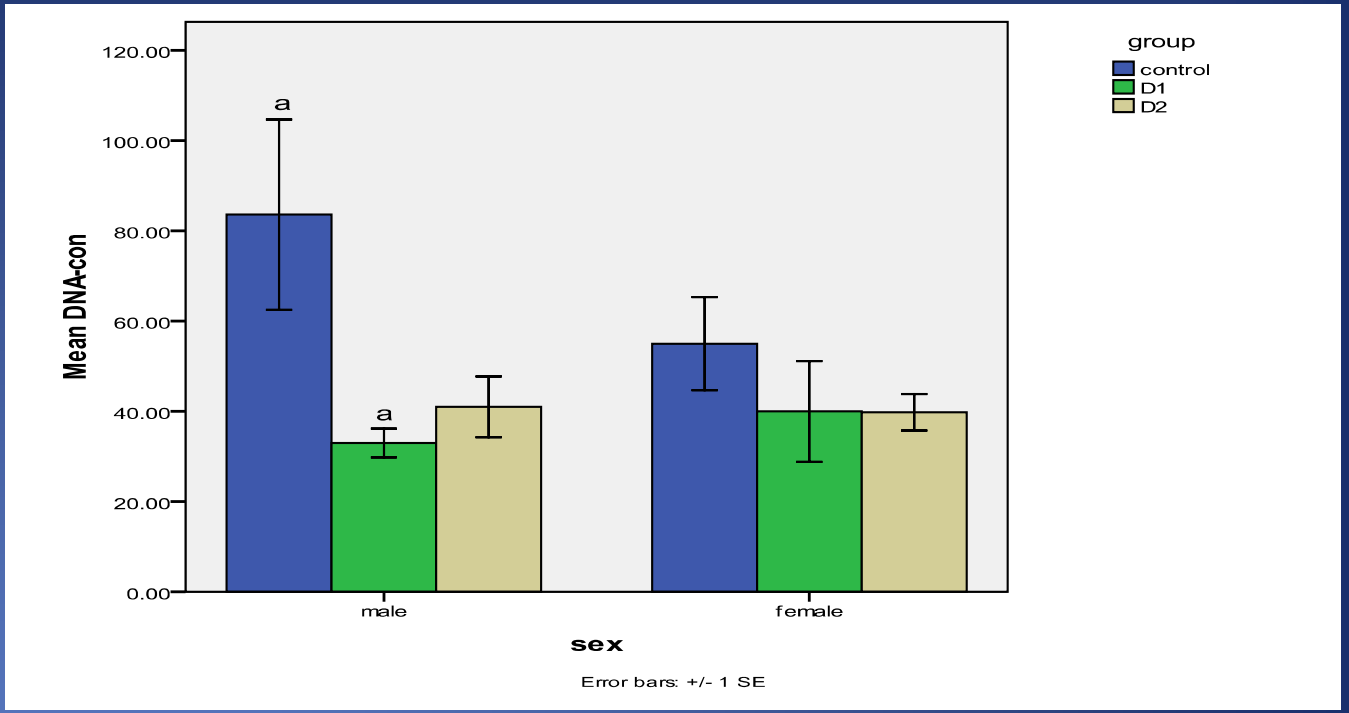
Mean ± SE Serum ALT activities (UL^{-1}) in male and female rats (*R. norvegicus*).

Serum ALP activities in both sexes of *Rattus norvegicus*



Mean ± SE Serum ALP activities (UL^{-1}) in male and female rats (*R. norvegicus*).

Liver DNA content in both sexes of *Rattus norvegicus*



Mean ± SE Liver DNA concentrations (ng μL^{-1}) in male and female rats (*R. norvegicus*).

conclusions

- Sex factor effect is negligible
- Tissue specific metal accumulation
- Higher bioavailability of non essential versus essential elements

conclusions

Adverse physiological and health effects including:

- Disturbances in blood coagulation activities
- Stress-based leukocyte mobilization
- Challenge of the immune system
- DNA damage
- Compensation of the deleterious effects of polymetal dust by detoxification pathways

Thank You

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