

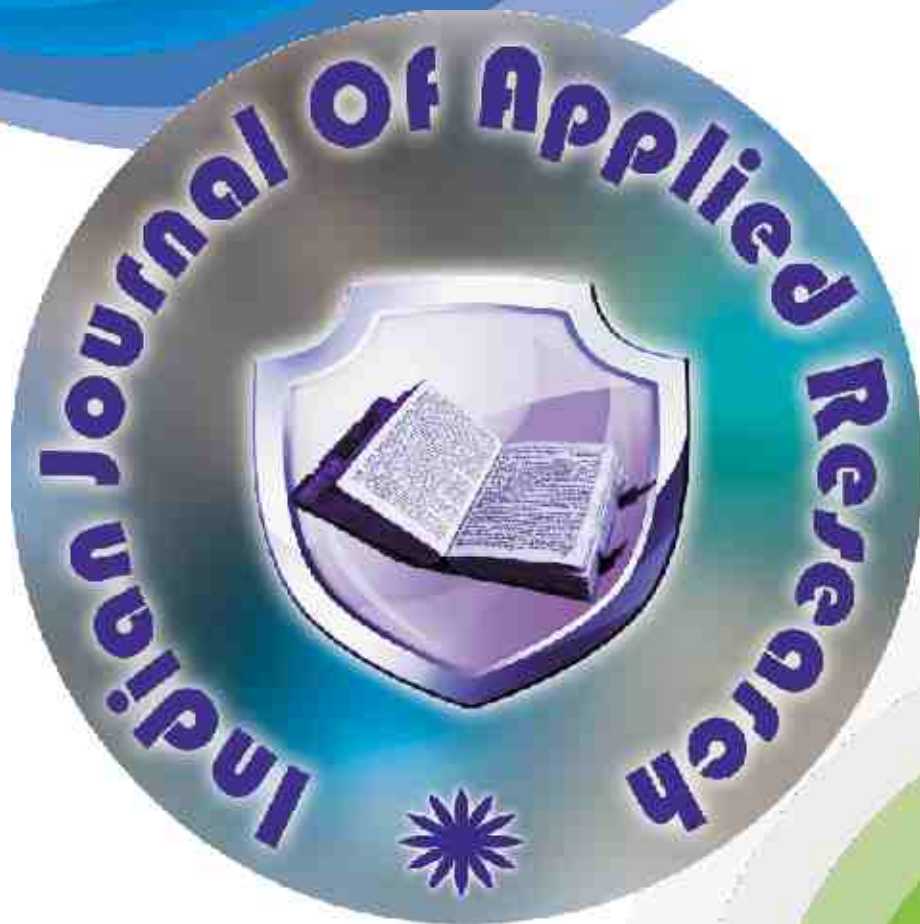
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ISSN - 2249-555X

**Volume : 1**

**Issue : 5**

**February 2012**



**Journal for All Subjects**

[www.ijar.in](http://www.ijar.in)

Listed in International ISSN Directory, Paris.



ISSN - 2249-555X

# Indian Journal of Applied Research

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## Association Study Between Lead And Copper Accumulation At Different Physiological Systems Of Goat By Application Of Canonical Correlation And Canonical Correspondence Analyses

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### ABSTRACT

*Environment induced Pb intoxication in animal body is actually a cumulative effect of several agonistic and antagonistic interactions with other heavy metals and micronutrients. Present investigation focused at association study between Pb and Cu accumulation in physiological systems of goat (sample size, n=200) reared around a 100 km stretch area along NH-34 in West Bengal, India by application of canonical correlation and canonical correspondence analyses. Both statistical techniques demonstrated a strong positive association between Pb and Cu at kidney and muscle. Observations obtained from two different statistical methods indicated that the overall pattern of Pb accumulation in goat's physiological systems as influenced by Cu in those organs was almost same except few contradictions. It is mainly due to the fact that canonical correlation is actually a special type of canonical correspondence analyses where linear relationship is followed between two groups of variables instead of Gaussian relationship.*

**Keywords :** statistical techniques, heavy metal toxicity; pollution; lead; copper

### Introduction

Like many other developed and developing countries lead (Pb) toxicity through automobile exhausts has become prevalent around the moderate to heavily trafficked highways in India (Karmakar et al. 2010). Pb pollution around highways is not only affecting the residents nearby but it has also adverse effect on the plantation and grazing animals there. Most of the cattle/goats in India are reared/ maintained by the small and marginal farmers with a common traditional management practice to graze their ruminants in the grasslands beside highways. Consumption of contaminated grasses, crops or vegetables by grazing animals, results in a considerable accumulation of Pb in their different organs/tissues. In India, Pb toxicity in grazing animals like goat, cattle and buffaloes has already been reported. Pb has been found in high concentration in blood and milk from urban cattle and buffaloes (Dwivedi and Swarup 1995; Swarup et al. 2006).

It is well established fact that intoxication of Pb in body is a complex phenomenon of several agonistic and antagonistic interactions between other heavy metals and micronutrients. Environmentally induced Pb toxicity in animals may be complicated by simultaneous exposures to other heavy metal like Cu. Cu is an important micronutrient (Reeves and Baker 2000) and becomes toxic when it is taken in excess of requirements. In recent years, cases of Cu toxicity among the grazing animals have been investigated by various researchers (Bidewell et al. 2000; Laven et al. 2004).

How Pb accumulation in various organs is affected by Cu level in those tissues in grazing animals is rare or less reported.

Correlation approach has been followed by various researchers to find the association among various heavy metal pool (López-Alonso 2005; D'Souza 2009) in both human and animals but in the present study, multi-variate statistical techniques like canonical correlation and canonical correspondence analyses were applied to evaluate association between Pb and Cu levels in different physiological systems of goat.

### Methodology

#### Area of Study

A specified region of 100 km stretch of along National Highway (NH- 34, West Bengal, India) was selected for the area of study as it was expected to have definite impact of lead toxicity from automobile exhausts prevailed there.

#### Traffic Level

The Highway under study area was heavily trafficked by 3787 ± 521 large and 3442 ± 483 small automobile with an overall mean with SD of 3615 ± 513 automobile per day during the study period.

#### Experimental Animals

Black Bengal goat (*Capra hircus*) (sample size, n = 200) of both sex (100 male and 100 female), with age group (1-5 years) and average body weight (12.1±1.29 kg) were considered for the experiment.

#### Sample Collection

Required amount of samples of blood, milk and various tissues (bone, muscle, kidney, liver etc.) were collected following standard sample collection method.

**Estimation of Heavy Metals**

The Pb and Cu were estimated in Atomic Absorption Spectrophotometer (Perkin Elmer A Analyst 100). Standard process as adopted by Fletcher (1971) and Makino and Takahara (1981) were followed for estimating Pb and Cu content in tissue and plasma samples, respectively. Pb was also estimated from blood and milk in Atomic Absorption Spectrophotometer (Perkin Elmer A Analyst 100) using specific lamp with specific wave length within the standard range condition by standard process as adopted by Zinterhofer et al. (1971).

**Result**

Estimated concentration (Mean + SE) of Pb and Cu in different physiological systems of goat are shown in table 1 and table 2, respectively. ( Table 1 & 2)

Canonical correlation analysis and canonical correspondence analysis are those two techniques of multivariate statistics which look at relationship between two groups of variables. Here in the present investigation, one group consists of values of Cu concentration in plasma, liver, kidney and muscle of goat and second group consists of mean values of Pb contamination in same organs and also in bone, blood and milk of the same goats studied at same area. Canonical correlation assumes a linear relationship between two sets of variables. Only first canonical correlation which gives the maximum correlation coefficient between two groups of variables has been described in the present study (table 3) for comparing with canonical correspondence analysis.

First set of canonical variate shared 70% of variance. Looking into canonical weights, it was observed that Cu in kidney, muscle and plasma were highly associated with Pb in all tissues and organs including milk except plasma. So, it can be assumed that Cu in liver, muscle and plasma influenced the transfer of Pb from plasma to other organs. This analysis included the study of redundancy by each group of variables for each set of canonical variants. Redundancy study showed that 20.91% of variability of Cu content in various organs could be explained by Pb concentration in those organs where as 21.53% of Pb accumulation was explained by Cu content. (Table 3)

Canonical correspondence analysis assumes Gaussian

relationship between two groups of variables. Canonical correspondence analysis technique using unimodal response model was followed to explain the Pb concentration in plasma, blood, liver, kidney, bone, muscle and milk with Cu load in plasma, liver, kidney and muscle through biplot type of scaling. Test of significance of both, first canonical axis and all canonical axes were made under Monte Carlo test with 499 permutations under reduced model. Relationship of Pb contamination with Cu loadings in various organs has been presented in ordination diagrams (biplot) for first two axes in fig. 1 (ter Braak and Smilauer 2002). ( Figure 1)

First two axes could explain 99.0% of Pb-Cu relation (table 4). Inflation factor of Cu loadings at different body organs were well below 20. Axis 2 of the biplot depicted that Cu loadings in muscle, liver, plasma, bone and kidney were highly associated with Pb contamination in muscle, milk and to some extent bone due to positive loading along that axis. On the other hand, plasma-Pb was found on the positive side along axis-1 while muscle-Cu and kidney-Cu on negative side along the same axis representing negative association between these two groups. (Table 4)

**Discussion And Conclusion**

Both statistical techniques (canonical correlation and canonical correspondence) demonstrated a strong positive association between Pb and Cu at kidney and muscle. Bi-plot diagram of canonical correspondence analysis showed that Cu in all tissues under study were at the positive side along with Muscle-Pb, Milk-Pb and Kidney- Pb due to their positive loadings along Axis-2. It could be assumed from observations that there may be synergistic activity of Cu to the accumulation of Pb in various organs/tissues of goat. It might be that Cu accumulation in goat's tissues somehow directed transferring of Pb-pool from blood, plasma and liver to other tissues. Although there were some contradictions between the observations obtained from the two different statistical methods, the overall pattern of Pb accumulation in various organs as influenced by Cu were same. It is mainly due to the fact that canonical correlation is actually a special type of canonical correspondence analyses where linear relationship is followed between two groups of variables instead of Gaussian relationship.

**Table 1.** Estimated Pb accumulation in various physiological systems of goat (µg/ml)

	Pism-Pb	Liver-Pb	Kidy-Pb	Bone-Pb	Muscle-Pb	Blood-Pb	Milk-Pb
Mean	0.276	2.613	4.957	242.944	1.622	0.129	0.018
SE	0.003	0.062	0.167	15.27	0.034	0.004	0.001

**Table 2.** Estimated Cu accumulation in various physiological systems of goat (µg/gm)

	Pism- Cu	Liver- Cu	Kidy- Cu	Muscle- Cu	Bone- Cu
Mean	0.629	44.656	11.063	5.344	36.652
SE	0.016	1.075	0.061	1.131	0.825

**Table 3.** Canonical weights of Pb and Cu (first set of canonical variates)

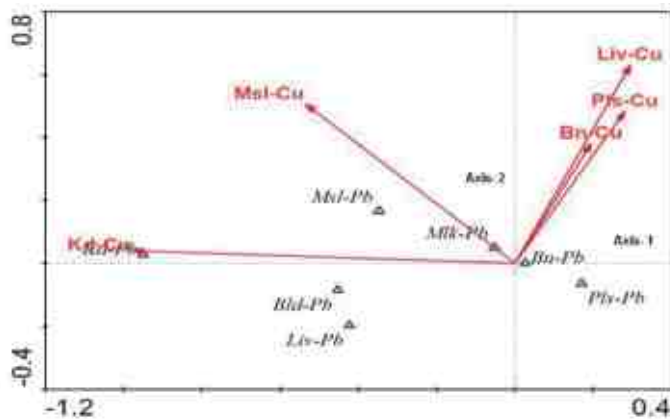
Lead		Copper	
Canonical variables	Weights	Canonical variables	Weights
Blood	0.137	Plasma	0.062
Plasma	-0.188	Liver	-0.046
Kidney	0.516	Kidney	0.953
Liver	0.183	Bone	-0.064
Bone	0.334	Muscle	0.028
Muscle	0.230		
Milk	0.221		

**Table 4.** Canonical Correspondence Analysis (CCA) results of Pb -Cu association

	Axis 1	Axis 2	Axis 3	Axis 4
Sum of all Eigen values = 0.006				
Pb vs. Cu set correlations	0.62	0.29	0.18	0.17
Cumulative percentage variance				
Pb data	30.1	30.9	31.2	31.2
Pb- Cu relation	96.30	99.00	99.80	100.00
F ratio to test first eigen value = 83.43				
P value = 0.00				



Fig.1. Biplot showing the spread of Pb contamination explained by Cu load in different organs of goat



## REFERENCES

- Bidewell CA, David GP, Livesey CT. 2000. Copper toxicity in cattle. *Vet Rec* 147: 399400. | D'souza SH, Menezes G, Venkatesh T. 2009. Influence of minerals on lead-induced alterations in liver function in rats exposed to long-term lead exposure. *J of Hazardous Materials* 166 (2): 1410-1414. | Dwivedi SK, Swarup D. 1995. Lead in blood and milk from urban Indian cattle and buffalo. *Vet Hum Toxicol* 37, 471-472. | Fletcher K. 1971. Direct Determination of lead in Plant materials by Atomic Absorption Spectrophotometry. *J of Sci Food and Agr* 22, 260-261. | Karmakar P, Das PK, Sarkar (Mondal) S, Karmakar S, Mazumdar D. 2010. Association Study between Lead and Zinc Accumulation at Different Physiological Systems of Cattle by Canonical Correlation and Canonical Correspondence Analyses. *Proceedings of International Conference on Modelling, Optimization and Computing (ICMOC 2010)*, American Institute of Physics (AIP). p 742-748. | Laven RA, Livesey CT, Offer NW, Fountain D. 2004. Apparent subclinical hepatopathy due to excess copper intake in lactating Holstein cattle. *Vet Rec*, 155: 120121. | López-Alonso M, Prieto F, Miranda M, Castillo C, Hernández J, Benedito JL. 2005. The role of metallothionein and zinc in hepatic copper accumulation in cattle. *Vet J* 169 (2): 262-267. | Makino T, Takahara KD. 1981. Direct determination of plasma copper and zinc in infants by atomic absorption with discrete nebulization. *Clin Chem* 27: 1445-1447. | Reeves RD, Baker AJM. 2000. Metal accumulation plants. In: Raskin I, Ensley BD, editors. *Phytoremediation of metals: Using plant to clean up the environment*, New York: John Wiley and Sons, Inc. p193-229. | Swarup D, Patra RC, Naresh R, Kumar P, Shekhar P, Balagangatharathilagar M. 2006. Lowered blood copper and cobalt contents in goats reared around leadzinc smelter. *Small Ruminant Res* 63(3): 309-313. | Ter Braak CJF, Smilauer P. 2002. *CANOCO reference manual and CanoDraw for Windows. User's guide: software for canonical community ordination (version 4.5)*, Microcomputer Power, Ithaca, New York, USA. | Zinterhofer LJ, Jatlow PI, Fappiano A. 1971. Atomic absorption determination of lead in blood and urine in the presence of EDTA. *J Lab Clin Med*, 78: 664674.



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