



CODEN [USA]: IAJPB

ISSN: 2349-7750

**INDO AMERICAN JOURNAL OF
PHARMACEUTICAL SCIENCES**<http://doi.org/10.5281/zenodo.3473973>Available online at: <http://www.iajps.com>

Research Article

**DETERMINATION OF TOTAL ANTIOXIDANT STATUS AND
ITS ASSOCIATION TO THE BLOOD LEAD**¹Farial Javed, ²Maheen Fatima, ³Adnan Faiz¹Dera Ghazi Khan Medical College, D.G Khan.

Article Received: August 2019

Accepted: September 2019

Published: October 2019

Abstract:

Objective: The aim of this research work is to determine the TAS (Total Anti-Oxidant Status) and its association with the blood lead in normal healthy young population of Dera Ghazi Khan, Pakistan.

Methodology: This is a transverse research work in which the selection of one hundred young people (55 with levels of blood lead less than seven µg/dl and 45 with levels of blood lead greater than eleven µg/dl) carried out from eight hundred and seventy-two adults having eighteen to sixty year of age choose from population of low salary from Dera Ghazi Khan. Kit of spectrophotometric assay was in use for the analysis of level of TAS in the serum whereas the determination of the levels of blood lead performed with the utilization of the Atomic-Absorption Spectrometric procedure.

Results: The average levels of TAS in the serum were low in the persons with high concentration of the lead in the blood in comparison with those having less concentration of the lead in the blood (1.048 ± 0.168 mmol/l versus 1.158 ± 0.138 mmol/l). In a relationship analysis attuned for sex & age, the levels of TAS were available to have link with lead of blood.

Conclusion: There were low levels of TAS in the normal healthy population with high concentration of lead in blood. The exposure to the lead pollution could be conceding with the anti-oxidant ability of the persons in this selected population.

Keywords: Lead, Cardiovascular Disease, Anti-Oxidant Epidemic, Disrupt, Spectrometric.

Corresponding author:**Farial Javed,**

Dera Ghazi Khan Medical College, D.G Khan.

QR code



Please cite this article in press Farial Javed et al., *Determination Of Total Antioxidant Status And Its Association To The Blood Lead*, Indo Am. J. P. Sci, 2019; 06(10).

INTRODUCTION:

Lead has the ability to interact with the super-oxide radical to formulate free radicals which are highly reactive like ROS (Reactive Oxygen Species) which has the ability to compromise the status of antioxidants of the individual resulting to different diseases related to oxidative stress like the CVDs (Cardiovascular Disease) & cancer. Our country Pakistan, like majority of the countries which are under development, is suffering from epidemic of CVDs and oxidative stress is one of the main reason for the rise of the danger of cardiovascular diseases in our population. There is very less amount of the research works on the impacts of lead pollution on the oxidative stress in normal healthy population.

In a work conducted in past, we stated that 57.0% population from low income in the city of Dera Ghazi Khan was available with levels of blood lead higher than ten $\mu\text{g}/\text{dl}$. Lead has the ability to disrupt the balance of the anti-oxidant in the body of human being, it is very important that TAS of the patients and its association to lead level of blood in the people of the countries which are under development like Pakistan where the pollution due to lead is very important health issue in the environment.

METHODOLOGY:

Total one hundred apparently healthy young populations (55 present with level of blood lead less than 7 $\mu\text{g}/\text{dl}$ and 45 present with concentration of blood lead greater than eleven $\mu\text{g}/\text{dl}$) carried out from

eight hundred and seventy-two persons having the age from eighteen to sixty years from low income population of Dera Ghazi Khan. The description of the selection in the research works on larger scales & analysis of the lead in blood is present in the communications of the past. The determination of the serum TAS carried out with the utilization of the kit of spectrophotometric assay in accordance with the guidelines of the manufacturer.

Briefly, 20 μl sample of serum incubated with the 1 milliliter of chromogen at the temperature of 37°C in the spectrophotometer. The determination of the concentration of total anti-oxidant status in mmol/l carried out in accordance with the formula: $A_2 - A_1 = \Delta A$ of sample / standard / blank standard concentration (ΔA blank - ΔA standard) total anti-oxidant status in $\text{mmol}/\text{l} = \text{Factor} \times (\Delta A \text{ blank} - \Delta A \text{ sample})$. The ethical committee of the DHQ/Teaching Hospital D.G Khan gave the approval to conduct this research work. SPSS V.13 was in use for the statistical analysis of the collected information. We expressed the total anti-oxidant status in averages and SD. T test was in use for the comparison of the values of two groups.

RESULTS:

Whereas male gender was present with greater levels of blood lead in comparison with the female gender, average concentrations of the total anti-oxidant status were not much different between both genders (Table-1).

Table-I: Mean Blood Pb And Serum Total Antioxidant Status (TAS) in Study Population

Status	Total n=100	Males n=65	Females n=35	P-value
	Mean \pm SD	Mean \pm SD	Mean \pm SD	
Blood Pb($\mu\text{g}/\text{dl}$)	11.148 \pm 6.738	15.588 \pm 7.068	8.458 \pm 5.708	0.001
TAS (mmol/l)	1.108 \pm 0.158	1.128 \pm 0.108	1.088 \pm 0.178	0.200

Table-2 describes the association between lead in blood & total anti-oxidant status vs profession. Persons who are working in an open environment like laborers, vendors, workers in the field of construction, divers of various vehicles, conductors of vehicles have

very high level of the average concentration of the blood lead in comparison with the persons working in a close environment like housewives, office workers & workers of a factory, perhaps due to the direct exposure to the pollution of the environment.

Table-ii: Mean Blood Pb Concentration and Serum TAS vs Occupations

Occupation	Pb($\mu\text{g}/\text{dl}$)	P-value	TAS (mmol/l)	P-value
	Mean \pm SD		Mean \pm SD	
Housewives	8.388 \pm 5.508	<0.001	1.98 \pm 0.168	0.500
Closed Environment	8.748 \pm 5.168		1.98 \pm 0.118	
Open Environment	17.488 \pm 7.300		1.98 \pm 0.188	

The average total anti-oxidant status in these groups of the persons were not much different. The average level of TAS in the serum were available to be highly reduced in the group of the persons present with levels of blood lead greater than eleven $\mu\text{g}/\text{dl}$ (Table-3) in comparison to those present with low concentration of lead in blood as lower than seven $\mu\text{g}/\text{dl}$.

In the associated analysis attuned for sex and age, levels of TAS in the serum were present having association with the lead of blood. But, we observed no important relationship for the TAS with the age of the person, habit of cigarette smoking & homocysteine.

Table-III: Concentrations of Serum TAS with Low and High Blood Pb

Blood Pb / TAS	Group with low blood Pb(n=65)	Group with high blood Pb(n=35)	P-value
	Mean \pm SD	Mean \pm SD	
Blood Pb (pg/ dl)	3.158 \pm 1.008	19.448 \pm 3.058	<0.001
TAS (mmol/l)	1.158 \pm 0.138	1.048 \pm 0.168	0.008

DISCUSSION:

There is very vital role of the oxidative stress in development of the disease of atherosclerosis. Initial research works stressed on the amounts of the anti-oxidant enzymes or the determinants of this stress in different complications. But there is inconsistency among results due to the no consideration to all parts of the anti-oxidant system of defense. In the current research work, we emphasized on the TAS to examine the part of lead pollution on it present in the normal healthy population of Dera Ghazi Khan. Our finding that an important reduction in the total anti-oxidant status of persons with higher amounts of blood lead supports the concept that lead is very vital factor in the rise of the oxidative stress. Bijoor reported the same results from India. The average values of total anti-oxidant status in the population of the research were not much different from the values reported previously in the healthy people of the country. There is an important impact of diet on the TAS and vegetarians & those persons using greater amount of the juice of fruits are available with increased levels of total anti-oxidant status.

Other than the pollution of the environment, the habit of cigarette smoking & homocysteine of plasma are the confounding features for the high levels of the lead in blood. The habit of cigarette smoking has the ability to rise not only the lead in blood & oxidative stress but it also causes the reduction in the capacity of the total anti-oxidant. One single puff of smoke has minimum 1014 not restricted radicals which can reduce the antioxidant's level but also excite inflammatory procedures resulting o high oxidative stress. In current research work, we were unable to discover an important disparity in the average levels of anti-oxidant status among smokers as well as non-smokers. Risal reported the same results on adults from Nepal. Distant from the impacts of diet and environment on the levels of anti-oxidant status, genetic donations to

variations in total anti-oxidant status of plasma must be into consideration.

In a research work conducted on the Americans, total levels of anti-oxidant status were present as very low in females in comparison with the male (1.578 ± 0.0038 verses 1.708 ± 0.0048 mmol/l), and there was very significant reduction in the TAS levels with age of the males. In the current research work, we were not able to find any important disparity between men and women regarding their average levels of TAS & age did not appear to present with remarkable impact on the level of TAS. Examination of the amounts of oxidized lipoprotein of low density would have been effective in evaluating the effect of oxidative stress on population of the research regarding the oxidation of LDL, which is very vital step in the disease development of the atherosclerosis. The findings of this research work show that pollution of lead which is very high in the city of Dera Ghazi Khan seems to be compromising with the TAS of the young population of the city.

CONCLSION:

The average levels of TAS were very low in the healthy young population with high levels of lead in blood in comparison with those present with low level of lead in blood showing that exposure to the pollution due to lead emerges to compromise anti-oxidant ability of the persons in the population of Pakistan.

REFERENCES:

1. Baser, H., Can, U., Baser, S., Yerlikaya, F. H., Aslan, U., & Hidayetoglu, B. T. (2015). Assesment of oxidative status and its association with thyroid autoantibodies in patients with euthyroid autoimmune thyroiditis. *Endocrine*, 48(3), 916-923.
2. SHENOY, S., Devi, U. H., Kumari, S. N., & Subramanya, C. (2018). A study on Association

- of Antioxidant Status of Red Blood Cells with Type 2 Diabetes. *Journal of Clinical & Diagnostic Research*, 12(8).
3. Hatami, M., Saidijam, M., Yadegarzari, R., Borzuei, S., Soltanian, A., Arian, M. S., & Goodarzi, M. T. (2016). Peroxisome proliferator-activated receptor- γ gene expression and its association with oxidative stress in patients with metabolic syndrome. *Chonnam medical journal*, 52(3), 201-206.
 4. Sridhar, A. V. S., Rao, P. V. N. S., Sivakumar, V., Satish, P., Shalini, P., Suchitra, M. M., & Kiranmayi, V. S. (2018). Study of oxidant and anti-oxidant status in patients with chronic kidney disease. *Journal of Clinical and Scientific Research*, 7(3), 124.
 5. Babiker, F., Al-Kouh, A., & Kilarkaje, N. (2019). Lead exposure induces oxidative stress, apoptosis, and attenuates protection of cardiac myocytes against ischemia-reperfusion injury. *Drug and chemical toxicology*, 42(2), 147-156.
 6. Jansen, E., & Ruskovska, T. (2015). Serum biomarkers of (anti) oxidant status for epidemiological studies. *International journal of molecular sciences*, 16(11), 27378-27390.
 7. Kumar A, Sivakanesan R, Gunasekera S. Antioxidants, oxidative stress status and waist/hip ratio in normolipidaemic AMI patients. *Pak J Med Sci*. 2008;24(5):689-693.
 8. Sharhan S, Normah H, Fatimah A, Fadilah RN, Rohi GA, Amin I, et al. Antioxidant intake and status, and oxidative stress in relation to breast cancer risk: A case-control study. *Asian Pac J Cancer Prev*. 2008; 9:343-349.
 9. Ahmad K. Facing up to Pakistan's cardiovascular challenge. *Lancet*. 2002; 359:859.
 10. Iqbal MP, Ishaq M, Mehboobali N. Increased levels of erythrocyte glutathione in acute myocardial infarction. *J Pak Med Assoc*. 2004; 54:254-258.
 11. Yakub M, Iqbal MP. Association of blood lead (Pb) and plasma homocysteine: A cross sectional survey in Karachi, Pakistan. *PLoS ONE* 2010; 5(7): e11706-doi:10.1371/journal.pone.0011706.
 12. Menke A, Muntner P, Batuman V, Silbergeld EK, Guallar E. Blood lead below 0.48 $\mu\text{mol/l}$ (10 $\mu\text{g/dl}$) and mortality among US adults. *Circulation*. 2006; 114:1388-1394.
 13. Kasperczyk S, Birkner E, Kasperczyk A, Zalejska-Fiolka J. Activity of superoxide dismutase and catalase in people protractedly exposed to lead compounds. *Ann Agric Environ Med*. 2004; 11:291-296.
 14. Yakub M, Iqbal MP, Kakepoto GN, Rafique G, Memon Y, Azam I, et al. High prevalence of mild hyperhomocysteinemia and folate, B12 and B6 deficiencies in an urban population in Karachi, Pakistan. *Pak J Med Sci*. 2010;26(4):923-929.
 15. Bijoor AR, Sinha R, Venkatesh T. Low-levels of blood lead and antioxidant status. *J Indian Society of Toxicology* 2007;3(2): online ISSN:0973-3566.
 16. Bansilal, Ali N, Afzal N, Khan TS, Shahjahan S. Antioxidant status in coronary heart disease (CHD) patients with type 2 diabetes mellitus. *J Ayub Med Coll Abbottabad*. 2007;19(4):98-101.
 17. Szeto YT, Kwok TC, Benzie IF. Effects of a long-term vegetarian diet on biomarkers of antioxidant status and cardiovascular disease risk. *Nutrition*. 2004;20(10):863-866.
 18. Codoner-Franch P, Lopez-Jaen AB, Muniz P, Sentandreu E, Belles VV. Mandarin juice improves the antioxidant status of hypercholesterolemic children. *J Ped Gastro & Nutr*. 2008; 47:349-355.
 19. Mannino DM, Homa DM, Matte T, Hernandez-Avila M. Active and passive smoking and blood lead levels in US adults: data from the third National Health and Nutrition Examination Survey. *Nicotine Tob Res*. 2005;7(4): 557-564.
 20. Aycicek A, Erel O, Kocycigit A. Decreased total antioxidant capacity and increased oxidative stress in passive smoker infants and their mothers. *Pediatr Int*. 2005;47(6):635-639.
 21. Bruno RS, Ramakrishnan R, Montine TJ, Bray TM, Traber MG. α -Tocopherol disappearance is faster in cigarette smokers and is inversely related to their ascorbic acid status. *Am J Clin Nutr*. 2005; 81:95-103.
 22. Risal S, Adhikari D, Alurkar VM, Singh PP. Oxidative stress and antioxidant status in cardiovascular diseases in population of western Nepal. *Kathmandu Univ Med J*. 2006;4(3):271-274.
 23. Wang XL, Rainwater DL, Vandenberg JF, Mitchell BD, Mahaney MC. Genetic contributions to plasma total antioxidant activity. *Arterioscler Thromb Vasc Biol*. 2001; 21:1190.
 24. Steinberg D, Witztum JL. Is the oxidative modification hypothesis relevant to human atherosclerosis? Do the antioxidant trials conducted to date refute the hypothesis? *Circulation*. 2002; 105:2107-2111.
 25. Rahbar MH, White F, Agboatwalla M, Hozhabri S, Luby S. Factors associated with elevated blood lead concentrations in children in Karachi, Pakistan. *Bull World Health Organ*. 2002;80(10):769-775.

27. Bharadwaj, S., Bhat, V. B., Vickneswaran, V., Adhisivam, B., Zachariah, B., & Habeebullah, S. (2018). Oxidative stress in preeclamptic mother–newborn dyads and its correlation with early neonatal outcome—a case control study. *The Journal of Maternal-Fetal & Neonatal Medicine*, 31(12), 1548-1553.
28. Masi, S., D’Aiuto, F., Cooper, J., Salpea, K., Stephens, J. W., Hurel, S. J., ... & Humphries, S. E. (2016). Telomere length, antioxidant status and incidence of ischaemic heart disease in type 2 diabetes. *International journal of cardiology*, 216, 159-164.
29. Karimi, S., Tabataba-vakili, S., Yari, Z., Alborzi, F., Hedayati, M., Ebrahimi-Daryani, N., & Hekmatdoost, A. (2019). The effects of two vitamin D regimens on ulcerative colitis activity index, quality of life and oxidant/anti-oxidant status. *Nutrition journal*, 18(1), 16.
30. Yildirim, M., Turkyilmaz, E., Neselioglu, S., Alisik, M., & Avsar, A. F. Y. (2017). Dynamic Thiol-Disulphide Status in Polycystic Ovary Syndrome and Its Association with the Pathogenesis of the Disease. *Gynecologic and obstetric investigation*, 82(1), 54-59.