International Journal of Advanced Biotechnology and Research (IJBR)
ISSN 0976-2612, Online ISSN 2278–599X,
Vol-9, Issue-2, 2018, pp735-738
http://www.bipublication.com

Research Article

Analysis of level of antioxidants in the prognosis of hypertension patients in Pakistan

Amna Razzaq[1], Iram Iqbal[2] and Hafiz Faizan Lateef[3]

[1]FMH College of medicine and dentistry Lahore, Pakistan.
[2]WMO at THQ Burewala, Pakistan.
[3]MO at Government Dispensary paisa akhbar, Lahore

Corresponding author: Dr Amna Razzaq, FMH College of medicine and dentistry Lahore, Pakistan.
E-mail: a.razzaq100010@gmail.com
Source(s) of support in the form of grants, equipment, drugs, or all of the above: None.

ABSTRACT

Introduction: Hypertension is a significant public health problem, with a worldwide prevalence of 40.8% and a control rate of 32.3. Hypertension is a noteworthy hazard factor for various genuine health conditions, including cardiovascular ailment, cerebrovascular malady, and constant kidney illness.**Objectives of the study:** The main objective of the study is to find the level of antioxidants in case of hypertension patients because hypertension directly effect on blood level and heart of the patient.**Methodology of the study:** The study was conducted at FMH hospital, Lahore during 2017 to 2018. All the data was collected according to the rules and regulations of authority. The data was collected from both genders of age between 30 to 50years. The blood was drawn from all patients for further analysis of antioxidants.**Results:** Our results showed that the level of antioxidants increases in hypertension patients due to increase in blood flow. The level of MDA, SOD, GSH and CAT vary in a different manner. The level of SOD become decreases due to hypertension. Antioxidants are compounds that are able to trap ROS and thus may be capable of reducing oxidative damage and possibly blood pressure.**Conclusion:** In conclusion, we found that hypertension increased free radical levels in the blood. According to our study, levels of free radicals increase in the blood,which maystimulate antioxidant defense systems of body during hypertension.

Keywords: antioxidants, hypertension, oxidative stress

INTRODUCTION

Hypertension is a significant public health problem, with a worldwide prevalence of 40.8% and a control rate of 32.3. Hypertension is a noteworthy hazard factor for various genuine health conditions, including cardiovascular ailment, cerebrovascular malady, and constant kidney illness[1]. Worldwide, 9.4 million passing are credited to difficulties from hypertension, including 45% of all passing because of coronary vein illness and 51% of all passing because of stroke[2]. These relations are steady in the two people, in youthful, moderately aged, and more seasoned subjects, among different racial and ethnic gatherings, and inside and between nations. In spite of the fact that there is a continuum of cardiovascular hazard crosswise over levels of circulatory strain, the characterization of grown-ups as indicated by pulse gives a system to differentiating levels of hazard related with different circulatory strain classes and for characterizing treatment edges and helpful objectives[3].

Mammalian cells are equipped with both enzymatic and non-enzymatic mechanisms of antioxidant defenses to reduce the cellular injury caused by contact with reactive oxygen species (ROS)[4]. ROS, such as hydrogen peroxide, super oxide and hydroxyl radicals, maytarget membranes causing peroxidation of lipids. Thismay lead to an increased impermeability of cell and loss of endothelial integrity. ROS are produced endogenously or exogenously. *In vivo*, free radicals are created during normal aerobic respiration, phagocytosis, β-oxidation of fatty acids in peroxisomes and by auto-oxidation of various molecules[5].

In cell, mitochondria constitute the main physiologic source of reactive oxygen species, which are generated during mitochondrial respiration. Superoxide radicals that are formed by side reactions of the mitochondrial electron transport chain or by an NADH-independent enzyme, can be converted to H_2O_2 and further to a powerful oxidant, the hydroxyl radical. Oxidative stress in organisms leads to the oxidation of all major biomolecules, such as DNA, proteins and lipids. Among these targets, the peroxidation of lipids is particularly devastating, because the formation of lipid peroxidation product leads to spread of free radicals[6]. The general process of lipid peroxidation consists mainly of initiation, propagation and termination.Commonly applied method to analyze oxidative stress is to determine lipid peroxidation with the thiobarbituric acid reactive substances[7].

Interestingly, ROS mayinduce carcinogenesis by oxidation of DNA, proteins and lipids. Several studies have reported the elevated levels of lipid peroxidation in human colorectalcancer and gastric cancer tissues. The major aldehyde products of lipid peroxidation are malondialdehyde (MDA) and 4-hydroxynonenal. MDA is mutagenic and thus carcinogenic in mammalian cells[8].

Peroxidation of lipids can disturb the integrity of the membrane, causing changes in fluidity, permeability as well as alterations in ion transport and in various metabolic processes. Mitochondrial damage induced by lipid peroxidation can promote further ROS generation. Catalase is a common enzyme found in nearly all living organisms that are exposed to oxygen. Catalase converts hydrogen peroxide to water and oxygen. This enzyme has one of the highest turnover rates; one molecule of catalase can convert millions of molecules of hydrogen peroxide to water and oxygen per second[9].

Objectives of the study

The main objective of the study is to find the level of antioxidants in case of hypertension patients because hypertension directly effect on blood level and heart of the patient.

Methodology of the study

The study was conducted at FMH hospital, Lahore during 2017 to 2018. All the data was collected according to the rules and regulations of authority. The data was collected from both genders of age between 30 to 50years. The blood was drawn from all patients for further analysis of antioxidants.Blood was centrifuged at 4000 rpm for 10 minutes and serum was separated. Blood samples were collected into EDTA tubes. Subsequently, indomethacin and butylatedhydroxytoluenewereadded into the plasma samples.Blood sampleswerestored at -80°C**.**

Statistical Analysis

Statistical analyses (Anova Test and Post Hoc) were performed using the SPSS software program (17.0). All results were expressed as the mean ± standard deviation (SD). P value below 0.05 was considered to be statistically significant.

RESULTS

Our results showed that the level of antioxidants increases in hypertension patients due to increase in blood flow. The level of MDA, SOD, GSH and CAT vary in a different manner. The level of SOD become decreases due to hypertension.Antioxidants is compounds that are able to trap ROS and thus may be capable of reducing oxidative damage and possibly blood pressure. Antioxidants terminate the chain reactions of ROS by removing free radical

intermediates, and inhibit other oxidation reactions. They do this by being oxidized themselves, so antioxidants are often reducing agents such as ascorbic acid, vitamin E or polyphenols that act by different mechanisms

Table 01: Analysis of Antioxidants in hypertension patients

No.of Observation	Analysis of blood	Normal µg/mL	Before treatment µg/mL	After treatment(5min) µg/mL
01	**SOD**	0.32±0.00	0.33±0.23	0.39±0.00
02	**CAT**	4.16±0.00	0.90±0.00	0.43±0.39
03	**GSH**	1.89±0.00	2.48±1.29	3.23±0.03
04	**MDA**	2.35±0.00	4.26±0.00	4.95±0.97

DISCUSSION

Different sources of ROS might exist in blood vessels. One of the best characterized sources of ROS is NADPH oxidase. Several other enzymes including NO synthase, xanthine oxidase, and mitochondrial enzymes may also contribute to ROS generation. The vasculature and kidney are the rich sources of NADPH oxidase-derived ROS, having important role in vascular damage and renal dysfunction under[9]. This system functions as an electron donor and catalyses the reduction of oxygen by NADPH which increases the generation of superoxide upregulation of NADPH oxidase in hypertensive patients[10].

The function of NADPH oxidase-derived superoxide is inactivation of NO in the reaction that forms peroxynitrite, leading to impaired endothelium dependent vasodilation. The activation of NADPH oxidase has been strongly associated with hypertension.Oxidation or deficiency of tetrahydrobiopterin (BH4) and L-arginine which are two cofactors for endothelium-derived NO synthase (eNOS) action are associated with the uncoupling of the L-arginine-NO pathway that results in increased eNOS-mediated generation of superoxide and decreased formation of NO[11].

Lipid peroxidation is one of the hallmarks of oxidative stress. Reactive oxygen species cause oxidation and peroxidation of membrane phospholipids, thereby impacting biological activity of these biomolecules[12]. Polyunsaturated fatty acids are abundantlipids in mammalian membranes and are predominant targets of ROS. Activities of enzymatic antioxidants like catalase, superoxide dismutase and glutathione peroxidase significantly decrease in prostate cancer patients compared to normal subjects. Oxidative stress initiates DNA damage. In our studies, we observed an increased MDA and GSH levels and enhanced SOD activity in conjunction with decreased catalatic activity. Increased levels of lipid hydroxyl peroxides and hydroxyl phospholipids have been associated with oxidative stress and membrane injury that occur in pathological conditions such as spinal cord injury[13]. Lenfant et al found that bupivacaine displays protective properties against free radicals induced by 2,2-azobis di hydrochloride. Increased levels of anti-oxidants and decreased activities of catalases can be correlated to enhanced lipid peroxidation and subsequent neoplastic transformation. Antioxidant enzymes thatscavenge reactive oxygen species include catalase, manganese containing superoxide dismutase and copper and zinc containing superoxide dismutase[14]. ROS-induced damage occurs as a consequence of GSH depletion, downregulation of antioxidant enzyme activities and enhanced lipid peroxidation. On the other hand, marked increase in oxidative stress may be a consequence of increased antioxidant enzyme activities. Nevertheless, antioxidants can scavenge ROS before they can damage vital biomolecules preventing radical chain reaction of lipid peroxidation to spread.GSH is a major non-protein thiol in mammals and is essential for structural and metabolic integrity of cells[15].

CONCLUSION

In conclusion, we found that hypertension increased free radical levels in the blood.

According to our study, levels of free radicals increase in the blood,which maystimulate antioxidant defense systems of body during hypertension.

Conflict of interest

There is no conflict of interest.

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