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Effect Of Selenium In Altering Hypertension Within Indian Population: A Review

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Abstract

Nowadays Hypertension is a most common Cardiovascular disorder throughout the world. It causes many underlying disease such as pathological condition of heart, blood vessel damage, myocardial infarction, stroke etc. Our review shows that the effect of a micronutrient Selenium (Se), in altering hypertension in Indian population irrespective of age, sex, life-style etc. Selenium is a natural anti-oxidant, has potential role in development and progression of cardio-vascular disease. Se maintains normal functioning of smooth muscle & heart. Experimental evidence shows Selenium level has significant negative relationship that is when Se level decreases, blood pressure increases as oxidative stress increases. Glutathione peroxidase, a selenoprotein, is a protein containing Se have the capacity to protect vascular smooth muscle. Therefore low Se intake leads to severe changes in blood vessel wall. In athlete's & body-builders strenuous exercise produce free radicals which also contributes on oxidative stress. So balancing of serum Se level is too much necessary for vascular system as it prevent CVD by lowering oxidative stress and inflammatory response. But the studies varied greatly in terms of study population & Se level measured in subject. Therefore repeated trials & Se levels are needed to fully finalized the relationship between Se and Hypertension.

Keywords: Selenium, Hypertension, Glutathione peroxidase, Antioxidant, Population

INTRODUCTION

Hypertension commonly known as high blood pressure, is a major Cardiovascular disorder nowadays throughout the world & also affect so many underlying disease. Over a billion of people worldwide affected by Hypertension and millions of death are also caused by it. Nearly 63% of total death in India is due to noncommunicable diseases, out of which 27% deaths are due to CVDs mainly hypertension. There are various research article and the researchers have studied about the role of micronutrients like Sodium, Chloride, Potassium, Calcium etc. and what effects they exert on Hypertension (Third National health and

nutrition survey, 2020). Selenium's precise impact on hypertension remains uncertain, with only a limited number of studies presenting conflicting findings on its relationship to this condition (Avissar, 1991).

Role of selenium in hypertension:-

Selenium, a crucial trace element, serves as a cofactor in the activity of glutathione peroxidase (GPx), an enzyme widely recognized as a prominent selenoprotein (CDC, 1984 revised). GPx plays a pivotal role in shielding cells from harm induced by free radicals like reactive oxygen species (ROS), thereby safeguarding against potential cellular and membrane damage initiated by these radicals. The absence of selenium or low level of selenium correlates with loss of glutathione peroxidase activity which ultimately leads to cell membrane damage due to accumulation of free radicals (Fan, 2023). This selenoprotein also keep the blood platelets from becoming sticky. Therefore it gives protection against cardiovascular disease (CVDs).

The Institute of Medicine (IOM) suggests a daily recommended intake of selenium for both men and women, falling within the range of 40-70 µg per day (Chen, 2022).

FOOD SOURCES OF SELENIUM:-

The selenium content in food can vary significantly based on the selenium levels present in the soil where the crops are cultivated or where the food sources originate. Plant foods obtain selenium from soil. Protein foods as animal source are good sources of selenium. Brazil nuts, Fin fish, shell fish, beef, turkey, chicken, cereals, whole wheat bread, eggs are the good source of selenium (Khan, Hafiz, 2023).

DATA SOURCE & ASSESSMENT:-

The study primarily relied on the database of the National Health and Nutrition Examination Survey conducted between 2011 and 2016. It involved 31,522 participants focusing on trace elements and their impact. Systolic and diastolic blood pressure measurements were taken for all participants, regardless of whether they were taking anti-hypertensive medication (Field, Bailey 2022). The average of three consecutive observations was then calculated for each individual. Besides blood pressure blood was also collected and serum selenium level was measured amongst those NHANES participants.

Normal reference values are collected from the values published by Mayo-clinic laboratories (2019). According to this laboratories data, normal serum selenium level is 110-165 mcg/L. Optimum selenium concentration is age dependent; usually children require less circulating selenium than adults.

DISCUSSION:-

Findings show that serum Selenium level – high, moderate high and high normal range are associated with hypertension. In addition people who were suffering from selenium deficiency (Nutritionally deprived), individuals who were supplemented with dietary selenium showed a propensity to develop diastolic hypertension rather than systolic hypertension. Therefore DBP is strongly affected compared to SBP in per unit increase of serum selenium level (Holmquist, 2021).

This study also indicates that in the Indian population, individuals with higher daily selenium intake tend to be associated with hypertension. Importantly, this association between higher serum selenium levels and hypertension appears to be consistent across all age groups, genders, and even among participants who are taking anti-hypertensive medication (Wang, 2019).

Recent research also reveals that accumulation of serum total cholesterol leads to increase serum Se level. So consumption of cholesterol rich food like eggs, meat, nuts etc. develop Hypertension in both way i.e. by increasing Se intake as well as high cholesterol (atherosclerosis) (Kieliszek, 2020). Sometimes in case of chronic malnutrition patients in hospital are treated with nutritionally rich food or supplements which are rich in Selenium. So those patients are more prone to develop Hypertension as organic & inorganic Se is accumulate within their body. Therefore the advisable method to get lower selenium level in blood is avoid Selenium rich sources (Foods and Water).

CONCLUSION

In conclusion, the review states that high level of selenium in serum including normal but tends to high may be associated with high blood pressure (Hypertension). It needs more research findings with larger population

including hypertensive with medication intake status for confirmation of actual role of selenium in hypertension. So it can be established that Hypertensive patient needs to lower daily selenium intake.

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