

International Journal of Innovative Research in Science, Engineering and Technology

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Visit: www.ijirset.com | Impact Factor: 7.249 |

Vol. 8, Issue 12, December 2019

Lead Poisoning or Lead Accumulation in Human Body Unknowingly in Daily Life: a Hidden Threat for Good Health

Dr. CHANCHAL KARADIA

Assistant Professor, Dept. of Chemistry, BBD Govt. College Chimanpura (Shahpura) Jaipur, Rajasthan, India

ABSTRACT: The presence of heavy metals in foods is a timely issue, involving contamination of the food chain and harm to public health. Contamination of foods by heavy metals has a number of different sources such as soil from which foods are produced; residual muds; chemical fertilizers and pesticides used in agriculture. Lead is a major contaminant of soil due to its past use in gasoline, plumbing pipes and paint. Soil around areas of heavy traffic has been shown to contain higher levels of lead, which is concerning for the urban gardener, water coming from leaded pipes and fittings can also contaminate soil. Lead in vegetables accumulates through uptake from soil, water and atmosphere. The intake of heavy metals like Pb through diet leads to several disorders such as kidney damage, nervous disorders, bone disease and tubular growth.

In this study effort was made to discuss about lead poisoning on human health, main source of lead, what foods & vegetables contain lead, heavy metal detoxification, how we can prevent exposure of our body to lead.

KEYWORDS: lead, chemical fertilizer, lead poisoning, heavy metal detoxification, health disorders.

I. INTRODUCTION

The heavy metals and their compounds rapidly contaminate agricultural land and becoming an alarming issue throughout the world. It has been estimated that food of plant origin contributes about half of the mean ingestion of lead, cadmium and mercury¹. Vegetables are also contaminated with heavy metals during transportation and marketing due to polluted air². Different agricultural practices such as use of fertilizers, manure etc. To enhance the crop yield are also heavy metals contributor in the soil.

These vegetables take up the metals by absorbing them from contaminated soil, water, as well as from deposits on different parts of the vegetables exposed to the air from polluted environments.

Lead occurs in foods because of its presence in the environment. Lead can enter our food supply by different ways.

Lead in the soil can settle on or be absorbed by plants grown for fruits or vegetables or plants used as ingredients in food. Lead, like other heavy metals does not biodegrade or disappear from the environment over time. It is not possible to remove or completely prevent lead from entering the food supply.

H.M. Nasser and co-workers have studied Pb, Cd and Ni contents of vegetables grown in industrially polluted and non polluted areas of Bangladesh³. Impact of contaminated vegetables, fruits and fodders on human health have been studied by Y. Nergus and co-workers⁴. M. Singh has studied about an evaluation of heavy metals concentration in vegetables grown in the vicinity of industrial area.⁵

Lead is naturally occurring element found in small amount in the earth's crust. Lead can be found in all parts of environment – the air, the soil, the water and even inside our homes. Lead in a wide variety of products found in and around our homes, including paint, ceramics, pipes and plumbing materials, solders, gasoline, batteries, ammunition and cosmetics. Lead may enter the environment from these part and current uses. Lead can also be emitted into the environment from industrial sources and contaminated sites, such as former lead smelters.

International Journal of Innovative Research in Science, Engineering and Technology

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Visit: www.ijirset.com | Impact Factor: 7.249 |

Vol. 8, Issue 12, December 2019

II. SOURCES OF LEAD

1. **Soil , yards and playgrounds :** Soil , yards and playgrounds can become contaminated when exterior lead based paint from louses or buildings flakes or peels and gets into the soil . Soil may also be contaminated from past use of leaded gasoline in cars , from industrial sources or contaminated sites .
2. **Dust :** Lead in household dust results from indoor sources such as old lead based paint on surfaces , deteriorating old lead – based paint on any surface home repair activities , tracking lead contaminated soil from the outdoors into the indoor environment
3. **Drinking water :** Lead can enter drinking water through corrosion of plumbing materials , especially where the water has high acidity or low minerals content that corrodes pipes and fixtures .
4. **Human activities :** Much of our exposure comes from human activities including the use of fossil fuels including past use of leaded gasoline , some types of industrial facilities and past use of lead based paint in homes .
5. **Herbal or folk remedies :** Lead poisoning has been linked to greta and azarcon , traditional hispanic medicines as well as some from India , china and other countries .
6. **Occupation :** People are exposed to lead and can bring it home on their clothes when they work in auto repair , mining pipe fitting , battery manufacturing painting , construction and certain other fields .
7. **Products :** Lead has been used for a long time in a wide variety of products found in and around our homes , including painted toys , furniture and toy jewelry , cosmetics , food or liquid containers and plumbing materials .

LEAD POISONING :

Heavy metals are elements that are naturally found in the earth . They are used in the many modern day applications . Such as agriculture medicine and industry .

Our body even naturally contains some metals like zinc , iron and copper which are necessary for regular body function as long as they are not present in toxic amounts .

Heavy metal poisoning occurs when our body's soft tissues absorb too much of a particular metal . It makes us sick and affects the way our body works .

The most common metals that the human body can absorb in toxic amounts are –

- Mercury
- Lead
- Cadmium
- Arsenic

Lead poisoning is a serious and sometimes fatal conditions . It occurs when lead builds up in the body . Lead poisoning usually occurs over a period of months or years . It can cause severe mental and physical impairment .⁶

CAUSES OF LEAD POISONING : –

Lead poisoning occurs when lead is ingested . Breathing in dust that contains lead can also cause it . We cannot smell or taste lead and it's not visible to the naked eye .

Lead can enter our body in different ways . We might consume them in the food we eat or absorb them through our skin .

Lead metal poisoning occurs with heavy or frequent exposure , usually over a long period of time . Occasional exposure would not lead to heavy metal poisoning .

SOME GENERAL CAUSES ARE FOLLOWING :-

- Living in a home with high levels of lead based paint
- Doing industrial construction work radiator repair
- Being in firing ranges
- Using kohl cosmetics

International Journal of Innovative Research in Science, Engineering and Technology

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Visit: www.ijirset.com | Impact Factor: 7.249 |

Vol. 8, Issue 12, December 2019

- Applying progressive hair dyes
- Using foreign digestive remedies calcium products , kohl , surma , kajal or progressive hair dyes
- Lead is widely in the environment and can get into our food through processing
- Medicine
- Improperly coated food container , plates and cooking
- Ingestion of lead based paints
- Ingestion of insecticides

EFFECT OF LEAD POISONING ON HUMAN HEALTH⁷-

Within our bodies , lead is absorbed and stored in our bones , blood and tissues . It does not stay there permanently rather it is a stored there as a sources of continual internal exposure .⁸

Generally lead affects children more than it does adults . Children tend to show sign of severe lead toxicity at lower levels than adults neurological effects and intellectual disability have also occurred in children whose parents may have job related lead exposure .^{B4}

The department of health and human services (dhhs) , environmental protection agency (epa) and the international agency for research on cancer (iarc) have determined that lead is probably cancer causing in humans .^{c5}

BELOW ARE KEY HEALTH CONCERNS ASSOCIATED WITH LEAD EXPOSURE

- Impaired brain development
- Lower iqs in children
- Cardiovascular disease
- Cancer
- Damage the brain , nervous system and kidneys
- Learning and behavior problems , intellectual disability
- Reduced muscle control
- Constipation
- High blood pressure
- Coma , seizures
- Vomiting
- Confusion
- Abdominal pain & cramps
- Aggressive behavior
- Sleep problems
- Irritability
- Loss of appetite
- Anemia headaches
- Fatigue
- Memory loss

SIMPLE MEASURES CAN HELP PROTECT US AND OUR FAMILY FROM LEAD POISONING^{9,10,11,11a}

- A. **Wash your hands and toys :** Wash hands after outdoor play before eating and at bedtime to reduce hand to mouth transfer of contaminated dust or soil wash children's toys regularly .
- B. **Clean dusty surfaces :** Clean floors with a wet mop and wipe furniture windowsills and dusty surfaces with a damp cloth .
- C. **Remove shoes before entering the house :** This will help keep lead based soil outside .
- D. **Run cold water :** If you have older plumbing containing lead pipes or fitting , let run cold water for at least a minute before using . Don't use hot tap water for cooking .
- E. **Prevent children from playing on soil .**

International Journal of Innovative Research in Science, Engineering and Technology

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Visit: www.ijirset.com | Impact Factor: 7.249 |

Vol. 8, Issue 12, December 2019

- F. **Eat a healthy diet** : Regular meals and good nutrition enriched with enough calcium , vitamin c and iron might help lower lead absorption .
- G. **Keep your home well maintained** : If your has lead based paint check regularly for peeling paint and try not to sand which generates dust particles that contain lead .
- H. **Test your water for lead** : If lead levels are high use a filtering device or drink bottled water .
- I. Clean faucets and aerators regularly .
- J. Use lead free paint in your home .
- K. Avoid areas where lead based paint may have been used .

LEAD IN FOOD ¹²⁻¹⁷

Food can be contaminated with lead during production , processing , packaging , preparation or storage . For e.g. Vegetables may be grown in soil that contains lead or exposed to exhaust from fuel that contains lead . Lead can lead into canned foods from tins manufactured with lead solder and some food containers and pots contain lead , such as lead glazed pottery and leaded crystal glassware .

Vegetables constitute an essential part of human diet and are considered to play an important role in a healthy diet providing important vitamins , minerals , antioxidants and phytochemicals . These vegetables take up the metals by absorbing them from contaminated soil , water , as well as from deposits on different parts of the vegetables exposed to the air from polluted environments to high concentrations thereby causing serious health risk for the consumers .

Lead occurs in foods because of its presence in the environment . Lead can enter our foods supply because-

- Lead in the soil can settle on or be absorbed by plants grown for fruits or vegetables or plants used as ingredients in food , including dietary supplements .
 - Lead in plants or water may be ingested and absorbed be ingested and absorbed by the animals we eat , which is then passed on to us .
 - Lead can enter inadvertently , through manufacturing processes . For eg. Plumbing that contains lead can contaminated water in food production .
 - Lead in some pottery and other food contact surfaces containing lead can pass or leach lead into food or drinks when food or prepared , served or stored in them .
- Lead , like other heavy metals does not biodegrade or disappear from the environment over time . It is not possible to remove or completely prevent lead from entering the food supply .

Lead was most commonly found in the following baby foods types - d

- ❖ Fruits juices – 89% of grap juice , 67% mixed fruit juice , 55% apple juice , 45% pear juice
- ❖ Root vegetables – 86% sweet potatoes , 43% carrots
- ❖ Cookies –64% arrowroot cookies , 47% teething biscuits

Good and bad foods for heavy metal exposure

Many people get a buildup of heavy metals in their system because of the foods they eat .

HOW TO AVOID LEAD EXPOSURE FROM FOOD ⁻¹⁸

Lead is toxic to the human body , so exposure should avoided or minimized as much as possible .

- 1) **Always wash fresh produce before eating it** : Wash fresh fruits and veggies before eat them . It's more effective to remove soil from fresh produced by soaking it in water for a 30 minutes or so before scrubbing it with something abrasive , such as special brush .
- 2) **Avoid consuming canned foods** : Lead can leak into canned foods from this made with lead solder which keeps the tins together . So it's more practical and healthier to simply eat less canned food .

International Journal of Innovative Research in Science, Engineering and Technology

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Visit: www.ijirset.com | Impact Factor: 7.249 |

Vol. 8, Issue 12, December 2019

- 3) **Clean meat thoroughly** : If you are a hunter: many types of bullets and pellets used to kill animals contain lead , which can tissues . Therefore , don't just wash the wounds , but cut out the flesh surrounding the bullet wound and dispose of it to be safe .
- 4) **Be careful how you store food** : Some food containers and pots contain higher levels of lead such as lead glazed pottery and leaded crystal glassware . Avoid storing foods such as rice , pasta and grains in these types of containers for long periods of time . Don't drink water juice or wine from leaded glassware .
- 5) **Use filtered cold water to cook and drink** : To reduce lead exposure only use cold tap water for cooking or drinking because hot water often contains higher levels of lead as it absorb it quicker .
- 6) **Test the soil in your yard** : You should test your home and yard for lead contamination , particularly if your house was built before 1978 or if it sits near a freeway or busy road where leaded gasoline can pollute your property . If the levels of lead in the soil are greater than 400 parts per million (ppm) you should not grow veggies in or let your child play in or around it .

FOODS WHICH KEEPS AWAY FROM LEAD POISONING

A well balanced diet is very important for health but some nutrients offer more protection from lead poisoning than others .

- A. **Eat foods rich in calcium** : Calcium helps keep lead from being absorbed by your body . Healthy foods rich in ca include low fat milk and cheese , yogurt , tofu and some green leafy vegetables , such as collard and mustard greens , spinach , kale and broccoli .
- B. **Consume iron rich foods** : When there is more iron than lead within your bloodstream , your body will absorb the iron first and let more of the lead pass through your digestive system . Healthy foods rich in iron include ; red meat , low fat pork , dried beans and peas , sunflower seeds , raisins , some leafy greens and fortified cereals and baby formula .
- C. **Get lots of vitamin c in your diet** : Vitamin c is helpful in combating lead exposure because it promotes the absorption of more iron and calcium within your body . Healthy foods rich in vitamin include : citrus fruits , strawberries , kiwi , mango , tomatoes , bell papers , broccoli , spinach , brussels sprouts , cabbage and sweet potatoes .

HEAVY METAL DETOXIFICATION ¹¹

A heavy metal detox aims to remove excess heavy metals from the body . A substance that binds to heavy metals is known as a chelator and the process that transport them out of the body is called chelation and this therapy is known as chelation therapy .

Heavy metal toxicity can affect the function of organs such as the brain , the liver and the lungs . Having high levels of heavy metals in the body can also reduce energy levels and affect blood composition .

Long term exposure to heavy metals can cause the symptoms seen in degenerative conditions , such as parkinson's disease and alzheimer's disease .

For people with heavy metal poisoning , a heavy metal detox may be essential to prevent life threatening complications .

Doctors may use certain drugs , such as penicillamine or dimercaprol , that bind to metals and carry them out of the body . Heavy metal detoxing may help prevent kidney cardiovascular and neurological conditions .

Some foods can help you detoxify by getting rid of heavy metals from your body . These foods bind to the metals and remove them in the digestive process .

Eating foods high in vitamins and minerals can have protective effects for those exposed to heavy metals .

FOODS TO EAT

- ✓ Cilantro
- ✓ Garlic
- ✓ Wild blueberries
- ✓ Lemon water
- ✓ Spirulina

International Journal of Innovative Research in Science, Engineering and Technology

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Visit: www.ijirset.com | Impact Factor: 7.249 |

Vol. 8, Issue 12, December 2019

- ✓ Chlorella
- ✓ Barley grass juice powder
- ✓ Atlantic dulse
- ✓ Curry
- ✓ Green tea
- ✓ Food contain vitamin b, b₆ and c vitamin c has been reported to have chelating effects on iron

FOODS TO AVOID : To minimize the effects of heavy metal poisoning or prevent it altogether you need to eliminate some foods from your diet .

Some foods to limit or avoid in your heavy metal detox diet include –

- * Some fish such as larger and long living fish as they contain more mercury
- * Alcohol
- * Nonorganic foods

III. CONCLUSION

The purpose of this article is to inform people about lead poisoning which is affecting the health of us and our children . We can avoid exposure to lead by adopting proper diet and lifestyle . Our goal is not to stop people from gardening at home , but to make them aware of the dangers of lead and how to avoid them . Some good habits developed in your children can save them from its ill effects to a great extent in future .

REFERENCES

1. Agarwal , m. & Marshall , f.m. , heavy metals contamination in vegetables grown in wastewater irrigation areas of Varanasi , India , bulletin of environmental contamination and toxicology , **2003** ,77, 311-318 .
2. Sharma , r.k. , agarwal , m. , & marshal , f.m. , heavy metals in vegetables collected from production and market sites of a tropical urban area of India . Food and chemical toxicity , **2009** , 47(3) , 583-590 .
3. Nasar , h.m., shil , n.c. , mahmud , n.u. , rashid , m. , & hassain , k.m., lead , cadmium and nickel contents of vegetables grown in industrially polluted and non polluted areas of bangladesh . Bangladesh j. Agricultural research , **2009** , 34(4) , 545-54 .
4. Nergua , y. , ahmed , s.i. , & sharif , s.i., impact of contaminated vegetables , fruits and fodders on human health . J. Chemical society of pakistan , **2005** ,6, 561-574 .
5. Singh , m. , an evaluation of heavy metals concentration in vegetables grown in the vicinity of industrial areas , j. Agro alimentary processes and technology , **2004** ,17(1) , 36-41 .
6. J. Cafasso , lead poisoning , healthline , dec.14 , **2018** .
7. Health problems caused by lead , the national institute for occupational safety and health (niosh) , june 18 , **2018** .
8. Gulson , b.l. , mahaffey , k.r. , mizon , k.j., contribution of tissue lead to blood in adult female subjects based on stable lead isotope methods , lab. Clin. Med. , **1995** , 125 , 703-712 .
9. Protect your family from lead in your home . U.s. environmental protection agency , may 7 , **2020** .
10. Nussbaumer – streit b. , et al. Household intervention for preventing domestic lead exposure in children . The cochrane database of systematic reviews , **2016** .
11. Sullivan , k. Anthony , healthline , heavy metal detox diet , sept. 28 , **2018** .
12. Singh , m. , an evaluation of heavy metals concentration in vegetables grown in the vicinity of industrial area . J. Agro alimentary processes and technology , **2004** , 17(1) , 36-41 .
13. Singh , s . , & kumar , m. , heavy metal load of soil , water and vegetables in peri-urban delhi . J. Environmental monitoring and assessment , **2006** , 120 , 79-91 .
14. Zurera , g. Moreno , r. , salerrooms , j . , & pozo , r. , heavy metal uptake from greenhouse border soils for edible vegetables . J. Science of food and agriculture , **1989** , 49 , 307-314 .
15. Fytianos , g . Katsianis , p . Triantafyllou and g . Zacharias , accumulation of heavy metals in vegetables grown in an industrial area in relation to soil , bulletin of environmental contamination and toxicology , **2001** , 67(3) , 423-430 .

International Journal of Innovative Research in Science, Engineering and Technology

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Visit: www.ijirset.com | Impact Factor: 7.249 |

Vol. 8, Issue 12, December 2019

16. Z . Parveen , m.i. khuhra and n . Rafiq , market basket survey for lead , cd , co , cr , ni and zn in fruits and vegetables , bulletin of environmental contamination and toxicology , **2003** , 71(6) , 1260-1264 .
17. A.o.igwagbe , h . Belhaj , t.m. hassan , and a.s. gibaldi , effect of a highway's traffic on the level of lead and cd in fruits and vegetables grown along the roadsides , j. Food safety , **1992** , 13(1) , 7-18 .
18. Chris , m . Matsko , how to avoid lead exposure from food , may 23 , **2021** , environmental health
19. Lead exposure : tips to protect your child , mayo clinic staff , may 22 , **2020** .