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Hidden Risk Area for Health and The Environment: Lead Poisoning in House

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Abstract: Most individuals spend so much time inside their house. In houses typically account for a major share of exposures to pollutants and toxics such as radon, asbestos, carbon monoxide, formaldehyde, nitrate and lead. In this biological and chemical pollutants in house or house environment, lead is more harmful for human health. Especially elderly, young children, pregnant women, disabled person are greater risk to lead poisoning. In this study is explained definition of lead, reasons of lead poisoning, relationship between lead poisoning and health, reasons that of children are at greater risk and take protective provisions to families and houses from lead poisining. Information on lead and lead poisoning can call attention to implemention and planing of education or extension programme towards individuals or families on public health, child health, quality of house, house environment.

Key words: Lead, lead poisoining, health, environment, lead in house

INTRODUCTION

Every body in the community wants to experience healthy lives. However, the environments in which lived, worked and played affect one's health and well-being. Individuals or families have right to live which in a clearly house, a suitable house, a healthy house and a comfortable house, fresh or safety water and food, noncontaminated soil. Individuals live to approximetly 80-90% of their life in house or house environment (Magrabi, 1991).

Everyone is vulnerable to environmental health problems depending on house conditions, however certain groups are at greater risk: the elderly, young children, pregnant women and the sick, particularly those who have weakened immune systems (such as someone with AIDS, asthma, or emphysema) and those who live in households that have limited resources available (Wysocki, 2002).

Therefore, it is necesarry to investigate risk areas in house environment for human health. The following are hidden risk areas in house or house environment which affecting human health.

Radon: Radon is a gas that can leak into home through a basement or crawl space-from the soil or rock, or through well water. Exposure can increase one's chances of getting lung cancer.

Asbestos: Asbestos is known to cause asbestosis, lung cancer and mesothelioma. An excellent thermal and electrical insulator, asbestos had been used widely in buildings for over 50 years (Wilson, 1979).

Lead: Lead poisoning is one of the most serious health threats for young children (up to age six). Lead accumulates in body and its effects are irreversible.

Carbon monoxide: Carbon monoxide is an odorless, colorless gas that can be fatal when breathed. Low levels can cause nausea, dizziness, weakness and muscle ache. Higher doses can impair judgment, cause paralysis or coma and death. Carbon monoxide can enter the home from a blocked chimney, improper operating of fuel burning heaters or grills indoors, car exhaust in an attached garage, or improperly functioning combustion equipment (Mott *et al*., 2002; Martin, 2006).

Secondhand smoke: Classified by the U.S. Environmental Protection Agency as a known cause of lung cancer in humans, secondhand smoke is a mixture of the smoke given off by the burning end of a cigarette, pipe, or cigar and the smoke exhaled from the lungs of a smoker. Especially, in United States; African-American children tend to have more tobacco-related illnesses than other children do and a new study suggests that part of the problem may be that they react to secondhand smoke more strongly (Nagourney, 2007).

Formaldehyde: Formaldehyde is a widely used preservative and adhesive in home furnishings products and in some textiles. This preservative causes strong

irritations such as watery eyes and in low doses causes burning sensations in eyes, nose and throat. Larger doses can cause asthma attacks as well as damage to the liver, kidney and central nervous system.

Household products: Solvents, paints, paint strippers, wood preservatives, aerosol sprays, moth repellants, air fresheners, stored fuels, auto products, hobby supplies, pesticides and some cleaners and disinfectants can affect your health. Short-term effects include eye, nose and throat irritation and headaches. Long-term exposure can cause loss of coordination, nausea and damage to liver, kidneys and the central nervous system.

Combustion pollutants: These pollutants can cause a variety of health problems ranging from eye, nose and throat irritation to cancer and even death. Combustion pollutants include the gases or particles that come from smoking and the burning of fuels-natural gas, propane, wood, oil, kerosene and coal.

Molds, mildew, fungi, bacteria and dust mites: These can cause allergic reactions including watery eyes, runny nose and sneezing, nasal congestion, itching, coughing, wheezing and fatigue. Dust mites have been identified as the single most important trigger for asthma attacks.

Nitrate: Bacteria and viruses in drinking water can cause upset stomach, diarrhea and more serious illnesses. Too much nitrate in your drinking water can cause blue baby syndrome in infants and also may result in birth defects and miscarriages. Nitrates get into the water from animal and human waste and fertilizer.

Other harmful chemicals: Chemicals in drinking water, such as pesticides and gas or oil from oil burners can cause damage to kidneys, liver, or other organs. Some cause cancer and others are especially harmful to pregnant women.

Pesticides: Bug sprays, pet flea collars and garden weed killers can cause birth defects, nerve damage and even cancer if used incorrectly. They can make allergies or asthma worse. Breathing fumes or dust from pesticide powders and sprays can be harmful (Tong and Wilson, 1990; Wysocki, 2002).

In to this biologic and chemical pollutants in house or house environment, lead is call attention to more harmful pollutant for human health.

LEAD POISONING

The major remaining cause of lead poisoning is lead-based paint in housing, especially housing built before 1950, when lead paint was commonly used. Most person, specially children with elevated lead levels are poisoned in their own homes by peeling lead-based paint and the lead dust it generates. The mere presence of lead-based paint in a home is not a hazard, as about 40% of all U.S. housing contains some leaded paint and the vast majority of children live safely in these homes and apartments (Kessel and O'Connor, 2001).

Housing age is an important predictor of lead poisoning risk, because the lead content of paint varied substantially over the past century. During the first half of the twentieth century, the lead content of paint was marketed as a measure of its quality-the more lead the better. Prior to about 1940, leaded paints typically contained high amounts of lead, ranging from 10 to as much as 50%. Lead was added to make paint durable, so lead paint was frequently used in high-traffic and high-moisture areas, including kitchens and bathrooms, exterior siding and trim, window and door trim, kitchens, stairs, porches, etc. In the early 1950s, the paint industry began reducing lead content, although many paints still contained harmful amounts of lead. Federal regulations limited lead content in 1972 and effectively banned lead in residential paints in 1978 (Potter, 1988; Warren, 2000).

Two situations account for the vast majority of poisoning in children. Most commonly, children are poisoned by lead dust from deteriorated paint in poorly maintained older housing. A lesser number of cases-though often more serious-are caused by repainting and remodeling projects that disrupt old painted surfaces without proper safeguards to control, contain and clean up lead dust. In both scenarios, small amounts of lead dust can create substantial health risks (Kessel and O'Connor, 2001). For example, imagine the amount of sugar in a 1 g packet. The same amount of lead particles evenly spread over 100 rooms, each measuring 10 feet by 10 feet, would leave dust levels of 100 $\mu g\ ft^{-2}$, an amount of lead that is twice the federal standard (40 $\mu g\ ft^{-2}$) for a hazardous level of lead on floors.

Lead in soil can come from many sources, including exterior lead-based paint that is peeling or flaking, dust or paint chips resulting from repainting or renovation projects, deposition from emissions of vehicles that used leaded gasoline and demolition of buildings with lead-based paint. The U.S. Geological Survey estimates the mean naturally occurring lead in soil concentration to be 16 parts per million (ppm). Environment Protection Agency (EPA) defines a soil-lead hazard as 400 parts per million (ppm) in play areas and 1,200 ppm average for bare soil in the rest of the yard.

Drinking water may become contaminated with lead from pipes or solder commonly caused by corrosion. EPA estimates that drinking water accounts for 10-20% of human exposure to lead. Infants may be put at increased

risk from lead in drinking water when contaminated tap water is used to make baby formula. EPA recommends that action be taken if more than 10% of tap water samples exceed the action level of 15 parts per billion.

Primary prevention of lead exposure, including testing for lead content in paint, soil and water; housing maintaince and remedetion of existing hazards is key to protecting children's health. Lead poisoning is a concrete expression of the affordable housing crisis, more prevalent among poor children and those living in older housing. Responsible property management, the need for enforceable housing quality standards that are both practical and cost-effective and increased resources are needed to protect high-risk communities (http://www.epa.gov/lead).

LEAD POISONING AND HEALTH

Lead is a heavy metal that was used in many materials and products such as; paint, water pipes, gasoline and pottery. Although not used much today, it still remains in places where it was once used such as old homes (built before 1950), in household dust, in the soil and even in water. Regularly, may cause learning and behavior problems and damage to hearing and the nervous system, including the brain. Larger doses can cause high blood pressure, anemia, kidney and reproductive disorders in both children and adults (Wysocki, 2002).

Lead is most harmful to children under age six because it is easly absorbed into their growing bodies and interferes with the developing brainand other organs and systems. Pregnant women and women of child-bearing age are also at increased risk, because lead ingested by the mother can cross the placenta and affect the unborn fetus.

Lead poisoning causes irreversible health effects and there is no cure for lead poisoning. At very low-levels of exposure in children, lead causes reduced IQ and attention span, hyperactivity, impaired growth, reading and learning disabilities, hearing loss, insomnia and a range of other health, intellectual and behavioral problems. At low levels, lead poisoning may not present identifiable symptoms and a blood test is the only way to know if a child is poisoned. At very high levels of exposure, which are now very rare in the U.S., lead poisoning can cause mental retardation, coma, convulsions and even death.

Specialists agree that exposure to lead-contaminated dust from deteriorated lead-based paint in older homes is the primary pathway for lead exposure in young children. Lead dust settles quickly, is difficult to clean up and is invisible to the naked eye. Young children usually are poisoned through normal hand-to-mouth activity, as lead dust settles on their toys and the floor. Children may also be seriously poisoned by eating lead-based paint chips, but this is relatively rare (http://www.aeclp.org).

Soil in the vicinity of the home can also be contaminated by flaking exterior lead-based paint, previous deposits of leaded gasoline and exterior sandblasting. In yards where soil is contaminated with lead, children can become exposed to harmful levels of the heavy metal when they get their hands dirty and place their fingers or a dirty or dusty toy in their mouths during normal play activity. Lead-contaminated soil and dust can also be tracked into homes on shoes or by pets or can be blown in through open windows and doors. Vegetables grown in lead-contaminated soil may absorb lead and poison children and adults (http://www.ehw.org).

Drinking water may become contaminated with lead from pipes or solder when water corrodes them. Less common sources include workplace exposures to lead where workers may receive doses well above those experienced by the general population. Exposed workers may carry lead particles home on their clothing, shoes, or hair, putting family members at risk. Those who work in construction, demolition, painting, with batteries, in radiator repair shops, lead factories, or with a hobby that involves lead are often exposed to lead. Rare sources of exposure include food and drink stored in leaded crystal, lead soldered cans, or lead glazed ceramicware; home remedies and cosmetics that are popular in some cultures; and some consumer products.

Most health department lead poisoning prevention programs postpone action to address lead-based paint hazards until after a child has been identified as lead poisoned. In effect, children are used to detect lead hazards in their homes. Over the past decade, emphasis has shifted to primary prevention to prevent and control lead hazards in housing before a child's health is harmed (Kessel and O'Connor, 2001).

REASONS THAT OF CHİLDREN ARE AT GREATER RISK

When it comes to harmful environmental exposures such as lead, children cannot be considered little adults. Their bodies take in proportionately greater amounts of environmental toxins than adults. Children can be exposed to environmental toxins even before birth if the mother is exposed during pregnancy to toxins that can cross the placenta, such as carbon monoxide or lead. Children's organs, including the brain, lungs and reproductive systems, begin developing during the fetal stage and continue to develop through adolescence. Organ

growth occurs in spurts and it is during key growth periods that organ systems are most vulnerable to permanent damage. The Environmental Protection Agency recently acknowledged the enhanced risk to children from environmental exposures when it released draft supplemental guidelines for assessing cancer risk from early-life exposure to carcinogens (Tong and Wilson, 1990; Richardson, 2005).

Children are exposed to greater amounts of lead: Children breathe more air, consume more food and drink more water than adults due to their substantial growth and high metabolism. For example, a resting infant takes in twice as much air per pound of body weight as an adult. Subject to the same airborne toxin, an infant therefore would inhale proportionally twice as much as an adult.

Children also drink proportionally more water than adults. Infants and children drink more than 2½ times as much water as adults. A formula-fed infant consumes about one seventh of its body weight in water each day the equivalent of a 154-pound man drinking nearly 6½ gallons of water per day. Standards for most waterborne contaminants are established based on the health impacts on adults, so current standards may not suffice to protect children.

Children also may be exposed to greater amounts of lead in the environment due to the fact that they spend significant amounts of time on the floor and ground. As a result, they are more likely to come into contact with toxins found in dust, carpets and soil, such as lead (Kessel and O'Connor, 2001).

Young children (ages 6 months to about 2 years) have a natural urge to place objects in their mouths. This normal hand-to-mouth activity can cause them to ingest toxins in their environment to which adults would not necessarily be exposed. For example, in homes with high dust-lead levels, children may ingest lead when they put their hands or toys in their mouths. Children also may be exposed to arsenic and creosote, two toxic chemicals used to pressure-treat wood, if they play on playground equipment, decks, or porches treated with these chemicals.

Small children also more readily absorb nutrients (and toxins) they ingest. For example, children require more calcium than adults because their bones are growing and they can absorb more calcium from the same food sources. Although this enhanced ability is a plus when it comes to nutrients, it also can increase a child's exposure to toxins such as lead. A toddler will absorb about 50% of ingested lead, whereas an adult will absorb about 15% (htpp://www.ehw.org).

PROTECT OF FAMILIES AND HOUSE FROM LEAD POISONING

To reduce exposure to lead in house, get children checked, have in house tested (especially if in house has paint in poor condition and was built before 1978) and fix any hazards one may have.

- For family
  - Children's blood lead levels tend to increase rapidly from 6 to 12 months of age and tend to peak at 18 to 24 months of age.
  - Consult to doctor for advice on testing children. A simple blood test can detect high levels of lead. Blood tests are important for:
    - Children at ages 1 and 2.
    - Children and other family members who have been exposed to high levels of lead.
    - Children who should be tested under your state or local health screening plan.
  - Doctor can explain what the test results mean and if more testing will be needed (htpp://www.pediatrics.about.com).
- For house
  - Can get to house checked in one of two ways, or both:
    - A paint inspection tells the lead content of every different type of painted surface in house. It won't tell whether the paint is a hazard or how one should deal with it.
    - A risk assessment tells one if there are any sources of serious lead exposure (such as peeling paint and lead dust). It also tells what actions to take to address these hazards.
    - Have qualified professionals do the work. There are standards in place for certifying lead-based paint professionals to ensure the work is done safely, reliably and effectively (Kessel and O'Connor, 2001).
- If there is a suspect that in house has lead hazards, it can be take to some immediate steps to reduce health risk:
  - If you rent, notify your landlord of peeling or chipping paint.
  - Clean up paint chips immediately.
  - Clean floors, window frames, window sills and other surfaces weekly. Use a mop, sponge, or paper towel with warm water and a general all-purpose cleaner or a cleaner made specifically for lead. Never mix ammonia and bleach products together since they can form a dangerous gas.

- Thoroughly rinse sponges and mop heads after cleaning dirty or dusty areas.
- Wash children's hands often, especially before they eat and before nap time and bed time.
- Keep play areas clean. Wash bottles, pacifiers, toys and stuffed animals regularly.
- Keep children from chewing window sills or other painted surfaces.
- Clean or remove shoes before entering your home to avoid tracking in lead from soil.
- Make sure children eat nutritious, low-fat meals high in iron and calcium, such as spinach and dairy products. Children with good diets absorb less lead.

- In addition to day-to-day cleaning and good nutrition:
  - One can temporarily reduce lead hazards by taking actions such as repairing damaged painted surfaces and planting grass to cover soil with high lead levels. These actions (called interim controls) are not permanent solutions and will need ongoing attention.
  - To permanently remove lead hazards, you must hire a certified lead abatement contractor. Abatement (or permanent hazard elimination) methods include removing, sealing, or enclosing lead-based paint with special materials. Just painting over the hazard with regular paint is not enough.
  - Always hire a person with special training for correcting lead problems--someone who knows how to do this work safely and has the proper equipment to clean up thoroughly. Certified contractors will employ qualified workers and follow strict safety rules set by their state or the federal government (Kessel and O'Connor, 2001).

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