

How to Cite:

Al-Husseini, Z. N. O., Neema, B. Z., & AL-Hussain, M. A. (2022). The role of metals exposure in allergic diseases in workers who work in iron factories. *International Journal of Health Sciences*, 6(S6), 9067–9076. <https://doi.org/10.53730/ijhs.v6nS6.12389>

The role of metals exposure in allergic diseases in workers who work in iron factories

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Abstract---Essential metal concentrations in the blood are an important measure for monitoring environmental and workplace exposure to metals. The determination of this training. To conclude the range of zinc (Zn), lead (Pb), copper (Cu) and manganese (Mn) in the blood of 50 men working in factories doors and windows etc. For long period with 20 healthy men as controls not working in this occupation. The study found an increase in the toxicity rates of the aforementioned metallic substances and that this increase is more in the ages from 30 to 50 years. The study also found an increase in the toxicity of metallic substances It leads to a higher rate of IgE caused by infection with these agents and some allergic diseases, including skin allergies (atopic dermatitis) and asthma, or both cases, where the rate of IgE increases and is higher in mixed people infection. The conclusions of the study that prolonged exposure to metallic substances leads to toxic effects, which in turn leads to the emergence of some allergic diseases

Keywords---iron factories ,allergies,Ige, asthma.

Introduction

The modern increase in combination of metal nanomaterials and metallic oxides into customer crops and this subsequent usage in professional environments has elevated fears that metals may cause some adverse toxic effects in water bodies. While nanoscale metallic have be present revealed to cause more damage in lung

and irritation than these larger metallic matching part, this size-association special effects on the immunity system and disease of allergic are fundamentally unidentified. This information breach is predominantly important because minerals have historically been common triggers of hypersensitive contacting dermatitis, work-related asthma, in addition allergens. study of potentially harmful effects of metallic nanomaterials on the immune system has become a topic of scientific interest due to the fact that these materials are generally lightweight, easy to inhale and aerosolize, and their small size allows for skin penetration. exclusivity increase. Size-specific immunomodulatory effects on allergic diseases. In addition, the change in the physical and chemical properties of nano-sized metals strongly influences their interaction with components of biological systems, which may be important for the emergence or exacerbation of allergic diseases.

While some research aims to address these issues, many aspects of the immunomodulatory action of metallic nanomaterials remain unclear. In general, there is scientific evidence for the ability of metallic nanomaterials to aggravate sensitive diseases more than that ability to cause sensitive diseases. In addition, the effect of metallic nanomaterials on airway sensitivity is described in more detail than their possible effect on skin sensitivity (1). In recent years, the field of nanotechnology has received great scientific interest. Significant progress has been made in understanding the unique behavior of matter at the nanoscale. This advance made it easier to change the properties of materials to increase their functional benefits. Subsequently, nanomaterials have proven useful in applications ranging from medicine and energy to transportation and electronics. The explosive growth of nanotechnology has not slowed down the dynamism of some industries as the global nanotechnology market is estimated to be worth more than \$20 billion.

While the effects of these technological advances are comparable to the effects of the Industrial Revolution, the spread of nanotechnology also raises many serious concerns. In addition to the environmental, legal, ethical, and regulatory issues associated with the growing presence of nanotechnology, the risks of potential adverse health effects from exposure to nanomaterials are also a major concern (2). Much effort has been devoted to the development of toxic nanomaterials in the development of new nanomaterials that depend on time, resources and non-transformative applications, which are of great importance in the field of research. A new and dangerous way to solve this problem is to identify the best doctors and chemists and reduce the number of viruses (3). The materials are also preferred as leading information and resources for in vivo studies and can also be categorized according to this scheme. These methods are based on the relationship between the physical and chemical properties of lung toxins and nanomaterials and their harmful use in other systems (4).

The need to eliminate warts from both internal and external threats is an immune modulating factor for hundreds of other diseases with rapid introduction of best-in-class pathophysiology incorporated in the spring of 2014(5). In addition to optimal immunity, management can stimulate or suppress host health. Allergies are an autoimmune disease and one of the most common and widespread global health problems. The term "allergic disease" is based on several pathogens, the

underlying immune system, and a variety of human diseases with clinical manifestations. It is said that there is a tendency for hypersensitivity to harmless framing versus adaptive immunity (6). Metallic nanomaterials are increasingly being incorporated into nanotechnology and consumer products and may have an impact on the universal community (7). Even though the unidentified immunomodulatory belongings of numerous metallic nanomaterials pose a danger to customers, employees elaborate in the production, processing, and transport of metallic nanomaterials are at particular risk of allergic reactions. New nanomaterials are constantly evolving, and workers often discover the first new materials in society that are much larger than consumers. The work environment is also recognized to donate to the emergence and development of sensitive illnesses (8). allergies in Skin are extra communal, disturbing of the broad-spectrum people about 15-20%, and cases of ACD around 25-60% are linked to the work environment (9).

Some particular fears have been expressed regarding nanomaterials of metallic and these prospective belongings on sensitive illnesses. Firstly, the lateral mass of the nanomaterials metallic avoids solitary of the main blocks related with the loss of metal resistance, the increased possibility of penetration through the skin, and the increased ability to accumulate in the lungs... Second, due to its unique chemical composition, it lowers the case limit. Finally, initiation of irritation and damaged in tissue through various metallic nanomaterials might induce susceptibility to environmental allergens and act as a trigger for an increase in the severity of persistent allergic states. The purpose of this brief description is to review the existing logical understanding of this ideas. In adding to investigating the effects of specific metallic nanomaterials on respiratory and skin studies, the study focuses on determining the part of chemical and physical things in this special effects. To end, the gap between thinking and understanding in this case has become a potential dimension for future research (10). Minerals are a class of agents that have a wide range of immunomodulatory effects, including pruritus, autoimmunity, sensitization, and support (11).

The potential for such a diverse biological effect is reflected in the potential expansion of the mineral composition, which may include basic forms, ions, salts, and organic compounds (12). In addition, as shown in the transition metal series, many metals and different oxidation conditions have transitions with different immunoreactivity (13). The unique chemical behavior of these potential states determines the molecular and cellular interactions responsible for mineral immunity. Since many of these properties are known to differ at the nanoscale, the immunological effects of metals related to sensitivity are described in detail, focusing on specific mechanisms that may be affected by the physical and chemical properties of metallic nanomaterials. Metal exposure may cause allergic reactions in humans (14). The incidence and harshness of sensitive signs has developed a significant problem in understanding the illness globally (15), and a current training found that grown person through vigorous or acute atypical dermatitis have an improved danger of death from all reasons and from specific causes. For example, contagious and respirational illnesses (16).

Total IgE levels are recognized to be related through allergies and the improvement of sensitive indicators (17). It has been stated that there is a

relationship between metal exposure and IgE, and some studies have been reported. Human studies have shown a positive relationship between exposure to lead (Pb) and range of IgE in the blood. (18). On the other hand, other studies have shown a link between exposure to mercury, cadmium, selenium (Se), manganese (Mn), and IgE (19). IgE, similar former immunoglobulins (Ig), is created via B lymphocyte and (usually) plasma cells in reaction to antigen stimulation. The existence of IL-4 and IL-13 results in the conversion to IgE of the Ig class from another isotype. (20) Those two cytokines interrelate with surface receptors of B cell to initiate the Janus kinase 3 (JAK3)-mediated signaling cascade and activator transcription signal transducer 6 (STAT6). (21) Switching to IgE requires a second signal that involves the interaction of CD40 in the B lymphocytes with the CD40 ligand in the T lymphocytes. (22) When B cells produce IgE from a specific allergen, it is converted to one that is released into the bloodstream.

IgE is found in lower concentrated in serum of blood. In reality, normal values are found in human serum, with the lowest concentration of each immunoglobulin around 50 ng/ml (compare IgG with about 10 mg/ml). The free IgE have half-life of is as well abundant littler than this of IgG (about 2 or 21 days). The molecule of IgE has a size of about 190 kDa and is architecturally like to additional immunoglobulins with 2 light chains and 2 heavy chains. In contrast to IgG, which has only 3 constant bands in the heavy chain, the heavy chains consist of four constant bands (Cε1-4). The Cε2 area of IgE substitutes the hinge area of IgG, resultant in an asymmetric doubled particle. normally IgE is create in blood and binds to numerous diverse kinds of cells via one of its receptors. to these receptors on the way to bind to the cell surface the Cε2-3 domain was bind. IgE could keep on binding to receptor with the high-affinity (FcεRI) for some weeks (23).

Materials and Methods

After the approval Ethics Committee of the workers in the iron factories Blood was collected from 70 men, including 50 men who work in factories that manufacture doors, windows and other iron materials for more than three years. They have no history of chronic diseases such as diabetes, cancer, kidney or liver disease and no previous parasitic infections, but suffer from allergic skin infections or chronic cough. Likewise, the study sample contains 20 healthy men who do not work in these factories as a control for the study. The blood sample was divided into two parts, one of the gel tubes containing 5 ml of blood for the purpose of obtaining the serum for testing and knowing the concentration of IgE by ELISA device, and the second tube containing EDTA to which 5 ml of blood is added also for the purpose of knowing the concentration of minerals in the blood. Serum metal levels were measured using an Agilent 7700 inductively coupled plasma mass spectrometer (Agilent Technologies, Japan).

Result

Table 1
The age group of study patients with concentration of some metallic material in whole blood of workers in iron factory

Age group/year	Number/%	mean concentration of metallic($\mu\text{g/l}$)			
		Cu	Lead	Zinc	Mn
20-30	(20%) 10	705	55.02	5904	25.1
31-40	(40) 20	997	60.32	7334	27.1
41-50	(24) 12	883	48.90	7125	28.4
51-60	(16%)8	966	50.36	6775	26.2
Total/mean	50(100%)	887.75	53.65	6784.5	26.7
Healthy control	20(100%)	569	22.13	2853	6.33

Table 2
Compare the mean concentration of IgE in atopic dermatitis, asthma, mixing (atopic dermatitis and asthma) patients and Healthy control

Type of allergy	Number/ %	Mean IgE
atopic dermatitis	33(66%)	319.1 UI/L
asthma	17(34%)	704 UI/L
mixing	9 (18%)	1910 UI/L
Healthy control	20(100%)	19.3 UI/L

Discussion

There is an increasing body of toxicological information demonstrating the enormous potential for adverse effects on the immune system as a result of exposure to metallic nanomaterials (1). The current results showed that the arithmetic mean in the concentration of Cu, Mn, Pb and Zn metals in people who work in factories manufacturing doors and windows and the rest of the iron materials is more than the healthy control and the average age is from 30 to 50 years and more people have a high concentration of metal toxicity table (1). This agree with (30) A major challenge facing Nano toxicologists comes after the mismatch among the fast appearance of many novel nanomaterials and the important period and incomes requisite to assess the protection for each substance (24, 25). A new danger valuation method planned to moderate this problem includes identifying relations among certain physical and chemical properties and toxicological manners of achievement (26). Allergy is an autoimmune disease that represents an important and growing worldwide healthiness problem. The word "sensitive disease" denotes to a variety of diseases that include a variety of causative causes, fundamental immune instruments, and medical appearances.

Nevertheless, common among all hypersensitivity illnesses is the hyperactivity of adaptive immune responses against harmless foreign antigens (27). Manganese (Mn), copper (Cu), zinc (Zn) and lead, which are important elements for health, are important in terms of nutrition, but their deficiency or excess is harmful to human health. On the other hand, it is a toxic metal commonly found in the environment and workplace and has adverse health effects (28). Human biological monitoring is an important environmental health tool that records and assesses the level of internal exposure to environmental pollutants in the common population, people groups, and persons. Humanoid biological monitoring could be used to determine the distribution of exposures in the general population, besides with movements and changes in chemical contacts, to identify vulnerable and high-risk populations, and to identify environmental risks at specific points in time. Polluted areas at a relatively low cost (29). The exact cause of the high level of the mineral in the blood of adolescents is still unknown; Active work and a vigorous everyday life can make those people in adults young more vulnerable to influences in the workplace and environment. Due to the environment of the intracellular spreading and the little half-life of the blood, blood minerals might not remain a perfect biomarker to differentiate an unprotected singular from the respite of the training people (31).

Even though the anonymous immunomodulatory properties of several metallic nanomaterials attitude a danger to customers, employees elaborate in the production, work and transport of metallic materials represent a demographic group that is mainly susceptible to adversative allergic things (32). New metallic materials are constantly being developed, and workers are often the first to come into contact with new materials in society, often in much larger quantities than consumers. The work environment is also identified to donate to the progress and development of sensitive illnesses (33). Of Americans about the 24 million with sensitive asthma, between 10% and 25% of cases in adult are related to work circumstances (34). Skin sensitive are extra communal and affect about 15-20% of the over-all populace, with about 25-60% of causes linked to work (10). Furthermore, as evidenced by different transition metals, many metals are present and in transition between different oxidation states showing different immunoreactivity. The unique chemical behavior of these prospective conditions determines the molecular and cellular communications in control for mineral immunity. Meanwhile numerous of those possessions are recognized to be modifiable, the immunological effects associated with metal sensitivity have been described in detail, focusing on specific processes likely to be affected by the physically and chemically things of metallic nanomaterials (35).

The current study reveals high rate of metallic toxicity by metallic element included in the study in a topic dermatitis then asthma and later in mixing cases (asthma and atopic dermatitis while the higher rate geometric mean of IgE in-patient with mixing cases followed by asthma and then atopic dermatitis table (2). The hypothesis that IgE is a sensor of low protein levels is the 'toxin hypothesis' printed in the 1991 manuscript of the Prophet, which states that the allergic reaction (caused by IgE) arises after a protection apparatus that triggers respond to the body. Slight quantities of hazardous materials. According to the toxicological hypothesis, the body develops IgE to quickly and efficiently get rid of these contaminants. Signs such as sneezing, nausea, coughing, and diarrhea can

assistance you complete this objective. Low blood pressure, a communal indication of stark sensitive responses, can be viewed as a way to slow the amount at which toxins flow concluded the blood to reach the mark structures and reduce the systemic effects of these toxins. Asthma patients who are allergic to ticks. In general, a positive correlation was observed between the strength of the skin response and higher serum IgE levels (36). Allergens are environmental antigens that can stimulate the production of certain IgE antibodies. An association between allergic (atopic) sensitivity and asthma has long been observed, but the onset of clinical symptoms in susceptible individuals after exposure to an allergen depends on several factors, such as the type, dose and course of the allergen. Applications such as respiratory. Always interact. (37). Many other environmental factors can increase the immune capacity of allergens (38). There is increasing evidence of a role for pollution, particularly in the increase in asthma and allergies (39).

Conclusion

The study concluded that the toxicity rate of metals such as copper, lead, zinc and copper manganese is high among people who work in factories manufacturing iron materials such as doors and windows, etc. Also, exposure to this type of metal leads to skin allergy diseases as well as asthma, which leads to an increase in their IgE rate.

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