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Assessment of Allergy Marker Leucocyte (Eosinophil) Count and other Blood Cells Parameters among Workers at Berber Cement Factory, Berber Governorate, River Nile State, Sudan, 2017

By Hisham Abdelhamid, Mosab Nouraldein Mohammed, Salima Abd Alrazig, Tagwa TajAlser, Eman Suliman, Kholood Abd Allah, Nihad Muzamil, Ensherah Said Ahmed, Manhal Mustafa Albakry & Zaineb Altaib

Elsheikh Abdallah Elbadri University

Abstract- Background: This study was conducted at Berber cement factory in barber to assess cement dust exposure and relationship to complete hemogram change and allergic condition among workers.

Rationale: Increasing of industrial activities in Berber governorate leading to many pathological conditions one of those phenomenons is allergy, certainly among whom worked in cement factories.

Objectives: To know the effect of exposure to the dust of cement on blood cells especially allergy Marker leucocytes.

Methodology: A total of 120 exposed and 30 non exposed workers were enrolled in this case control study.

Result: Allergy marker leucocyte (eosinophil) was increased (eosinophilia) other blood cell parameters were not affected.

Conclusion: There is intimate relation between exposure to cement dust and eosinophilia.

Recommendations: Furtherer studies are recommended with large sample size and taking the IgE measurement as a priority of the following studies.

Keywords: allergy marker, eosinophilia.

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Assessment of Allergy Marker Leucocyte (Eosinophil) Count and other Blood Cells Parameters among Workers at Berber Cement Factory, Berber Governorate, River Nile State, Sudan, 2017

Hisham AbdElhamid ^α, Mosab Nouraldein Mohammed ^σ, Salima Abd Alrazig ^ρ, Tagwa TajAlser ^ω, Eman Suliman [¥], Kholood Abd Allah [§], Nihad Muzamil ^χ, Ensherah Said Ahmed ^ν, Manhal Mustafa Albakry ^θ & Zaineb Altaib ^ζ

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I. INTRODUCTION

Allergy' is the term often used loosely to describe any intolerance of environmental factors irrespective of any objective evidence of immunological reactivity to an identified antigen.

Patients often present to an allergy clinic because of a popular public perception that they are 'allergic' in origin To Define These Mutually Exclusive Terms Allergy – is used to define those conditions in which antigen specific IgE or sensitized T cells play a definite role Atopy – is a state of disordered immunity in which Th2 lymphocytes drive an inherited tendency for hyper production of IgE antibodies after exposure to common environmental allergens Hypersensitivity –

refers to the Gell and Coombs classification for immunological diseases Intolerance is used to describe all abnormal but reproducible reactions to food when the causative mechanism is unknown Truly allergic diseases are common: about 20% of the population experience some form of allergy and this imposes a substantial physical and economic burden on the individual and society.⁽¹⁾

II. EFFECT OF CEMENT ON WORKER

Exposure to cement can occur through inhalation ingestion and eye or skin contact. Portland cement cause eye irritation and prolonged or repeated contact of the cement dust with skin cause dermatitis chronic exposure to cement dust may cause respiratory ailment in the form of cough, sputum, wheezing dyspnea, chronic bronchitis and adversely alter the pulmonary function indices.

Long term contact of skin with cement result in inflammatory changes or in some cases chemical burns. Chronic exposure to wet cement damages skin, leads to chemical burning rashes on skin and inflammation.⁽²⁾

III. COMPLETE HEMOGRAM

It includes blood Smear; Hemoglobin; Hematocrit; Red Blood Cell Count; White Blood Cell Count; WBC Differential; Platelet Count; Reticulocyte Count All content on Lab Tests Online has been reviewed and approved by our Editorial Review Board.⁽³⁾

CBC usually done to determine general health status; to screen for, diagnose, or monitor any one of a variety of diseases and conditions that affect blood cells, such as anemia, infection ,inflammation, bleeding disorder or cancer.

They are produced and mature primarily in the bone marrow and, under normal circumstances, are released into the bloodstream as needed.

A standard CBC includes the following: Evaluation of white blood cells:

Author α σ ρ ω ¥ § χ ν θ ζ: Medical Laboratory Department, Faculty of Health Sciences, Elsheikh Abdallah Elbadri University, Sudan.
e-mail: musab.noor13@gmail.com

WBC count; may or may not include a WBC differential Evaluation of red blood cells: RBC count, hemoglobin (Hb), hematocrit and RBC indices, which includes mean corpuscular volume (MCV), mean corpuscular hemoglobin (MCH), mean corpuscular hemoglobin concentration (MCHC), and red cell distribution width (RDW).

The RBC evaluation may or may not include reticulocyte count Evaluation of platelets: platelet count; may or may not include mean platelet volume (MPV) and/or platelet distribution width (PDW) Significant abnormalities in one or more of the blood cell populations can indicate the presence of one or more conditions.

The three types of cells evaluated by the CBC include:

White Blood Cells there are five different types of WBCs, also called leukocytes which the body uses to maintain a healthy state and to fight infections or other causes of injury. They are neutrophils, lymphocytes, basophils, eosinophils, and monocytes. They are present in the blood at relatively stable numbers. These numbers may temporarily shift higher or lower depending on what is going on in the body. For instance, an infection can stimulate the body to produce a higher number of neutrophils to fight off bacterial infection. With allergies, there may be an increased number of eosinophils. An increased number of lymphocytes may be produced with a viral infection. In certain disease states, such as leukemia, abnormal (immature or mature) white cells rapidly multiply, increasing the WBC count.

Eosinophil: These cells are similar to neutrophils, except that the cytoplasmic granules are coarser and more deeply red staining and there are rarely more than three nuclear lobes.

Eosinophil myelocytes can be recognized but earlier stages are indistinguishable from neutrophil precursors. The blood transit time for eosinophil is longer than for neutrophils. They enter inflammatory exudates and have a special role in allergic response, defence against parasites and removal of fibrin formed during inflammation. Red Blood Cells also called erythrocytes, are produced in the bone marrow and released into the bloodstream as they mature. They contain hemoglobin, a protein that transports oxygen throughout the body. The typical lifespan of an RBC is 120 days; thus the bone marrow must continually produce new RBCs to replace those that age and disintegrate or are lost through bleeding.

A number of conditions can affect the production of new RBCs and/or their lifespan, in addition to those conditions that may result in significant bleeding. The CBC determines the number of RBCs and amount of hemoglobin present, the proportion of blood made up of RBCs (hematocrit), and whether the population of RBCs appears to be normal. RBCs

normally are uniform with minimal variations in size and shape; however, significant variations can occur with conditions such as vitamin B12 and folate deficiencies, iron deficiency, and with a variety of other conditions. If the concentration of red blood cells and/or the amount of hemoglobin in the blood drops below normal, a person is said to have anemia and may have symptoms such as fatigue and weakness. Much less frequently, there may be too many RBCs in the blood (polycythemia).

Platelets also called thrombocytes, are special cell fragments that play an important role in normal blood clotting. A person who does not have enough platelets may be at an increased risk of excessive bleeding and bruising. An excess of platelets can cause excessive clotting or, if the platelets are not functioning properly, excessive bleeding. The CBC measures the number and size of platelets present.⁽³⁾

The human hematopoietic system is extremely sensitive to some environmental influences because of rapid synthesis and destruction of cells with consequent heavy metabolic demand.⁽⁴⁾

The CBC test is the most basic blood test used in assessing allergies in people. This test simply counts the number of red and white blood cells per cubic millimeter of blood. This test can be used to check for anemia or other blood conditions and is the most basic test to assess general health in individuals. If a person suffers from asthma, a physician may check for a high level of red blood cells, or polycythemia. Differential White Blood Cell Count A differential white blood cell count will provide physicians with a percentage of the different types of white blood cells in an individual. For example, if an individual suffers from asthma, a physician will look for a high eosinophil count, indicating a possible allergy. In extreme high levels, a person may be suffering a condition more serious than an allergy, such as a parasitic infection.

Allergen Specific IgE Antibody Test Immunoglobulin E, or IgE, is a protein related substance that is usually found in minute amounts in a person's blood. IgE is actually part of a normal individual's immune system and it helps to fight foreign substances that threaten one's health. As you would expect, elevated levels of IgE will alert physicians to the existence of allergies. This test can be used when a patient has symptoms of allergies to a variety of substances. Negative results to this antibody test probably mean you don't have an allergy, which involves an IgE response by a patient's immune system. However, results of this test should be interpreted cautiously because there is a small chance that an allergy may be present even if the test results were negative. If the test does show the presence of elevated IgE antibodies, an allergy is most likely present, but we need to qualify that statement.

You may never have an allergic reaction to that particular substance even though you tested positive. Also, the degree of IgE antibody measured does not indicate the severity of a supposed allergy. As you can see, blood allergy tests should be interpreted with caution. We should note that the conventional method of administering the IgE antibody test has been the RAST test. More recently, most medical laboratories test for specific IgE antibodies using a more modern, immunoassay method. The PRIST test is now the most common immunoassay method used for testing the amount of IgE present in a person's blood. Radio allegro-sorbent Test. In the 1960s, the radio allegro-sorbent test (RAST) was developed as an in-vitro blood allergy test.⁽⁵⁾

a) *Rationale*

Increasing of industrial activities in Berber governorate leading to many pathological conditions one of those phenomenons is allergy, certainly among whom worked in cement factories.

b) *Objectives*

To know the effect of exposure to the dust of cement on blood cells especially allergy Marker leucocytes.

IV. METHODOLOGY

a) *Study design*

Case control study.

b) *Study area*

Berber cement factory.

c) *Study population*

Workers at Berber cement factory.

d) *Inclusion criteria*

Work at Berber cement factory.

e) *Exclusion criteria*

Work out Berber cement factory.

f) *Sample size*

150 samples, 120 exposed to cement dust and 30 non exposed college students.

g) *Sample processing*

120 male samples was taken in subjects employed in barber cement factor, was collected from different area such as crusher, crane, backing, and 30 health selected subjects were randomly From college student.

Questionnaire 30 healthy male control include age, smoking habit, and 120 workers include age, smoking, job duration, exposure to dust, safety, working place, hours' work, allergic condition and cough.

Blood sample was collected from vein in 5cc disposable syringe of which 2.5 ml in EDTA as an anticoagulant for the analysis of different hematological

parameters by CBC mandarin machine. The various haematological parameters, such as haemoglobin (Hb) concentration, total red blood cells (TRBC) count, total white blood cells (TWBC) count, different count of WBC, platelet count, packed cell volume (PCV), mean corpuscular volume (MCV), mean corpuscular haemoglobin (MCH), mean corpuscular haemoglobin concentration (MCHC), were estimated. And made thin blood film, fixed by Alcohol, stained by Leishman stain, and seen under microscope to estimate of eosinophil to assessment of allergic condition.

h) *Ethical consideration*

All participants were informed about the purpose of the study and they consent to enroll in it.

i) *Data Analysis*

The difference in means of the different groups was determined using the Student's t-test while the relationship between variables was determined using Pearson correlation coefficient. All the statistical analyses were done using the SPSS, version 17.0 and p-values less than 0.05 were considered sign.

V. RESULT

Allergy marker (eosinophil) was increased, 53.3% of workers showed eosinophilia. Other parameters of hemogram were not affected.

VI. DISCUSSION, CONCLUSION AND RECOMMENDATIONS

This pioneer study in Berber governorate showed that cement dust effect on the health of workers inside the factory but the harmful effect of dust may affect huge number of people around the factory so control measures should be obtained and Furtherer studies are recommended with large sample size and taking the IgE measurement as a priority of the following studies.

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