

## الآلية

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قال تعالى:

لَا يُحِلُّ لِلَّهُ نَفْسًا إِلَّا وُسِّعَهَا حَمَّا مَا يَعْسِيْنَاهُ وَعَلَيْهَا مَا  
لَمْ يَعْسِيْنَاهُ قُلْ رَبُّنَا لَهُ تُوْلَى خَطْنَا إِنْ تَسْتَأْنِ أَوْ أَخْطَلْنَا حَمَّا وَلَا  
تَعْلَمْ عَلَيْنَا أَصْرَارًا بِمَا حَمَّلَتْهُ حَلَّ الظَّيْنَ مِنْ قَتْلَنَا حَمَّا وَلَا  
تُحِلْنَا مَا لَا طَلَاقَةَ لَنَا بِهِ وَلَا عُفْنَا وَلَا غُفرَنَا وَلَا حَمَّنَا  
أَنْتَ مَوْلَانَا فَانصُرْنَا حَلَّ الْقَوْمِ الْكَافِرِينَ

سُورَةُ الْأَلْيَةِ

البقرة (٢٨٦)

## **Dedication**

To my mother who candle the light to my life.....

To my father who spend all their life to help me.....

To my sisters,brother& all our families.....

To my teachers.....

To my colleagues.....

## **Acknowledgement**

I thank God first and foremost to give the health and strength until it reached this stage, it is beyond thanks go to my teacher and supervisor Dr. FathElrahman Hassan Gameel.

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## **Abstract**

Radiation technicians are at risk of varying degrees of radiation exposure during their work and changes in hematological parameters and exposure to benzene depression of peripheral blood cells is a well-known indicator of benzene hematotoxicity.

The aim of this study to evaluate radiation effect and benzene toxicity on haematological parameters and the results of the present study suggest that in radiation effect and toxicities of benzene depend on the time of exposure.

This is a descriptive, cross sectional study to determine changes of some haematological parameters in radiation and benzene station workers, people recruited for this study were age (18-52 years), male and female Sudanese radiation and benzene station workers, duration of work range from 1-30 years ,these people work for 3 dayes/week to benzene equivalent to 18 hours/day and about 8 hours /day to radiation in Khartoum state. The study period extended from March 2014 to May 2014. This study was conducted using special questioner and taken 150 venous blood samples (50 radiation,50 benzene and 50 control) in EDTA containers, were taken to laboratory for investigation CBC for study subjects and healthy volunteers

as controls, investigations were performed by using sysmex and manual thin blood film.

Result show that CBC parameters of radiation workers there was significant difference between radiation workers and control on platelets count (Mean =  $173\pm59$ ),(P value=.000), thrompocytopenia increased when increased the number of years of work, while all CBC parameters of benzene workers significantly decreased in TWBCs(Mean =  $3.4\pm.6$ )(P value = .00), RBCs (Mean =  $3.4\pm.6$ )(.00), Hb (Mean =  $12.5\pm.9$ )(P value =.00), HCT(Mean =  $38\pm2$ )(P value =.00),MCV(Mean =  $77\pm8$ )(P value =.00), MCH(Mean = $27\pm9$ )(P value =.00),MCHC(Mean =  $32\pm7$ ), PLTs(Mean= $125\pm32$ )(P value = .00), N(Mean =  $54\pm11$ )(P value=.00), L(Mean =  $37\pm9$ )(P value =.00), M(Mean = $13\pm6$ )(P value = .00) when compared to correspondent parameters of the control subjects but with the exception in counts of eosinophil (Mean =  $5\pm3$ )(P value =0.1) and basophil (Mean =  $.4\pm.6$ ) (P value = 0.8) which were higher than that control ,and observed association between exposure to benzene and pancytopenia which increase by working duration.

CBC parameter show that there was significant difference between radiation workers and control on platelets count, thrompocytopenia increased when increased the number of years of work and observed association between exposure to benzene and pancytopenia which increase by working duration

## ملخص الدراسة

اجريت هذه الدراسة الوصفية المقطعة لمعرفة وقياس التغيرات في بعض قياسات الدم لعاملين في حقول الاشعاع ومحطات البنزين وتقدير تأثير الإشعاع وسمية البنزين في البشر ، الفئة التي تم عليها البحث اعمارهم بين (18-52) عاما من الذكور والإناث السودانيين ويعملون داخل ولاية الخرطوم ، فترة البحث امتدت من مارس 2014 الى مايو 2014 م، ولقد اجريت هذه الدراسة بملء فورمات خاصة بالبحث واخذ 150 عينة (50) من العاملين بالأشعاع 50 من عمال البنزين و 50 من اصحاب متطوعين (من الدم الوريدى فى حافظات بها مادة مانعة للتجلط واخذت للمعمل لإجراء التعداد الخلوي الكلى ومعاملات كرات الدم الحمراء بجهاز sysmex) والمسحة الدموية الرقيقة.

فى للعاملين الدم تحليل نتائج فى فرق هنالك أن إلى تشير الاحصائى التحليل بعد الدراسة هذه نتائج = المتوسط) الدموية الصفائح فى فقط قليلة النتائج لأن الدموية الصفائح على والسيطرة الاشعاع حقول نتائج كل بينما ، العمل سنوات عدد بزيادة مرتبطة القلة وهذه ( .00 = المعنوية القيمة ) ( 59 ± 173 ) الدم كريات وجد حيث ، ملحوظ بشكل انخفضت البترول محطات فى للعاملين الكلى الدم تحليل = المتوسط) الحمراء الدم كريات ، ( .00 = المعنوية القيمة ) ( 3.4 ± 6.0 = المتوسط) البيضاء ، ( .00 = المعنوية القيمة ) ( 12.5 ± 9 = المتوسط) الهمقلوبين ، ( .00 = المعنوية القيمة ) ( 3.4 ± 6.0 ، كريات حجم ، ( .00 = المعنوية القيمة ) ( 38 ± 2 = المتوسط) البلازم فى الحمراء الدم كريات نسبة حمراء دم كرية فى الهمقلوبين كمية ، ( .00 = المعنوية القيمة ) ( 77 ± 8 = المتوسط) الحمراء الدم المتوسط) الحمراء الدم كريات كل فى الهمقلوبين كمية ، ( .00 = المعنوية القيمة ) ( 27 ± 9 = المتوسط) = المعنوية القيمة ) ( 125 ± 32 = المتوسط) الدموية الصفائح ، ( .00 = المعنوية القيمة ) ( 32 ± 7 = الليمفاوية الخلايا ، ( .00 = المعنوية القيمة ) ( 54 ± 11 = المتوسط) المتعادلة والخلايا ، ( .00 = المعنوية القيمة ) ( 13 ± 6 = المتوسط) الوحيدة الخلايا ، ( .00 = المعنوية القيمة ) ( 37 ± 9 = المتوسط)

= المتوسط) الحمضية الخلايا في الملحوظة الزيادة باستثناء القياسية العينات مع بالمقارنة, (00. 5±3 = المعنوية القيمة)(3. 1. = المعنوية القيمة)(4.±6. ) المتوسط) القاعدية الخلايا و, ( ) التعرض بين الملاحظ والارتباط, القياسية للعينات الكلى الدم تحليل نتائج من اعلى نتائجهم ظهرت العمل فترة بزيادة الكريات وقلة البنزين لمادة.

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## List of Abbreviations

<b>Abbreviations</b>	<b>Full word</b>
AA	Aplastic Anaemia
Ab	Absorption
AML	Acute myeloid leukaemia
BFU-E	Brust forming unit erythroid
BM	Bone Marrow
CBC	Complete blood count
CD	Cluster of differentiation
CFU-E	Colony formic unit-erythroid
CFU-S	Colony formic unit-stem
Ch	Carbon hydrogen
CLL	Chronic lymphocytic leukaemia
CNS	Central nervous system
DNA	Deoxy nucleic Acid
EDTA	Ethylene Diamine Tetra Acetic Acid
FBC	Full blood count
Hb	Haemoglobin
HCT	Haematocrit
IARC	International Agency system for Research on cancer
MCH	Mean Cell Haemoglobin
MCHC	Mean Cell Haemoglobin Concentration
MCV	Mean Cell Volume
MDS	Myeloid dysplastic syndrome
NCI	National Cancer Instiute
PCV	Packed cell volume
Ph-H	Benzene
PLTs	Platelets
PM	Particular Matter
RBCs	Red blood cells

RDW	Red cell distribution width
RES	Reticulo endothelial system
RNA	Ribonucleic Acid
Std	Standard deviation
WBCs	White blood cells