

DIDECATION

To my

Mother

Father

Wife

Son Mohammed

Daughter Reiham

Our colleagues at department of physics

University of Kassala

I didecate this work

Suleiman

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Abstract

In this thesis the element minerals in the human hair and fingernails(350 samples) from inhabitants of Kassala State ,eastern Sudan were assessed by performing X-Ray Fluorescence spectroscopy (XRF) analysis.

The objective of the study was to determine the element composition of the human hair and fingernails substance and to provide data for the long-term losses of nutrients by this routine. The elements investigation in the samples are: Fe, Zn, Cu, Mn, Bi, Pb, Ni, Ti, Zr, Co, V and Cr, it is found that mean concentration of Zr are equal in all study area, Co high concentration in Kassala , Aroma, Shamal eldelta and Telkok, V high concentration in Refi Kassala , Shamal eldelta and Hameshkoreb, Cu high concentration in Kassala , Aroma and Shamal eldelta , Fe high concentration in Aroma, Telkok and Wadelhelaw, Mn high concentration in Kassala , Aroma, Shamal eldelta and Hameshkoreb, Bi are equal in all study area , Pb high concentration in Kassala , Telkok and Shamal eldelta , Ni high concentration in Aroma , Shamal eldelta and Wadelhelaw, Cr high concentration in Kassala , Hameshkoreb and Wadelhelaw, Ti high concentration in Kassala , Refi Kassala and Shamal eldelta The elements Pb, Bi and Cr found in the samples indicating pollutions in the area of study may be came from water or nutrient.

The trace elements Fe, Zn, Cu and Mn the mean concentrations of which change from one area to another, in view of spectroscopic analysis of hair and nails, reflect the nutritional practices that explain the spread of anemia in some respective area, this means the results difer from one area to another . This study may be considered as a part of national project indicating malnutrition map expected to over other areas of Sudan and where othor spectroscopy techniques may be used.

المستخلص:

في هذه الأطروحة تم فحص 350 عينة من الشعر و الأظافر لقطاع من سكان ولاية كسلا-شرق السودان لمعرفة مكوناتها من العناصر واستخدمت في هذه الدراسة مطيافية أشعة إكس المنقولة. الهدف من هذه الدراسة معرفة درجة التركيز في مكونات هذه العينات من العناصر الضرورية للتغذية لدرء مخاطر الأمراض، لأن شعر وأظافر الإنسان تمثل العامل الرئيسي في تعامل الإنسان مع البيئة وهي تكشف عن المكونات الغذائية لجسمه بصورة معقولة ويمكن أخذهما بسهولة ولا تؤثر علي الإنسان. استخدمت في هذه الدراسة بعض المعايير الإحصائية. العناصر التي تم فحصها في كل من الشعر و الأظافر هي الحديد المنجنيز، الخارصين، النحاس الكوبالت، النيكل، التيتانيوم ، الكروم، البزمت، الزر كيم ، الفانديوم ، الرصاص والتجستن وجد أن متوسط تركيز الزر كيم متساوي في جميع مناطق الدراسة في كل العينات، الكوبالت أعلي في كل من كسلا، أروما، شمال الدلتا وتلكوك، الفانديوم أعلي في كل من ريفي كسلا، شمال الدلتا وهمشكوريب، الخارصين أعلي في كل من كسلا ، ودالحليو، تلكوك وهمشكوريب ، النحاس أعلي في كل من كسلا، شمال الدلتا و أروما، الحديد أعلي في كل من أروما ود الحليو وتلكوك المنجنيز أعلي في كل من كسلا، أروما، ودالحليو، شمال الدلتا وهمشكوريب، البزمت يكاد يكون متساوياً في جميع المحليات، الرصاص أعلي في كل من كسلا ، تلكوك وشمال الدلتا، النيكل أعلي في كل من أروما، شمال الدلتا وود الحليو ، الكروم أعلي في كل من كسلا، همشكوريب وودالحليو أما التيتانيوم أعلي في كل من كسلا، ريفي كسلا و شمال الدلتا.

وجود الكروم، الرصاص و البزمت يعني أن هنالك تلوث ناتج أما من الماء أو الغذاء، أما عناصر التغذية الحديد، النحاس، المنجنيز والخارصين يختلف متوسط تركيز كل منها من منطقة إلي أخرى مما يعني أن مناطق الدراسة غير متكافئة في العناصر الضرورية للتغذية مما يؤدي لظهور بعض أمراض سوء التغذية في الولاية.

هذه الدراسة تعتبر كمشروع يمكن أن تعمم تجربته علي مناطق أخرى في السودان باستخدام تقانات مختلفة.

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List of Abbreviations

AAS	Atomic Absorption Spectroscopy
AES	Atomic Emission Spectroscopy
ICP-MS	Inductively Coupled Plasma Mass Spectroscopy
IRS	Infra Red Spectroscopy
LIBS	Laser-Induced Break down Spectroscopy
NMR	Nuclear Magnetic Resonance Spectroscopy
SEM	Scanning Electron Microscopes
TEM	Transition Electron Microscopes
STS	Scanning Tunneling Spectroscopy
SIMS	Secondary Ion Mass Spectrometry
AES	Auger Electron Spectroscopy
XPS	X-ray Photoelectron Spectroscopy
ISS	Ion Scattering Spectroscopy
EPRS	Electrons Paramagnetic Resonance Spectroscopy
FTIRS	Fourier Transform InfraRed Spectroscopy
FIAS	Flow Injection Analysis Spectroscopy
ED -XRF	Energy Dispersive X-ray Fluorescence
WD-XRF	Wavelength Dispersive X-ray Fluorescence
TXRF	Total Reflection X-Ray Fluorescence