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Women Awareness about Violence against Women in *Jabal Awliya* Locality at Khartoum State, Sudan 2021

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Abstract

Violence against women (VAW), also known as gender-based violence (SGBV) are violent acts primarily or exclusively committed against women or girls. Such violence is often considered a form of hate crime because they are female, and can take many forms. The aim of study to assess women knowledge regarding violence against women. This was a descriptive, cross sectional community-based study done in locality of *Jabal Awliya* from September 2020 to January 2021. The study sample composed of 180 women selected by simple random technique. The data was collected by using questionnaire and analyzed by statistical package of social science (SPSS) version23. The study revealed that women knowledge regarding violence is very high (91.1%). Less than one third (30.6%) of women experience violence, the study showed women knows physical and social violence (84.4, 81. 7%) while more than two fifth (43,6%) of women experience violence at the community. Majority of women consider lack of commitment to religious values among men and Silence about their rights (92.2.82.2%) were the main causes of violence. Less than two fifth (36.1%) of women mentioned that rape as type of sexual violence and more than two fifth (46%) of women experience society violence as (a double violence). The study concluded that majority of women had good knowledge about all types of

violence, and they experience violence at home. The study recommended that the appropriate way to prevent violence against women by increase awareness and educating the community about this issue through the media and social networking.

Keywords: Women rights, Violence against women; Sexual violence

Introduction

Twenty years ago, violence against women was not considered an issue worthy of international attention or concern. Victims of violence suffered in silence, with little public recognition of their plight. This began to change in the 1980s as women's groups organized locally and internationally to demand attention to the physical, psychological and economic abuse of women. Gradually, violence against women has come to be recognized as a legitimate human rights issue and as a significant threat to women's health and well-being. Violence against women, in its various forms, is endemic in communities and countries around the world, cutting across class, race, age, religious and national boundaries(*Daher, 2003)*.The term "violence against women" encompasses many forms of violence, including violence by an intimate partner [intimate partner violence] and rape/sexual assault and other forms of sexual violence perpetrated by someone other than a partner [non-partner sexual violence], as well as female genital mutilation, honor killings and the trafficking of women(*Coombs and Daly, 1995)*.Violence against women is perhaps the most shameful human rights violation, and its perhaps the most pervasion. It knows no boundaries of geography, culture or wealth. As long as it continues, we cannot claim to be making real progress towards equality, development and peace. All human rights issues affect women. However, women also suffer specific denial of their human rights because of their gender. The experience or

threat of violence affects the lives of millions of women everywhere, cutting across boundaries of age, wealth, race, religion, sexual identity and culture*(Feleke et al., 2015)*.Sexual violence is a reality for millions of people worldwide, and for women in particular. Research indicates that the vast majority of victims of sexual violence and female, perpetrators are male, and that most victim know their attacker. This does not, however, negate that fact sexual violence against men and boys is also widespread*(Levitan et al., 1998)*.

Martials and Methods

Study design

A descriptive cross sectional study design carried out among women to assess knowledge regarding violence against women in *Jabal Awliya* locality at Khartoum state - Sudan 2021**.**

Study area

This study was carried in *Jabal Awliya* locality in Al Khartoum state established in March 2003, the locality is the southern gateway of the state, with an area of 615 square kilometers, bordered to the north by Khartoum, to the south by White Nile State, to the southeast by the Gezera State and to the west by the White Nile, and the locality population is 1,216,649 people (https://en.wikipedia.org, 2021)

Setting:

Al-Kalakala: is located in the area of southern Khartoum state; the locality of Jabil Awlia, its population is 443,805, and an area of 39.33 km2.

Al-Azhari: emerging in the southeast of Khartoum, and Its population is 449779, its area is 50.29 km2, and its density 8943.70 inhabitants / km2, which is higher than the general density of Khartoum.

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Al-Salamah: is located south of the city of Khartoum, about 7 kilometers away from it, population of (7,500).

Al-Engath: is about (248766) people and is represent (26%) of the local population.

Mayo is located in the southern side of the capital, Khartoum, which is also called Janob alhezam, the population is about one million people.

Study population

All women living in the selected area in *Jebal awalia* locality at Khartoum state during the study period.

Inclusion criteria

- Agree to participate the research.
- Her age between 18-50 years old.

Exclusion criteria

- Women not living in selected areas.
- Women younger than 18 years old.

Sample size & Sampling technique

The study composed of 180 women. Probability sampling technique (cluster sampling) was used.

Data collection tools

The data were collected using self-administered, close-ended questionnaire contains 30 questions; 6 questions about demographic data and from 7 to 14 questions about the woman' awareness about violence, from 15 to 20 the questions about women experience to violence. From 21 to 30 the questions about women's opinion to solve violence against women.

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Data analysis

Frequency analysis, cross tabulation, and through SPSS program. The following statistical measures used (Descriptive measures include: count, percentage, and arithmetic mean, standard deviation, minimum and maximum).

Ethical considerations:

- The study was approved by ethical committee of the collage and the institute research board of the international university of Africa.
- Approves from selective area.
- Verbal consent from each woman after explanation for purpose of study and she has right to continue or withdrawal from study.

Results

Table No (1) Women knowledge regarding women rights:

Item (S)	Frequency	Percent
Free from domestic violence	30	16.7%
Free from discrimination	7	3.9%
Right to educate	31	17.2%
Right to earn a fair and equal wage	16	8.9%
Domestic & discrimination	96	53.3%
Total	180	100%

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Table No (2) Woman knowledge regarding types of Violence:

Type of violence	Yes		No		
	F	**P (%)**	**F**	**P (%)**	***Total***
Physical violence	152	84.4%	28	15.6%	
Psychological violence	144	80.0%	36	20.0%	*180*
Sexual violence	143	79.4%	37	20.6%	*(100%)*
Social violence	147	81.7%	33	18.3%	

Table No (3) Causes of violence:

Cause	Yes		No		
	F	**(%)**	**F**	**(%)**	**Total**
lack of commitment to religious values	166	92.2%	14	7.8%	
Silence about women's her right	148	82.2%	32	17.8%	
Abuse the women to control her	136	75.6%	44	24.4%	
Men right concept	116	64.4%	64	35.6%	
Behavioral and personal problem	135	75.0%	45	25.0%	**180**
The man feel lower than his wife	145	80.6%	35	19.4%	**(100%)**
Economic dependence and limited income	106	58.9%	74	41.1%	
Family or cultural believes or concept	118	65.6%	62	34.4%	
Due to women behavior	117	65.0%	63	35.0%	

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Table No (4) Physical violence experience and place of violence:

Item (S)	F	P	Total
Beating	30	16.7%	180 (100%)
Burn	3	1.7%	
Pushing by force	8	4.4%	
Strangulation	5	2.8%	
Beating & pushing by force	134	74.4%	
Place of violence			
Home	38	21.1%	
Work place	5	2.8%	
Public area	14	7.8%	
Never	123	68.3%	

Table No (5) Psychological violence experience by women:

The act	Always		Usually		Sometime		never	
Someone tell you : you are worthless	F	%	F	%	F	%	F	%
Isolate you from friend and family	10	5.6%	28	15.6%	32	17.8%	110	61.1%
Control your behavior	14	7.8%	28	15.6%	23	12.8%	115	63.9%
Tell you: you are crazy	12	6.7%	30	16.7%	26	14.4%	112	62.2%
Blame you for everything	12	6.7%	17	9.4%	19	10.6%	132	73.3%
Guilt you over things that not your fault	24	13.3%	36	20.0%	34	18.9%	86	47.8%
Someone tell you : you are worthless	21	11.7%	31	17.2%	27	15.0%	101	56.1%
Total	180 (100%)							

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Table No (6) Women opinion about women facing double violence and its sources:

Item (S)	Frequency	Percent
Women face double violence		
Yes	126	70.0%
No	54	30.0%
Source of double violence		
Government policies	32	25.4%
Family	36	28.6%
Society	58	46%
Total	180	100%

Discussion

The study found that more than half (53.3 %) of women mentioned aware that to be free from Domestic & discrimination is women right. Majority of them revealed that physical, social and Psychological violence were the most types of violence (84.4%, 81.7%, 80.0%) respectively. On the other hand, majority of women agree that lack of commitment to religious values in men, and women Silence about their rights were the most causes of violence (92.2%, 82.2%) respectively. This disagree with results from study done Nibal which mentioned the main causes of violence were low status of women, illiteracy, economic dependence, patriarchal society. Other causes were inter-caste marriage, husband listening to other family members, sexual dissatisfaction, and unemployment*(Khatri & Pandey, 2013*).

The study showed that more than two fifth (46%, 45.6%) of women experience society violence and fear from family disruption and their reasons is fell into four themes, "shame or embarrassment, minimization of the experience, fear of consequences, and privacy," This is usually attributed to a woman's shyness to

talk about any violence she is exposed to from the husband, as it is a departure from traditions and norms.

Based on the findings of study near one third (30.6%) of women experience violence. They were at higher risk of violence from their community (43,6%) than in the home and this has serious repercussions on women's health. This finding is agree with WHO which mentioned that on domestic violence recognized intimate partner violence (IPV) as the most common form of violence in women's lives, much more than assault or rape by strangers or acquaintance(WHO, 2005) . So There is a need to understand better the magnitude and nature of the different forms of violence against women.

According to (Antai, 2011) women who justified wife beating and earned more than their husband/partner were at higher likelihood of experiencing physical and sexual violence. In this study women experience two or more of physical violence and some of women by beating (74.4% - 16.7%) respectively. The result agrees with Multi-country study on women's health and domestic violence against Women "The most common act of violence experienced by women was being slapped by their partner, from 9% in Japan to 52% in provincial Peru. This was followed by being struck with a fist, for which these two settings again represented the extremes (2% and 42%,) respectively, (García-moreno, n.d.).

The study found that less than half (36.1%) of women consider rape as type of sexual violence perhaps that rape is the most underreported crime in overall world and its effect can be seen in the social activity, mental health and medical state of the victim. While more than two third (70%) of women stated that women may face double violence and they experience society violence (46%).

In this study women believe that violence can cause psychological effect by (32.2%) this finding consistent with national center on domestic violence which stated that women who have experienced domestic violence or abuse are at a significantly higher risk of experiencing a range of mental health conditions including post-traumatic stress disorder (PTSD), depression, anxiety, substance abuse, and thoughts of suicide
(National Center on Domestic Violence, 2014).

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Preparation of Methyl and Benzyl Guar using Dimethyl Sulfoxide/Paraformaldehyde Solvent System

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Abstract

Guar gum (GG) is a naturally occurring polymer extracted from the seeds of *Cyamopsiss tetragonaloubus* plant, GG contains a minimum of 82% galactomannan. The aim of this study is the etherification of GG under homogeneous conditions using dimethyl sulfoxide/paraformaldehyde (DMSO/PF) as a solvent system. Etherification of GG diversifies and enhances its applications and functionality. GG was obtained and purified then dissolved in DMSO/PF. The prepared GG ethers were methyl guar and benzyl guar, they were prepared by the treatment of solubilised GG with dimethyl sulphate and benzyl chloride in the presence of sodium hydroxide which acts as a reactant and as a catalyst. Fourier transform infrared spectroscopy (FT-IR) shown new peaks at 1114.78cm-1 and 1056.99cm-1 indicating (C-O) stretching vibration of functional group of ether for methyl guar and benzyl guar respectively. The degree of substitution (DS) was 0.97 for methyl guar and 0.3 for benzyl guar. The results of thermal stability of purified GG and GG ethers by the thermal gravimetric analysis (TGA) and differential scanning calorimetry (DSC) showed that benzyl guar was more stable than the unmodified GG whereas methyl guar was less stable. The solubility of methyl guar and benzyl guar in different

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organic solvents was different from the solubility of unmodified GG which only soluble in water. This study recommends that further research should be carried out to study the physical and biodegradable properties of the prepared guar ethers.

المستخلص

صمغ القوار هو بوليمر طبيعي يتم استخلاصه من بذور نبات القوار، والاسم العلمي لهذا النبات هو *Cyamopsiss tetragonaloubus*. ويحتوي صمغ القوار على 82% في الأقل من مادة الجلاكتومانان. الهدف من هذه الدراسة هو أيثرة صمغ القوار في وسط متجانس وذلك باستخدام ثنائي ميثيل سلفوكسيد/بارافورمالدهيد (DMSO). أيثرة صمغ القوار تؤدي إلى تنويع وزيادة استخداماته. تمَ الحصول على صمغ القوار وتنقيته ومن ثم إذابته باستخدام ثنائي ميثيل سلفوكسيد/بارافورمالدهيد (DMSO). الإيثرات التي تمَ تحضيرها هي ميثيل القوار وبنزيل القوار، وتمَ ذلك بتفاعل الصمغ المذاب مع كبريتات ثنائي الميثيل وكلوريد البنزيل في وجود هيدروكسيد الصوديوم والذي يعمل كمتفاعل وكعامل مساعد. أظهر مطياف الأشعة تحت الحمراء (FT-IR) قمم جديدة عند 1114.78سم$^{-1}$ و 1056.99سم$^{-1}$ والتي تشير للزمرة الوظيفية (C-O) الخاصة بالإيثر لكل من ميثيل القوار وبنزيل القوار على التوالي. درجة الإحلال (DS) كانت 0.97 لميثيل القوار و 0.3 لبنزيل القوار. أظهرت نتائج الثبات الحراري لصمغ القوار غير المعدل وإيثرات صمغ القوار بواسطة جهازي التحليل الوزني الحراري (TGA) والمسح المسعري التفاضلي (DSC) أن بنزيل القوار أكثر ثباتاً من القوار غير المعدل، بينما ميثيل القوار كان أقل ثباتاً. ذوبانية ميثيل القوار وبنزيل القوار في مذيبات عضوية مختلفة كانت تختلف عن ذوبانية القوار غير المعدل والذي يذوب في الماء فقط. توصي الدراسة بالمزيد من البحث والدراسة لدراسة الخواص الفيزيائية وقابلية التحلل العضوي للأيثرات التي تم تحضيرها.

Keywords: Dimethyl sulfoxide/ Paraformaldehyde; Guar gum; Guar gum ethers; Methyl guar; Benzyl guar.

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Introduction

The polysaccharide gums represent one of the most abundant industrial raw materials and have been the subject of intensive research due to their sustainability , biodegradability and biosafety (Vikas et al., 2011). GG is a galactomannan composed of a chain of (1-4)–β–D manno-pyranosyl units linked to side chains of galactopyranosyl units (Figure 1) (Whistler and Miller, 1992).

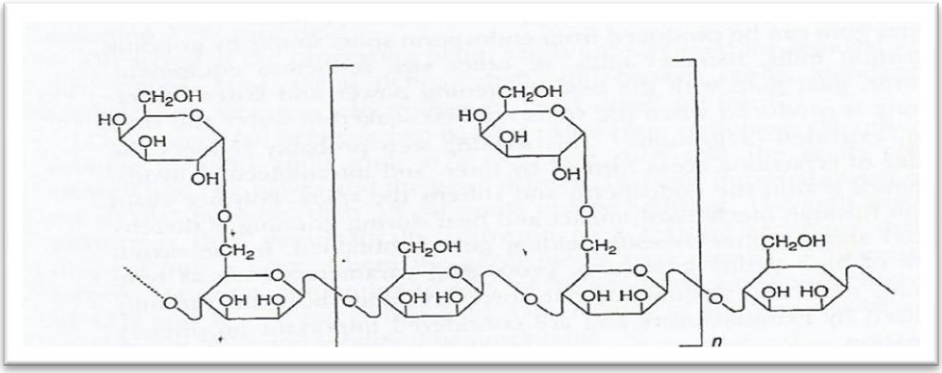

Figure (1): Idealized structure of galactomannan (Whistler and Miller, 1992)

It was first believed that the side chains are substituted at regular intervals along the manna backbone. However, irregularity in the distribution of side chains is now accepted. The ratio of D-mannosyl (M) to D- galactosyl (G) units is about 1.8:1 (Whistler and Miller, 1992). For starch and cellulose, the reactivity order of the various hydroxyl groups in a glucose unit has been found to be in the order C-2 > C-6 > C-3. For steric consideration, C-6 primary hydroxyl appears to be less hindered, but inductive effect, due to glycoside oxygen, increases the reactivity of C2-OH. Not much investigation has been carried out to determine the reactivity of these (2, 3, and 6) hydroxyl groups in galactomannan, but the reactivity order seems to be in the same sequence as that of a glucose monomer in cellulose or starch. In the case of galactomannans, substitutions can occur in mannose as well as in the galactose unit of the polysaccharide (Mathur,

2012).Chemical modifications of GG which occurs under heterogeneous or homogeneous conditions alters its properties such as solubility and thermal stability.. Preparation of guar gum ethers under homogeneous conditions gives a higher degree of substitution value for each guar gum ether.

Martials and Methods

Guar gum

Guar flour was obtained from Gitaf Gums Production and Marketing Co. LTD, Khartoum, Sudan.

Reagents

Diethyl sulphate was obtained from HOPKIN & WILLIAMS LTD. Benzyl chloride, paraformaldehyde and dimethyl sulfoxide (DMSO) were obtained from S d Fine – chem. Limited-India. Sodium hydroxide was obtained from VWR CHEMICALS. Acetone was obtained from Oxford Laboratory Reagents, India. Diethyl lace amide was obtained from Merck, Germany. Diethyl l form amide (DMF), Formic acid and methanol were obtained from LOBA Chemise. Ethanol was obtained from Schar Lab S.L, Spain. All of these reagents were used without further purification.

Measurements

Fourier transform infrared spectroscopy (FT-IR)

FT–IR spectra were performed on a Shimadzu FT–IR 8400 S.CE and Shimadzu IR Tracer–100 instruments using potassium bromide (KBr) discs prepared from powdered sample (GG and GG ethers) mixed with dry KBr in the ratio approximately 1:100 by weight. FT-IR spectra were analysed in the Central Research Laboratories, University of Khartoum and Mohammed Obaid Mubarak Laboratory, University of Gezira.

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Elemental analysis

Elemental analysis was performed on dry, finely ground samples using elemental analyzer Flash EA 1112 series, instrument. The samples were analyzed in Central Petroleum Laboratories (CPL) of the Sudanese Petroleum Corporation (SPC). DS values for etherified guar gum were calculated on the basis of measured carbon percent. The next equation was used to determine the DS value for each guar ether:

$$DS = \frac{C_E\%}{C_T\%} \times 3$$

Where, CE % is the carbon content calculated from elemental analysis of guar ether, 3 is the total DS value, CT % is the theoretical carbon content of guar ether.

Solubility

The solubility of etherified guar gum samples were determined at the concentration 0.01g/ 1ml in water and various organic solvents.

Thermogravimetric analysis

Thermogravimetric analysis (TGA) was done on a Perkin–Elmer Pyris Diamond thermal instrument TGA 4000 in the Laboratories of the Faculty of Science, University of Malaya, Kuala Lumpur, Malaysia. TGA runs were carried out in a temperature range of 50-700^{o} C under nitrogen atmosphere and a heating rate of 5oC min^{-1}.

Differential scanning calorimetry

DSC measurements were carried out on DSC Mettler- Toledo (model DSC C822e) instrument in the Laboratories of the Faculty of Science, University of Malaya, Kuala Lumpur, Malaysia in the range started from 25^{o} C to 250^{o}C and

cooling to -25^{o} C, under nitrogen at a flow rate of 20cm3/min and a scan rate of 10^{o}C/min .

Purification of guar gum

Purification of guar gum followed a modified method combining the methods of Hyena and Whistler (1984) and Mulimani and Prashanth (2002).

Solubilization of guar gum in the Dimethyl Sulfoxide/para- formaldehyde (DMSO/PF)

Solubilization of GG in DMSO/PF followed the method which was described by Yalpani (1985) for dissolution GG in DMSO/PF with some modifications.

Preparation of methyl guar

Methylation of GG followed the same steps as those described by McCormik and Callais(1987) for cellulose with some modifications. 0.75g of sodium hydroxide suspended in 10ml of DMSO was added to the solution of 0.5g GG in DMSO/PF, and the solution was heated to 80℃ for 4 h. The reaction mixture was cooled to 25℃, and a solution of 10.5ml dimethyl sulphate in 25ml of DMSO was added over a period of 1 h. An additional 0.75g of sodium hydroxide was added and the stirring was continued for 10 h at 60–80 ℃ and then for 48 h at 25℃. The product was isolated by precipitation of the reaction solution in a mixture of methanol, water and acetic acid (85:10:5 v/v). the filtered polymer was washed with hot ethanol and dried in oven for 48 h at 50℃. The yield was 0.3g (60%).

Preparation of benzyl guar

Benzylation of GG followed the method of McCormick (1981) for cellulose with some modifications. 0.8g of sodium hydroxide suspended in 10ml of DMSO was added to the solution of 0.5g GG in DMSO/PF. The mixture was heated at 45–50℃ for 40 min. After cooling, 3.7ml of benzyl chloride was

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added. The mixture was stirred for 6h and then another 0.4g of sodium hydroxide suspended in 10ml of DMSO was added and heated to 45–50℃ for 30 min. After cooling, another 2.8ml of benzyl chloride was added. The reaction mixture was stirred for 8h, the polymer was precipitated with methanol, water and acetic acid (85:10:5 v/v) mixture and washed with methanol. The polymer was dried in oven for 48h at 50℃. The yield was 0.45g (90%).

Results and discussion

Degree of substitution (DS) by elemental analysis

The DS – values of etherified GG were calculated on the basis of measured C% from elemental analysis. Results of actual elemental analysis and calculated (theoretical) DS values are shown in Table (1).

Table (1): Calculated DS-value

Guar ether	C% from elemental analysis for ethers	Theoretical value of C% for DS= 3	DS
Methyl guar	17.28	52.9	0.97
Benzyl guar	7.51	75	0.3

The DS value of benzyl guar is lower than that of methyl guar and this may be related to the effect of steric hindrance of benzyl group and GG.

FT-IR spectrum of purified unmodified guar gum

The infrared spectrum of the unmodified GG as shown in Figure (2). The strong peak at 3417.63 cm-1 indicates the presence of (OH) stretching.

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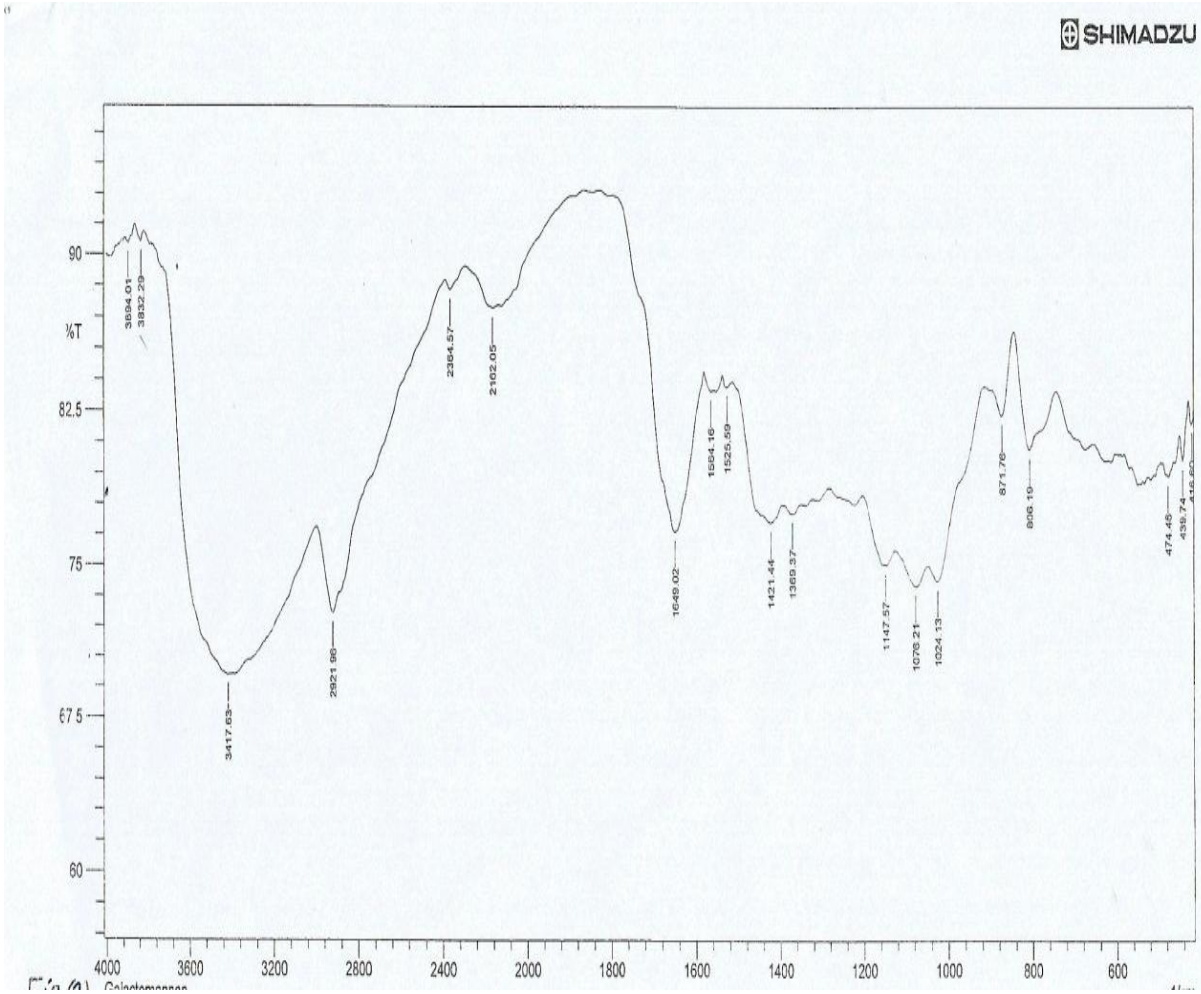

Figure (2): FT-IR spectrum of unmodified guar gum

FT-IR Spectrum of methyl guar

The infra-red spectrum of the methyl guar shows a weaker absorption in the (OH) stretching region at 3409.91cm^{-1} indicating the substitution of the hydroxyl groups. And the peak at 1114.78cm^{-1} of (C-O) stretching an evidence of etherification, see figure (3).

FT-IR spectrum of benzyl guar

The spectrum of benzyl guar shows (O-H) stretch at 3417.86 cm^{-1} with less intensity than that of the strong bond of the native GG. The peak at 1056.99cm-1 indicating (C-O) stretching vibration of functional group of ether, see figure (4).

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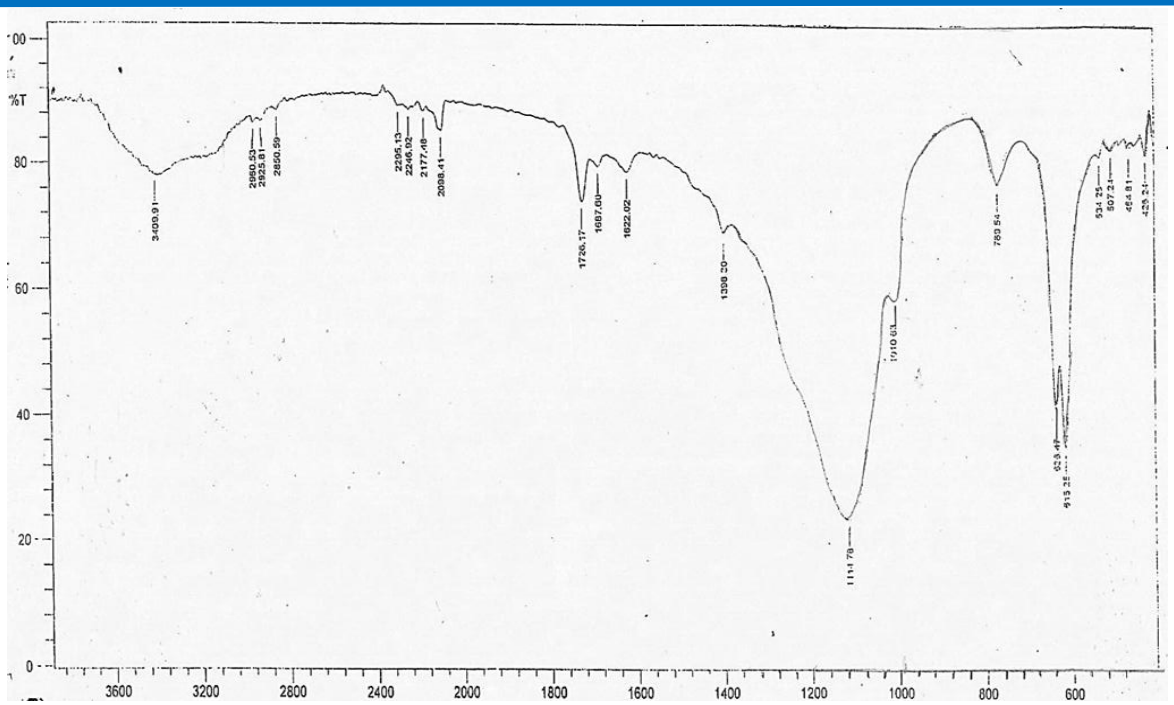

Figure (3): FT-IR spectrum of methyl guar

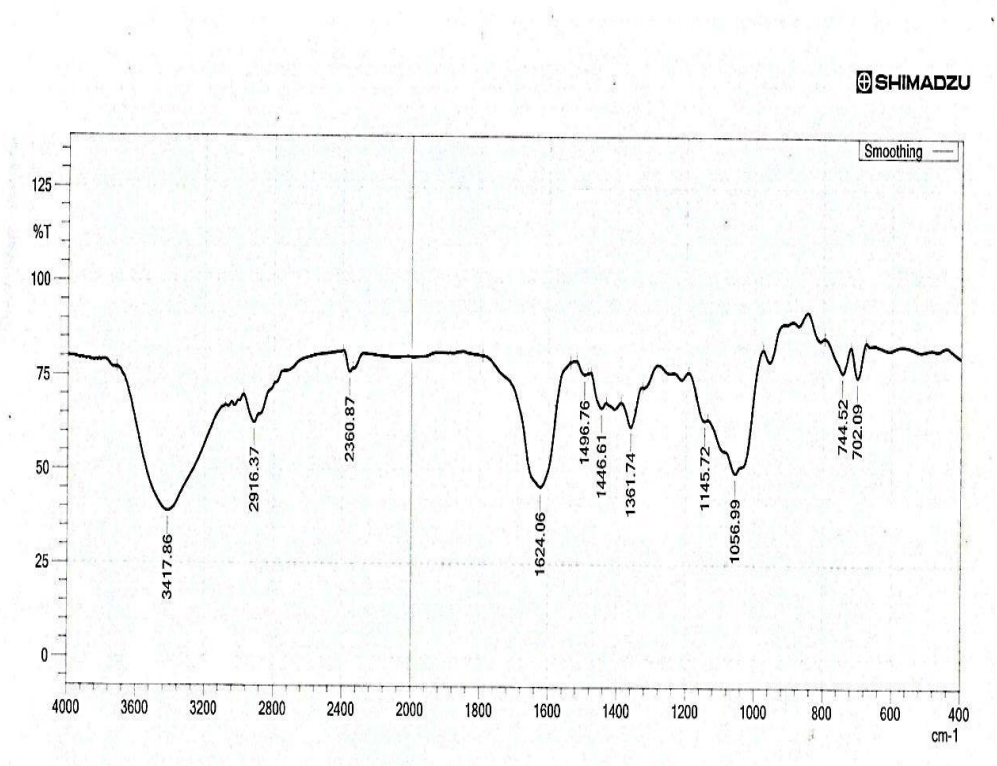

Figure (4): FT-IR spectrum of benzyl guar

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TGA for purified unmodified GG

The result of TGA analysis for purified unmodified GG is shown in Figure (5). By tracing the residual weight percent, it shows that pure GG weight loss begins at a temperature about 50^{o}C – which can be attributed to dehydration process- with a weight residue of 97%. The rate of weight loss was increased with increasing temperature up to 275oC with a weight residue of 88% . The last step of degradation at 340^{o}C with a weight residue of 35%.

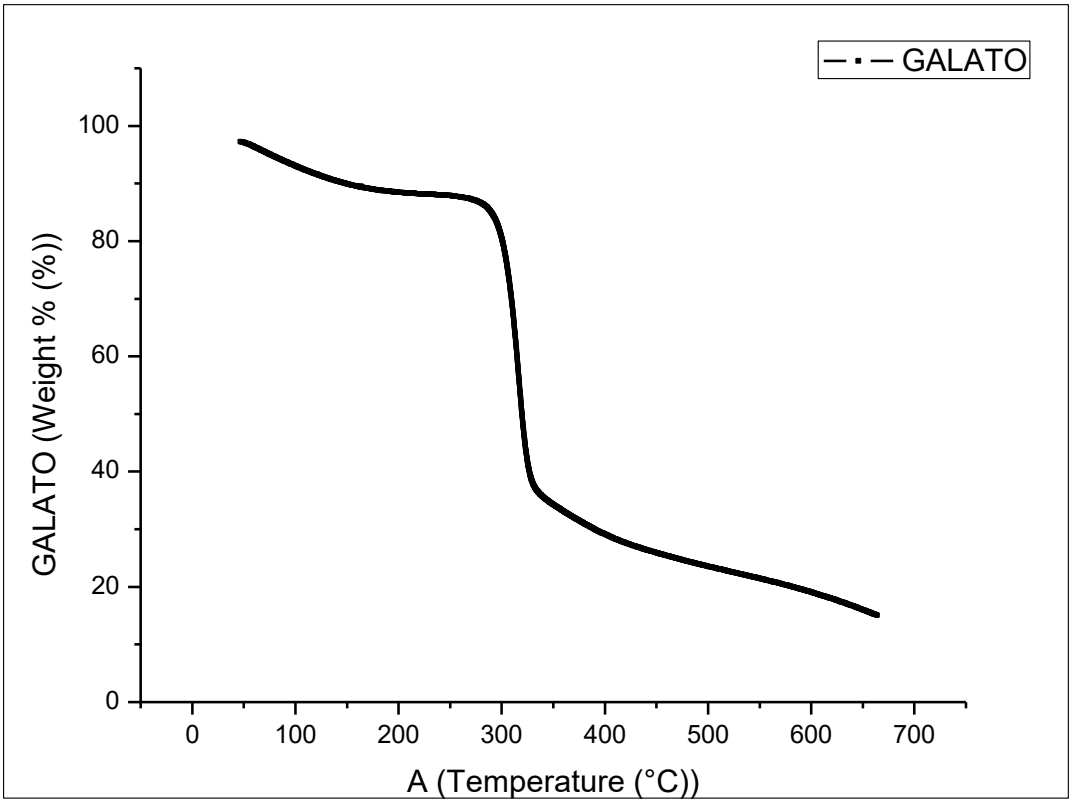

Figure (5): TGA curve of unmodified guar gum(GG)

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TGA for methyl guar

The TGA of methyl guar is shown in Figure (6). The first the rmogravimetry step of decomposition occurs at about 55oC- losing volatile matter and dehydration processes- with a weight residue of 90% .The weight loss increased with further heating up to 180^{o}C with weight residue of 62%. The final degradation occurs at 300^{o}C with weight residue 25%. The second decomposition temperature of methyl guar is lower than that of pure unmodified GG that means methyl guar is less stable than unmodified GG. The thermal stability of GG is affected by the crystalline order, which decrease after substitution. This feature was reported by Abdulla 2012 about the thermal stability of cellulose derivatives.

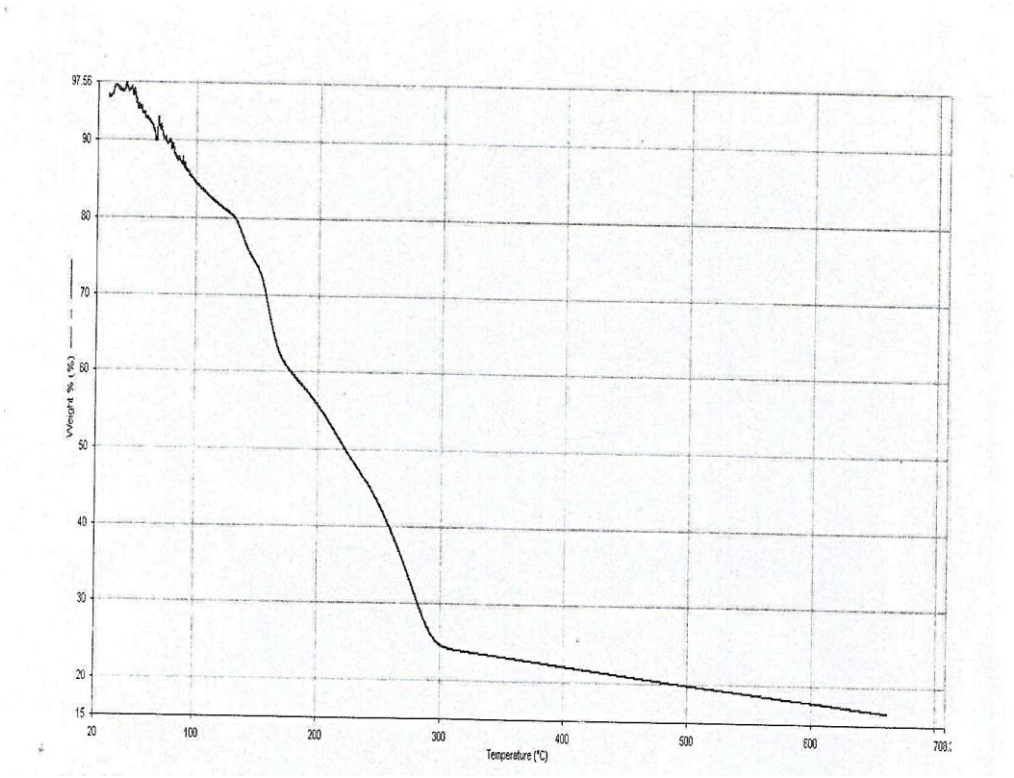

Figure (6) : TGA curve of methyl guar.

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TGA for benzyl guar

Figure (7) shows the TGA of benzyl guar. The weight loss begins at a temperature about 51^{o}C- losing volatile matter and dehydration processes- with a weight residue of 99%. On further heating up to 210^{o}C, weight loss increased with residual weight 98%. Final degradation occurs at 375^{o}C with weight residue 90%. The temperature of final degradation of benzyl guar is higher than that of unmodified GG, that means benzyl guar is more stable than unmodified GG and this feature may be attributed to the effect of the benzyl ring.

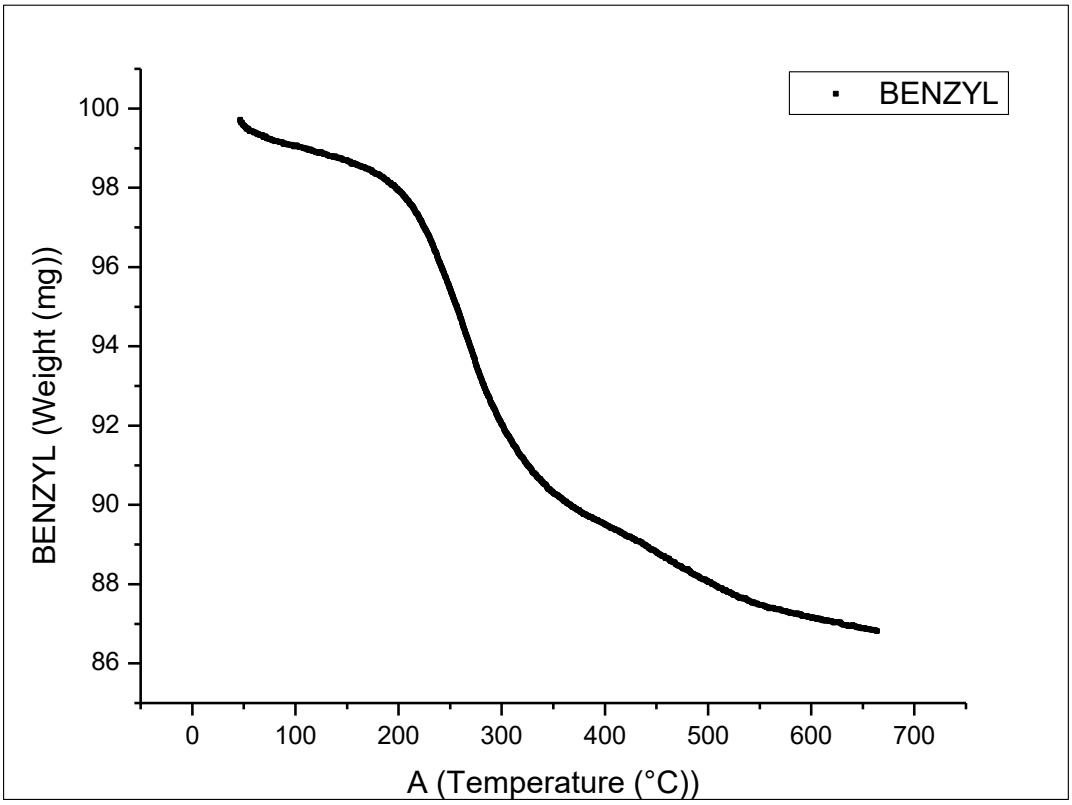

Figure (7): TGA curve of benzyl guar

DSC for unmodified GG

In the DSC the rmogram of purified unmodified GG Figure (8) a single sharp endothermic peak is observed for thermal transition at 164^{o}C.

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DSC for methyl guar

From the rmogram Figure (9), the sharp exothermic peak which was observed at 160.6^{o}C is due to possible exothermic transition. Also there are five endothermic peaks in the range of 118.4^{o}C to 222.6^{o}C and they are due to possible endothermic transition. From the rmogram, methyl guar is less stable than unmodified GG. The result of DSC of methyl guar confirm the result of the TGA of methyl guar.

DSC for benzyl guar

The DSC thermogram Figure (10) shows two endothermic peaks at 160^{o}C and 236.2^{o}C. These peaks are due to possible endothermic transition. From the thermogram, benzyl guar is almost as stable as unmodified GG.

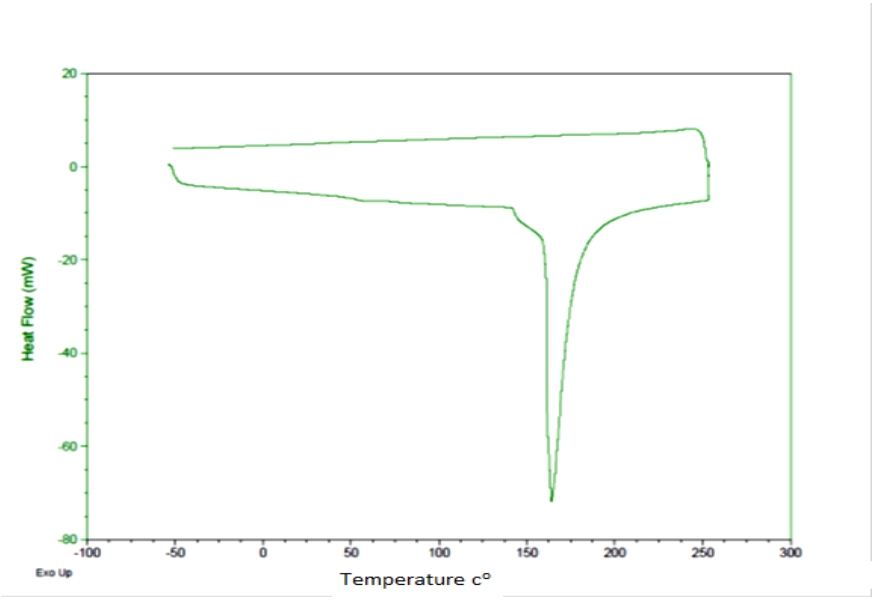

Figure (8): DSC curve of unmodified guar gum

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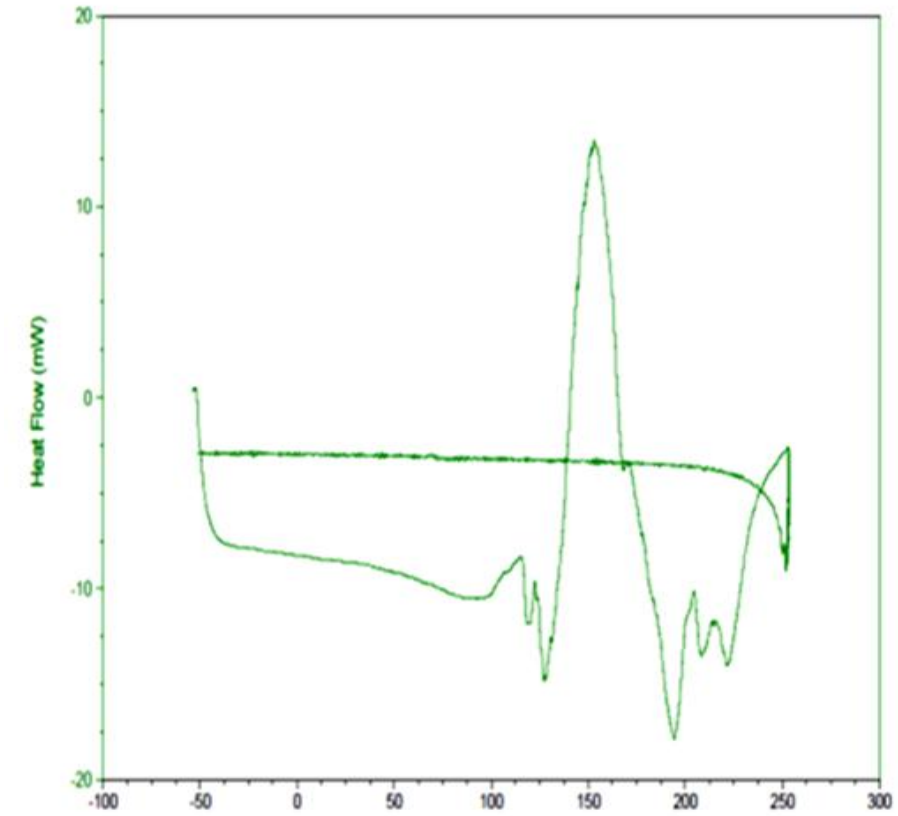

Figure (9): DSC curve of methyl guar

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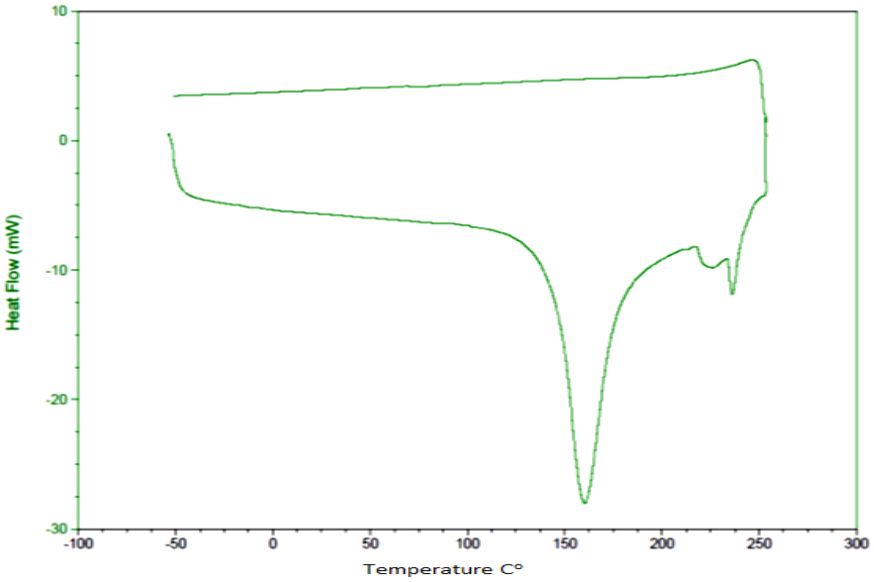

Figure (10): DSC curve of benzyl guar

The solubility of GG and its ethers derivatives in organic solvents

Table (2) shows the solubility of GG and its ethers derivatives at the concentration 0.01g/1ml in water and various organic solvents at room temperature.

Table (2): The solubility of GG and its ethers derivatives in organic solvents

Sample	Water	DMA	Chloroform	DMF	Acetone	Formic acid	DMSO
GG	+++	_	_	_	_	_	_
Methyl guar	_	++	++	++	++	+++	++
Benzyl guar	+++	++	_	+	_	+	++

(+++) = Soluble, (++) = Partially, (+) = Swelling, (-) = Insoluble

For GG, it seemed that the galactose groups hold back solid–state by free rotation about the (1-6) linkage due to conformational entropy. Due to this factor

GG was not organo-soluble. Methyl guar is soluble in polar protic solvent formic acid. And partially soluble in polar aprotic solvents such as diethyl lace amide (D M Ac), diethyl lsulfoxide (DMSO) and diethyl lformamide (DMF). Benzyl guar is partially soluble in (DMAc) and (DMSO).

Conclusions

After purification of GG from GG flour, it dissolved in dimethyl sulfoxide/paraformaldehyde solvent system. After dissolution, GG was successfully transformed into modified guar (guar ethers) by homogeneous etherification using sodium hydroxide as a reactant and as a catalyst. The structure of GG and its ethers were determined by FT-IR. In methyl and benzyl guar there was a decrease in the hydroxyl group (OH) absorption, and appearance of new peaks which related to the ether group. Methyl guar and benzyl guar have significantly altered solubility properties compared to native GG. The thermal properties of methyl guar and benzyl guar were different from those of pure GG. Benzyl guar is more stable than unmodified GG and this maybe attributed to the presence of the benzyl ring. Methyl guar is less stable than unmodified GG and this feature maybe attributed to the alkyl group which decrease the crystallinity and accordingly decrease the thermal stability.

Recommendations

This study recommends that further research should be carried out to study the physical and biodegradable properties of the prepared guar ethers.

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Chemical Analysis of Some Irrigation Waters in Sudan for Plant Nutrients Content and the Impact on Crops Production

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Abstract

There were five samples of irrigation waters; of which three were surface waters and two were underground waters were collected from different locations in Sudan during summer and winter seasons. These samples were analysed for N, P, K, Ca, Mg, S and micronutrient . For the N the $NH_4^+ - N$ and $NO_3^- - N$ which are the forms of Nitrogen absorbed by plants from the growth medium were not detected and hence, excluded from the results. P,K, Ca, Mg and S were found in the ranges (0 - 0.20) , (3.9 - 49) , (30 - 108) , (3 - 25) and (0.18 - 0.32) ppm respectively for all locations. The Micronutrients were excluded from the results because it displayed very low values. Based on the assumption that one feddan (4200 m^2) requires 400 m^3 equivalent to 400,000L of water for optimum irrigation (prof H.H.Adm, personal communication) ,the amount of nutrients supplied by one irrigation (in Kg) can be calculated which is important for fertilizer recommendations to obtain economical crops yield. Also, a proposal of measures to mitigate the potential harmful effect of excessive Ca on soil physical properties was suggested.

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التحليل الكيماوي لعناصر تغذية النبات في بعض مياه الري في السودان واثر ذلك علي إنتاجية المحاصيل

مستخلص:

تم تجميع خمسة عينات من مياه الري بالسودان ثلاثة منها مياه سطحيه واثنين مياه جوفية من عده مناطق وذلك اثناء فصل الصيف والخريف والشتاء حيث تم تحليل النتيروجين(N) والفسفور (P) والبوتاسيوم (K) والكالسيوم (Ca) والمغنسيوم (Mg) والكبريت (S) وعناصر التغذية الصغري. لم نتمكن من الحصول علي أي قيمة للنتروجين ,الامونيومي والنتراتي (الاشكال التي تمتص بها النبات النتيروجين من التربة) في كل العينات التي تم تحليلها ولذا استبعد من النتائج .بالنسبة للعناصر(P),(K),(Ca),(Mg),(S)كانت نتائج التحليل في المدي (0,0_0,2),(3,9_49),(30_108),(30_25),(0.18_0,32)جزء من المليون علي التوالي لكل المواقع. نتائج تحليل عناصر التغذية الصغري كانت ضعيفه جدا وبالتالي تم حجبها. بما ان الفدان (4200 متر مربع) يحتاج لحوالي 400 متر مكعب من الماء (400,000) للري ,فان كمية عناصر التغذية الذائبة في الماء يمكن حسابها وهذا يساعد في التوصيات التسميدية للحصول علي إنتاج اقتصادي أيضاً تم اقتراح بعض الحلول التي تخفف من الأثر السالب لعنصر الكالسيوم الموجود بكثرة في مياه الري علي خواص التربة الفيزياوية.

Keywords: Irrigation Waters, Plant Nutrients, Crops Production

Introduction

It is well established that all green plants require 16 nutrient elements for growth and development. These include carbon(C),oxygen(O),hydrogen(H)nitrogen(N), phosphorus(P),potassium(K),calcium(Ca),magnesium(Mg),sulphur(S),zinc(Zn), copper(Cu),iron(Fe),manganese(Mn),Boron(B)molybdenum (Mo) and chlorine (Cl). The source of (C) and (O) is carbon dioxide CO_2 while the source of (H) is water. These two sources are renewable. The remaining 13 nutrients are

classified into macronutrients which are needed in large quantities including N, P, K, Ca, Mg, S and micronutrients which are needed in small quantities including Zn, Cu, Fe, Mn, B, Mo and Cl (Arnon and Stout,1939). All the 13 nutrients are absorbed by plants in ionic form i.e. + vely or – vely charged ions (Tandon, 1974). The uptake of these nutrients must be balanced to keep the ionic balance inside the plant close to neutrality. Macronutrients are further classified into primary including N, P and K and secondary including Ca, Mg and S. This classification is not fair for S as it is involved in diverse biological functions such as biosynthesis of chlorophyll, proteins, oil in oil crops and above all S is included in the structure of two amino acids: namely cysteine and methionine. For these reasons, S should be considered as a primary macronutrient and not neglected as occurring in irrigated agriculture. Most of the Sudanese agricultural soils are classified as of low to moderate fertility (Fink, 1961). The fertility of soil refers to its ability to supply crops with their nutrients need and hence, application of fertilizers is very important to attain sustainable agriculture in Sudan. Simply a fertilizer can be defined as that material containing one or more plant nutrients. In addition, fertilizers should be free from radioactive materials, environmental pollutants, and heavy metals. Specifically, solid, and liquid fertilizers are available in the market for crops production. It is worth mentionable that the prices of fertilizers increased drastically that farmers cannot purchase for promoting their crops yield. Since water is considered as a universal solvent, it can dissolve salts of plant nutrients in variable concentration and hence, it is logical to analyses irrigation waters for these nutrients. Eventually, it is imperative to indicate that the objective of this work is to determine the concentration of plant nutrients in different irrigation

waters and form this total amount of a particular nutrient delivered by irrigation water that can be calculated by knowing the number of irrigations that the crop received. This is important for fertilizer recommendations to obtain economical crop yield, and propose possible solutions arising from excess nutrients.

Materials and Methods

There were five types of irrigation waters collected from different locations in Sudan and analyzed for readily available plant nutrients. Out of these, there were three surface waters collected from White Nile. (W.N.) near kosti, Blue Nile.(B.N.), near Wad Medani and River Nile. (R.N.) near Elgiali and two underground waters were collected from Eastern Sudan (E.S.) near Kassla and near Atbara in the Northern Sudan (N.S.)Specifically, the samples were collected during the summer, winter and rainy seasons making a total of fifteen samples. These samples were kept in plastic containers (10Leach). After that, these water samples were then taken to the laboratory of the Faculty of Agriculture, University of Khartoum for chemical analyses. While Nitrogen was determined by Kjeldahl method, Phosphorus was determined spectrophotometrically, and Potassium was determined by flame photometer.

Also, Calcium, magnesium, and trace elements were determined by atomic absorption and Sulphur was determined turbidimetrically.

The results were reported as part per million (ppm) (Estenfanetal 2013 and Kjeldahl, 1883).

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Results and Discussion

Table (I) Nutrients conc.(ppm) during the summer season:

Location	P	K	Ca	Mg	S
W.N.	0.01	12.87	40.00	10.80	0.24
B.N.	0.01	17.16	32.00	4.80	0.22
R.N.	0.01	10.14	40.00	3.60	0.26
E.S.	0.02	49.14	76.00	16.20	0.32
N.S.	0.02	26.91	106.00	12.00	0.30
Mean	0.015	23.25	58.60	9.48	0.27
SD^{+}_{-}	0.006	15.81	21.42	5.24	0.04

Table (II) Nutrients conc.(ppm) during the rainy season:

Location	P	K	Ca	Mg	S
W.N.	0.01	12.09	40.00	10.80	0.20
B.N.	0.01	17.94	34.00	4.80	0.18
R.N.	0.00	10.14	42.00	3.60	0.22
E.S.	0.01	46.02	72.00	18.00	0.24
N.S.	0.02	26.13	108.00	25.20	0.26
Mean	0.01	22.46	59.20	12.48	0.22
SD^{+}_{-}	0.007	14.56	31.00	9.12	0.03

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Table (III) Nutrients conc.(ppm) during the winter season:

Location	P	K	Ca	Mg	S
W.N.	0.01	11.31	36.00	9.60	0.22
B.N.	0.01	15.60	30.00	4.20	0.20
R.N.	0.00	8.58	37.00	3.00	0.24
E.S.	0.01	3.90	65.00	16.80	0.28
N.S.	0.02	25.35	104.00	23.40	0.26
Mean	0.01	12.95	54.40	11.40	0.24
SD^{+}_{-}	0.007	8.13	30.85	8.46	0.03

Table (IV) Amount of Nutrients (Kg) supplied by one irrigation ($400m^3$)during the summer season:

Location	P	K	Ca	Mg	S
W.N.	0.004	5.15	16.00	4.32	0.10
B.N.	0.004	6.**86**	12.80	1.92	0.09
R.N.	0.004	4.06	16.00	1.44	0.10
E.S.	0.008	19.66	30.40	6.48	0.13
N.S.	0.008	10.76	42.40	4.80	0.12
Mean	0.0056	9.30	23.52	3.79	0.108
SD^{+}_{-}	0.0022	6.32	12.57	2.10	0.016

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Table (V) Amount of Nutrients (Kg) supplied by one irrigation ($400m^3$)during the rainy season

Location	P	K	Ca	Mg	S
W.N.	0.004	4.84	16.00	4.32	0.08
B.N.	0.004	7.18	13.60	1.92	0.07
R.N.	0.000	4.06	16.80	1.44	0.09
E.S.	0.004	18.41	28.80	7.20	0.10
N.S.	0.008	10.45	43.20	10.08	0.12
Mean	0.004	8.99	23.68	4.99	0.092
$SD^{\pm}$	0.003	5.82	12.40	3.64	0.01

Table (VI) Amount of Nutrients (Kg) supplied by one irrigation ($400m^3$)during the winter season:

Location	P	K	Ca	Mg	S
W.N.	0.004	4.52	14.40	3.84	0.09
B.N.	0.004	6.24	12.00	1.68	0.08
R.N.	0.000	3.43	14.80	1.20	0.10
E.S.	0.004	1.56	26.00	6.72	0.11
N.S.	0.008	10.14	41.60	9.36	0.10
Mean	0.004	5.18	21.76	4.66	0.096
$SD^{\pm}$	0.0028	3.25	12.34	3.46	0.011

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Tables I, II and III show the concentration of plant nutrients expressed in ppm during the summer, winter, and rainy season, respectively. It is of interest to observe that the concentration of these nutrients is lower in winter season compared to that in the summer and rainy seasons. This is in line with the fact that solubility of solutes increases with rise in temperature. These results are within the range reported by Rai (1965) for Blue Nile water which indicates the stability of the concentration of nutrients.

In addition, Ammonium Nitrogen ($NH_4^+ - N$) and nitrate nitrogen ($NO_3^- - N$) were not detected in all samples, nevertheless the total Nitrogen concentration was in the range (28-42ppm) in all locations. This is properly organic Nitrogen and mostly bound by soil microorganisms, thus unavailable for crops. This assumption is supported by the fact that in irrigated agriculture when crops are grown without nitrogen application gave very low yield in both quantity and quality (Ali *et al* 2001 and 2007). The main source of nitrogen in irrigated agriculture is urea containing 46% nitrogen in the amide ($-NH_2$) form which is not readily available for crops uptake unless transformed into $NH_4^+ - N$ and $NO_3^- - N$. Moreover, the urea is characterized by nitrogen volatilization loss in form of ammonia(NH_3) gas. This loss is in the range of (20-70%) (Musa, 1968). In Gezira, for example, there are about 80 kg of urea are applied for cotton production. When considering the volatilization loss, then the amount of nitrogen available will be inadequate to sustain the crop. As a result, this could be one of the reasons for low productivity in the irrigated sector. As a matter of fact, the concentration of phosphorous is in the range of (0.0-)0.20ppm) for all tested water samples .This is too little to sustain crops. In soil the concentration of available phosphorus is in the range of (2-4 ppm). The phosphate fertilizer in

form of triple super phosphate (TSP) was recommended for wheat production (Ageeb *et al* 1986). Furthermore, the phosphate in this fertilizer (46%P_2O_5) is subject to fixation in soils containing calcium (Saeed,1974). Recently diammonium phosphate (DAP) (18% N+ 46% P_2O_5) was recommended for wheat and cotton production (Ali et al 2004 a and b). DAP is normally applied at a rate of 50 Kg/fed supplying the crop with 9 Kg nitrogen in form of (NH_4^+) and 23.5Kg (P_2O_5).This seems to be adequate for sustaining crops since the yield of cotton and wheat improved by using this fertilizer. The concentration of K is in the range (3.9 - 49) ppm for all locations This is equivalent to (1.56 - 19.6) Kg/fed delivered by one irrigation .It is of interest to observe that the concentration of K is rather low during the winter season and high during the summer and rainy seasons. Also, K is harnessed to crops and can be absorbed in amounts like or greater than that of nitrogen without any detrimental effect on crops. Amount of K delivered free by irrigation water in adequate to sustain crops in this sector. The concentration of Ca is in the range (30 -108) ppm for all locations. This is equivalent to (12-43.2) Kg/feed delivered by one irrigation and when this is multiplied by the number of irrigations a particular crop receives could be excessive Ca supply which may cause physical soil problems. Ca has a positive charge while clay particles have a negative charge. Thus, both can unite forming Ca-clay complex on drying. Ca-clay complex can lead to clods formation during the different tillage practices of land preparation which is harmful to machine sowing. Also, Ca-clay complex can lead to soil surface crust formation which can prevent seedling emergence as occurring in certain locations in northern Sudan. The harmful effect of excessive Ca can be mitigated by a pre sowing application of ammonium Sulphate ($(NH_4)_2SO_4$)

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fertilizer. The (NH_4^+)portion can improve the soil nitrogenstatus for good crop establishments, whereas the ($SO_4^=$) portion is partially needed as essential plant nutrient and partially react with some excess Ca to form calcium sulphate (CaSO_4) which improves soil physical status and thus reducing clods and crust formation. The concentration of Mg is in the range (3.0 - 25.2) ppm for all locations. This is equivalent to (1.2 - 10.08) Kg Mg/fed. delivered by one irrigation. When this is multiplied by the number of irrigations a particular crop receives during the season of growth, will give the total amount of Mg which looks adequate to sustain crops production .Besides being a cofactor in number of enzyme catalyzed reactions, Mg is an integral part of chlorophyll, the pigment responsible for photosynthesis and hence, the preparation of the raw material for the biosynthesis of other cellular components such as carbohydrates, proteins, lipids ,nucleic acids etc.. The concentration of S is in the range (0.18 - 0.32) ppm for all locations. This is equivalent to (0.07 - 0.13) Kg S/fed. which is very low to sustain crops. In Gezira scheme, ammonium sulphate was first used as a source of nitrogen for cotton production and at the same time as a source of S. In 1960, urea was produced commercially by reacting ammonia (NH_3) with carbon dioxide (CO_2) under high pressure and temperature. Since then, urea was introduced in Gezira as a source of nitrogen for crops production. By so doing, the essential plant nutrients S was neglected, and this could be an important factor in crops yield depression. In this case, it is very tempting to propose that at least %50 of crops need of nitrogen should be from ammonium sulphate fertilizer to correct for S deficiency. This is very logical if crops yield promotion is seriously intended . Our preliminary investigation onthe concentration of micronutrients indicated that they are very low in the irrigation

waters tested and should be supplied as fertilizers for crops yield promotion. Also, micronutrients are needed in very small amount compared to macronutrients and cannot be applied in the solid state by broadcasting or placement. Foliar application of micronutrients proved to be adequate for crops yield promotion (Abu Surra et al 2006 and 2007). In conclusion, this study showed clearly that the macronutrients N, P,S and all micronutrient except CL are needed for sustainable crop production in the irrigated agriculture in Sudan. Most of solutes dissolved in water are salts of chlorine. Urea and ammonium sulphate can be used as sources of N and S. Diammonium phosphates can be used as a source of N and P. For micronutrients, a number of liquid fertilizers formulations are available in the local market; and farmers should be encouraged to use them so as to correct the deficiency in these nutrients .For the rest of nutrients including Ca, Mg, K and Cl, these are delivered free by the irrigation water and not needed to be purchased as fertilizers.

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The sources of Economic Financial Value from Black Sand

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Abstract

The paper studies the effect of heavy elements, on the local and global economy is involved in many strategic industries and thus leads to increased investment opportunities. And adding value is a task that works to move all industrial sectors to upgrade the level of existing industries. Samples were collected from mountains adjacent to the red sea coast. Analyzed by XRF (XR–Flourcensise instrument. All results showed that these samples contained estimated percentages of the important heavy minerals. Therefore, the prices of heavy metals in black sand are expected to increase in the future for many reasons, the most important of which is the increase in global demand and the weakness of its mining technology. The paper came out with recommendations. - Conducting further research and studies on the heavy elements in the Black Sands at the Red Sea region, Planning to establish industrial projects to take advantage of heavy metals, Work to implement safety measures to prevent emissions of heavy metals, and attempting to posses advanced technology in exploration, processing and analysis economically exploit heavy metals .

المستخلص

هدفت هذه الورقة على القاء الضوء على تأثير العناصر الثقيلة التي بالرمال السوداء على الاقتصاد المحلي والعالمي وتأثيره على الصناعات الاستراتيجية مما يؤدي الى جذب فرص الاستثمارات ويعطي قيمة مضافة تعمل على تحريك قطاع الصناعات الثقيلة.تم جمع العينات من الجبال المحاذية لشواطئ البحر الاحمر وحللت بجهاز الاشعة السينية المتفلورة.اظهرت نتائج تحليل العينات الى انه توجد نسبا مقدرة من العناصر الصناعية ومن المتوقع ان أسعار تلك العناصر تزيد زيادة مطردة مستقبلا وذلك لعدة اسباب اهمها زيادة الطلب العالمي لها وضعف التقنيات المستخدمة في تعدين وتحليل الرمال السوداء.

خرجت الورقة بتوصيات من اهمها اجراء مزيد من الدراسات والبحوث عن الرمال السوداء بمنطقة شواطي البحر الاحمر , وضع خطط لمشاريع صناعية للاستفادة من العناصر الثقيلة بالرمال السوداء مع

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مرعاة الاشتراطات البيئية العالمية لتجنب الانبعاثات التي تصدر من بعض العناصر ومحاولة امتلاك تكنولوجيا متقدمة في مجال بحث واستخلاص وتحليل المعادن الصناعية.

Keywords: Black Sand, Financial Value, Economic sources

Introduction

Black sand is an important commodity and is found in Sudan in Red Sea Coast. Its importance comes from the fact that it contain radio active strategic elements, monazite, zirconium, Halfnium, Uranium, Thorium , Titanium , and Magnetite. Rare earth elements heavy and light most of these minerals are involved in modern and very advanced applications and the technology. The paper aimed to spot light on the heavy minerals in Black Sand. Global Black Sand prices are expected to increase for this: Weak existing research regarding the important metals in Black Sand, increasing demand for it globally in the production of environment friendly energies, the decline in global export and the expected delay in some countries, it is difficult to recycle these heavy metals due the weakness of technologies in many countries of the world. All this will lead to an increase in the prices of the goods and products that are used by heavy elements in their manufacture in the future. The most important Countries producing heavy minerals of black sand are: China, California, Japan, India, Brazil, Canary Islands, Egypt and Miser land.

Materials and Methods

The samples collected from mountains adjacent to the red sea coast - Dried and grinned .

-Weight gram from sample in aluminum cups

- Mix with one gram of wax

-Pressed to make smooth palettes

- Read by XRF – Fluorescence instrument

X-R F Spectrometry instrument

The basic concepts and processes of x-ray physics that relate to x-ray spectrometry are presented. Special emphasis is on the continuum and characteristic x-ray well as on the interactions of phones with matter, In the letter, only major processes of the interactions are covered in details, and the cross sections for different types of interactions and the fundamental parameters for other processes involved in the emission of characteristic x-ray are given by the analytical expressions and/or in a tabulated form. Basic equations for the intensity of the characteristic x-ray for the different modes of x-ray spectrometry are also presented (4).

Samples collection

Samples were collected from mountains adjusted to the red sea coast . and analyzed by XRF instrument.

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Chemical analysis (5)

	Fe2O3 %	Ag ppm	Ni ppm	Th ppm	U ppm	Ce ppm	TiO2 %	ZrO2 %
Sample1	59.95	**965**	60.17	10035	343	39551	24.25	5.26
Sample2	62.12	**895**	61.01	989	410	3901	26.21	7.27
Sample3	55.69	**929**	58.29	10011	396	38992	23.10	5.30
Sample4	60.03	**990**	59.96	1102	399	3790	20.99	8.24
Sample5	61.01	**999**	61.0	1100	402	3803	25.12	4.21
Sample6	63.00	**1000**	60.96	999	340	3799	24.01	8.27
Sample7	54.33	**1006**	60.12	1008	401	3812	23.67	10.29
Sample8	59.23	**995**	59.09	997	321	3798	20.13	8.28
Sample9	60.21	**971**	58.16	1108	398	3911	21.98	6.30
Sample10	53.1	**1112**	60.13	1100	405	3536	23.23	7.31
Sample11	55.61	**967**	55.89	993	382	3803	25.08	9.26

Results and Discussion

Chemical analysis showed, Iron was the main component of Black Sand where the ratio reaches to 63%. Heavy and light industries based on it. It is one of the basic components of industrial strength. We also found gold and silver minerals in significant proportions, they are minerals of economic financial value and give the countries that produce them international prestige and economic prestige. Retile and Monazite were found in high proportions as well as medical technology and space craft technology. So they are classified as essential elements for technological develop as for uranium and thorium, they are radioactive elements and safety precautions must taken when you mine black sand because of its risks.

Recommendations

- Conducting further research and studies on the heavy elements in the Black Sand at the Red Sea region.

- Planning to establish industrial projects to take advantage of heavy metals.

- Work to implement safety measures to prevent emissions of heavy metals.

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التحليل العاملي لتحديد العوامل المؤثرة علي جودة الاداء الاكاديمي بالجامعات الحكومية والأهلية ودمدني – ولاية الجزيرة – السودان (2017- 2020م)

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مستلخص

تمثلت مشكلة البحث في تحديد اهم المتغيرات المؤثرة على جودة الاداء الاكاديمي ، حيث هدفت الدراسة الى معرفة اهم المتغيرات المؤثرة على جودة الأداء الاكاديمي من وجهة نظر إعضاء هيئة التدريس . اتبع الباحث المنهج الوصفي التحليلي تم جمع البيانات بواسطة استمارة اعدت لغرض جمع البيانات من المبحوثين بجامعة الجزيرة وجامعة القران الكريم وجامعة ود مدنى الأهلية حيث احتوت على سته محاور كادأه لجمع البيانات من عينة البحث المكونة من 800 من عضاء هيئة التدريس ، وتم تحليل البيانات باستخدام برنامج الحزم الاحصائية للعلوم الاجتماعية (SPSS). وتوصلت الدراسة من تحليل المركبات الاساسية الى ان جميع المتغيرات هم بنفس الاهمية حيث ان الوسط الحسابى للعمر (38.93) بانحراف معياري (8.97) في الاعمار ما بين 20 الى 69 عام ، نخلص من تحليل المتغيرات أن هناك عشرون (20) مركبة مهمة لبدء صياغة خطة متكاملة لجودة الاداء الاكاديمي . من خلال اجراء التحليل العاملي ولاستخراج اهم العبارات من اختبار العينه تم استخراج قيم الشيوع وهي تقديرات للتباينات في كل مركبة بالنسبة للمركبات الأخرى ويلاحظ أن قيم الشيوع المستخرجة جميعها إما متوسطة أو عالية. توصلت الدراسه الى سته عوامل نظراً لكون قيمها العينية (الجزر الكامن) اكبر من (0.8) كما تم التوصل الى نسب تفسير التباينات من التباين الكلى لكل عامل.) والذى يمثل مصفوفة العوامل قبل التدوير والتى تتضمن سته (6). هم التوصيات هى ان تركز الجامعات على جانب التدريب والتدريب المتخصص في مجال الجودة.

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Abstract

The research problem was to determine the most important variables affecting the quality of academic performance, as the study aimed to know the most important variables affecting the quality of academic performance from the point of view of faculty members. The researcher followed the descriptive and analytical method. The data was collected by a form specially prepared for the purpose of collecting data from the respondents at the University of Gezira, the University of the Holy Qur'an, and the University of Wad Madani Al-Ahlia, as it contained six axes as a tool to collect data from the research sample consisting of 800 members of the teaching staff. Statistical Packages for Social Sciences. The study concluded from the analysis of the basic components that all the variables are of the same importance as the arithmetic mean of age is (38.93) with a standard deviation (8.97) for ages between 20 to 69 years. We conclude from the analysis of the variables that there are twenty (20) important components to start formulating an integrated plan. For the quality of academic performance. By conducting a factor analysis and to extract the most important expressions from the sample test, the values of the frequency were extracted, which are estimates of the variations in each vehicle with respect to other compounds. It is noticed that the values of the commonness extracted are all either medium or high. It turns out that we have reached six factors due to the fact that their sample values (latent islands) are greater than (0.8). Also, the percentages of interpretation of variances were obtained from the total variance of each factor. Which represents the matrix of factors before the rotation, which includes six (6) factors, and upon analysis and interpretation, in this formulation, each factor is dealt with separately, and the interpretation and analysis begins with each factor that has been accepted. They are the recommendations that

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universities focus on the training side and specialized training in the field of quality

مقدمة

يعرف التحليل ألعاملي بأنه أسلوب من أساليب التحليل الإحصائي متعدد المتغيرات حيث يصف ويفسر الظواهر أو الصفات للمتغيرات على أساس الوصول إلى أعلى درجة من المعلومات بأقل عدد من العوامل التي تعبر عن العلاقات بين المتغيرات بدلالة خطية أو غير خطية.

2. مشكلة الدراسة

شهدت مؤسسات التعليم العالى توسعاً كمياً فائقاً ، وارتبط التوجه الأهلى نحو التعليم العالى ، بالتطور الاقتصادى وتذايد أعداد الطلبه من خريجى الثانوية العامة ، وتصاعد درجة الوعى والانفتاح على مظاهر العولمة ، وشهد العالم في نصف القرن الماضى طفرة تعليمية كبيرة . لذلك تتبلور مشكلة البحث في الإجابة عن التساؤلات التالية:- ماهو اثر جودة الأستاذ الجامعي على جودة الأداء الاكاديمي؟ وماهو اثر جودة الادارة واثر المنهج الدراسى وتاثير الوسائل والتقنيات الحديثة على جودة الأداء الاكاديمي ؟وهل للعناصر المادية اثر على جودة الأداء الاكاديمي؟ وكيف تؤثر سمعة الجامعة ورضا المستفيد على جودة الأداء الاكاديمي؟.

3 . أهمية الدراسة

تستمد هذه الدراسة إهميتها من أهمية منهج الجودة في ضبط جودة الأداء الأكاديمى بالجامعات وبالتالى تحقيق أعلى درجات الجودة ومستويات أداء عالية لتلك المؤسسات مقارنة مع مثيلاتها في ذاك المجال . ومن ثم توجيه الموارد في الأتجاهات الصحيحة وبالتالى تطوير العمليات وتحسين الأداء إلى درجات جودة عالية وتلبية الحاجات الحالية والتطلع الى مستقبل مشرق .

4. أهداف الدراسة

الهدف الرئيسى : تحديد اهم المتغيرات المؤثرة على جودة الاداء الاكاديمى بالجامعات السودانية .

5. المنهجية

ان المجتمع الذى استهدف الدراسة بالبحث والتحليل هم اعضاء هيئة التدريس بجامعة الجزيرة وجامعة القران الكريم وجامعة ودمدنى الاهلية .يتكون مجتمع الدراسة من 800 من اعضاء هئية التدريس .تم جمع البيانات بواسطة استابة خصصت لجمع البنات من المبحوثين تحتوى على سته محاور بالاضافة الى البينات الشخصية

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للمبحوثين . وسيتبع البحث المنهج الوصفى التحليلى. أساليب التحليل: أستخدام أسلوب التحليل العاملى متعدد المتغيرات وقد تم التحليل بواسطة برنامج الحزم الاحصائية SPSS

6. حدود الدراسة

الحدود الجغرافية : السودان ولاية الجزيزة ودمدنى

الحدود الزمانية : اغسطس 2017م الي يوليو 2021م

7.الدراسات السابقة

أحمد , فائزة حاج علي الحاج , (2015)تطبيق إدارة الجودة الشاملة في الجامعات السودانية: الفرص والتحديات. يهدف هذا البحث إلى التعرف على مفهوم الجودة الشاملة وأهمية تطبيقه في مجال التعليم الجامعي في السودان وضرورة تحقيقه في الجامعات السودانية، كما يهدف أيضاً إلى استكشاف مدى ملاءمة النظام التعليمي الجامعي في السودان لتطبيق منهج إدارة الجودة الشاملة، وإلى معرفة أهم التحديات التي تواجه الجامعات السودانية نتيجة لعدم تطبيق المنهج. ويهدف كذلك إلى معرفة العلاقة بين منهج إدارة الجودة الشاملة وكفاءة المستوى الأكاديمي للخريجين. اتبعت الباحثة المنهج الوصفي التحليلي، استخدمت الاستبانة التي شملت عدة محاور تمثل في جوهرها أساس العمل الأكاديمي الإداري بالجامعة توصلت الباحثة للنتائج التالية: إن الفرص مواتية للجامعات السودانية عامة، لتطبيق منهج الجودة الشاملة،، ومن أهم التوصيات ضرورة اهتمام الجامعات بنشر ثقافة الجودة الشاملة وسط الأسرة الجامعية وتحقيقها من خلال إعادة النظر في رسالة الجامعة وأهدافها التي تضمن لها جودة مخرجاتها.

الورثان ، عدنان بن أحمد بن راشد (2015) مؤشرات قياس الأداء المؤثرة فى التعليم الجامعى: دراسة تحليلية فى ضوء مبادئ الاعتماد الأكاديمى هدف البحث إلى الكشف عن مؤشرات قياس الأداء المؤثرة في التعليم الجامعي من خلال دراسة تحليلية في ضوء مبادئ الاعتماد الأكاديمي. تناول البحث عدة نقاط، أولا: ضمان الجودة في قطاع التعليم العالي، حيث أن نشاط الجودة في قطاع التعليم العالي يتم من خلال التقويم والاعتماد في مؤسسات التعليم العالي في العالم. ثانيا: أنواع الاعتماد، حيث تم تصنيف الاعتماد وفق صفه الاعتماد إلى (التقويم او الاعتماد، الشهادة، الترخيص او التصريح) كما صنف الاعتماد وفق موضوع الاعتماد إلى (الاعتماد المؤسسي، الاعتماد التخصصي) ثالثا: معايير الاعتماد. رابعا: إجراءات تطبيق ضمان الجودة والاعتماد في التعليم، خامسا: معايير ومؤشرات الاعتماد في المؤسسات التعليمية الوطنية، سادسا: مقاييس

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الأداء، سابعا: تقييم الأداء الجامعي، ثامنا: مقاييس أداء التميز والتفوق الجامعي. توصلت نتائج البحث إلى أن فكرة اعتماد المؤسسات التعليمية تقوم على أساس أنه من حق المجتمع أن يتأكد ان هذه المؤسسات تقوم بدورها التي أنشئت من أجله بأفضل أداء ممكن، كما توصلت النتائج إلى انه توجد مجموعه من المحاور الضرورية والتي بدونها لا يمكن تطبيق نظام الاعتماد وتتمثل هذه المحاور في (ضرورة ان يكون للكلية رؤية واضحة ورسالة واهداف محددة وخطط وإمكانات مادية وبشرية، وبرامج لتدريب وتنمية قدراتها البشرية وإجراء بعض التعديلات في اللوائح والسياسات وخاصة فيما يتعلق بنظام القبول وتقييم الأداء. أوصى البحث بوضع معايير للاعتماد وربطها بمؤشرات قياس الأداء لضمان الجودة في جميع مجالات العمل في المؤسسات التعليمية سواء خدمية او إنتاجية او تعليمية او تربوية او إدارية او ماليه، كما أوصى بوضع منهجية لتقويم العملية التعليمية من خلال قياس مؤشرات الأداء لمدخلات وعمليات ومخرجات العملية التعليمية التعلمية.

8. الادبيات:

التعريف الشامل لمفهوم إدارة الجودة الشاملة:هو التطوير المستمر للعمليات الادارية وذلك بمراجعتها وتحليلها والبحث عن الوسائل والطرق لرفع مستوى الاداء وتقليل الوقت لانجازها بالاستغناء عن جميع المهام والوظائف عديمة الفائدة والغير ضرورية للعميل او للعملية وذلك بتخفيض التكلفة ورفع مستوى الجودة مستندين في جميع مراحل التطوير على متطلبات واحتياجات العميل (خضير ، 2003) .

المرحلة الاولي :

الفحص :كان تحليلات الجودة تركز فقط على المنتج ، وكان القرار الرئيسى السائد خلال تلك الحقبة هو القرار الخاص بتحديد متى يتم فحص المنتجات وماهو عدد المنتجات التى تخضع للفحص . وتتضمن عملية الفحص الانشطة المتعلقة بقياس واختيار وتفتيش المنتج وتحديد مدى مطابقة المنتج للمواصفات الفنية والموضوعية ، وبالتالى فان المنتجات المطابقة للمواصفات الفنية يمكن تسليمها الى العميل ، اما المنتجات غير المطابقة للمواصفات الفنية فانها ام تتلف او ان يعاد العمل عليها او يتم بيعها باسعار اقل ، ان عملية فحص المنتج كانت تركز فقط على اكتشاف الاخطاء والقيام بتصحيحها فالخطأ او العيب او التلف قد حصل فعلاً ، ان عملية الفحص اكتشفت الخطا ، ولكنها لم تقم بمنعه من الاساس .

المرحلة الثانية :

ضبط الجودة : يشمل ضبط الجودة على كافة النشاطات والاساليب الاحصائية التى تضمن المحافظة على مقابلة مواصفات السلعة . وكما يقول Dale Bester بان ضبط الجودة هو استخدام الادوات والقيام

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بالانشطة المختلفة لتطوير جودة السلعة او الخدمة ، وبالتالى فضبط الجودة يشمل التاكد من ان تصميم السلعة مطابق للمواصفات المحددة ، وبناء على ذلك فقد امتدت عملية ضبط الجودة لتشمل التصميم والاداء ويمكن القول ان هذه المرحلة اعتمدت على استخدام اساليب احصائية حديثة لمراقبة الجودة .

ووفقاً لهذا المفهوم فان ضبط الجودة يعتبر مرحلة متطورة عن الفحص فيما يتعلق بالاساليب وتطور الانظمة المستخدمة (خضير ، 2003) .

المرحلة الثالثة :

تاكيد الجودة: تركز هذه المرحلة على توجيه كافة الجهود للوقاية من حدوث الاخطاء وبالتالى وصفت المرحلة بانها تعتمد على نظام اساسة منع وقوع الاخطاء منذ البداية . فايجاد حل المشكلة عدم مطابقة المواصفات ليست طريقة فعالة ، حيث الافضل من ذلك هو منع وقوع المشكلة اصلاً والقضاء على اسبابها منذ البداية ، ان عملية تاكيد الجودة تتضمن كافة الاجراءات اللازمة لتوفير الثقة بان المنتج او العملية تفي بمتطلبات الجودة ، وبناء على ذلك فان اسلوب تفكير الادارة ينبغي ان يتغير ليطور فلسفة رقابية تعتمد على الوقاية بدلاً من الفحص واكتشاف الخطأ بعد فوات الاوان.ان تاكيد الجودة مرحلة تشمل بمنظورها عملية التخطيط للجودة بالاضافة الى ضرورة دراسة تكاليف الجودة ومقارنتها بالفوائد الممكن تحصيلها من تطبيق نظم تاكيد الجودة .

المرحلة الرابعة :

إدارة الجودة الشاملة: بدأ مفهوم إدارة الجودة الشاملة بالظهور في الثمانينات من القرن العشرين حيث يتضمن هذا المفهوم جودة العمليات بالاضافة الى جودة المنتج ، ويركز على العمل الجماعي وتشجع مشاركة العاملين واندماجهم ، بالاضافة الى تركيز على العملاء ومشاركة الموردين وهناك فروقات عديدة اجمالاً بين التقليدية وادارة الجودة الشاملة .

9. تحليل البيانات ومناقشة النتائج

1.9اختبار كفاية حجم العينة واختبار مصفوفة الارتباط

أ – اختبار كايزر ماير أولكن : يستخدم هذا الاختبار لاختبار مدى كفاية حجم العينة في تفسير الظاهرة المدروسة وتتراوح قيمته بين الصفر والواحد وكلما اقتربت قيمته من الواحد الصحيح دل ذلك على كفاية حجم العينة. ولكي يكون حجم العينة كافياً يجب ألا تقل قيمة الاختبار عن 0.80 . وبالنظر إلى جدول رقم(4.16) نجد أن قيمة اختبار KOM تساوي 906. مما يدل على كفاية حجم عينة الدراسة .

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ب - اختبار بارتلت : يستخدم لاختبار ما إذا كان مصفوفة الارتباط الأصلية مصفوفة الوحدة أم لا . فإذا كانت مصفوفة الارتباط الأصلية هي ليست مصفوفة الوحدة فيدل ذلك على وجود علاقات بين المتغيرات وهذا هو ما يطلب عند استخدام طريقة المكونات الرئيسة . وبالنظر إلى جدول رقم (1) نجد أن قيمة اختبارBartlett تساوي 7870.652 وبمستوى معنوية (0.000) وهذا يدل على أن الاختبار دال(معنوي) إحصائيا عند مستوى معنوية (0.01) وبالتالي نستنتج أن المصفوفة الارتباطية الأصلية ليست من نوع مصفوفة الوحدة. وعليه فقد تحقق شرط استخدام طريقة المكونات الرئيسة في التحليل وبالتالي التحليل العاملي .

جدول رقم (1): اختبار كفاية حجم العينة واختبار مصفوفة الارتباط

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		**0.906**
Bartlett's Test of Sphericity	**Approx. Chi-Square**	**7870.652**
	Df	**190**
	Sig.	**.000**

المصدر : المسح العيني لأعضاء هيئة التدريس بالجامعات 2020

من خلال اجراء التحليل العاملي ولاستخراج اهم العبارات من الجدول أعلاه سيتم استخراج قيم الشيوع وهي تقديرات للتباينات في كل مركبة بالنسبة للمركبات الأخرى ويلاحظ أن قيم الشيوع المستخرجة جميعها إما متوسطة أو عالية.

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2.9 التباين المفسر الكلي

التباين المفسر في الحل للمركبات المستخرجة والمركبات المداورة تظهر في الجدول (3) . بالنسبة للعمود الأول (TOTAL) يعني القيم المميزة (حجم التباين في المركبات الأصلية والتي تمثله كل مركبة في الحل المبدئي) . اما بالنسبة للعمود الثاني يعني النسبة المئوية لتأثير كل مركبة في التباين الكلي . اما العمود الثالث فهو يمثل النسبة المئوية التراكمية لتباين أي مركبة من جملة التباين الكلي ونلاحظ هنا ان مجموع المربعات في الحل المبدئي يساوي عدد المربعات المدخلة . وبما اننا حددنا الحد الأدنى للقيم المميزة بالواحد الصحيح $\lambda = 0.8$ فإن العوامل الرئيسية الستة الأولى هي المستخلصة وهي التي لها اكبر تباين كلي مفسر في قيم الشيوع للحل المبدئي. ويلاحظ ان المركبة الأولى لها نسبة التأثير الأعلى من بقية المركبات العشرون الداخلة في النموذج وذلك لأن المركبة الأولى لها نسبة تفسير 20.909 % علماً بان نسبة التباين المفسر الكلى تساوى 71.871% وبذلك تكون هذه النسبة هى عبارة عن مجموع التفسير الكلى لجودة الاداء الأكاديمي من وجهة نظر الاستاذ الجامعي في الجامعات الحكومية والاهلية بمدينة ودمدني - ولاية الجزيرة. ومن اهم المركبات: (تخصيص الوقت اللازم لاستخدام الوسائل والتقنيات الحديثه - توظيف ادوات التقنية الحديثة - ارتباط المنهج مع احتياجات المجتمع - الصيانة المستمرة مع مستوى نظافة مقبول - اختيار موضوعات المقرر الضرورية - ارتباط المنهج بثقافة المجتمع)

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جدول (2): التباين الكلى المفسر									
	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	7.988	39.940	39.940	7.988	39.940	39.940	4.182	20.909	20.909
2	2.127	10.637	50.577	2.127	10.637	50.577	2.963	14.816	35.725
3	1.359	6.796	57.373	1.359	6.796	57.373	2.309	11.546	47.270
4	1.126	5.629	63.002	1.126	5.629	63.002	1.710	8.549	55.819
5	.924	4.621	67.623	.924	4.621	67.623	1.626	8.130	63.950
6	.850	4.248	71.871	.850	4.248	71.871	1.584	7.921	71.871
7	.714	3.569	75.441						
8	.667	3.335	78.775						
9	.578	2.891	81.666						
10	.516	2.578	84.244						
11	.485	2.423	86.667						
12	.429	2.146	88.813						
13	.392	1.961	90.774						
14	.347	1.734	92.508						
15	.327	1.633	94.142						
16	.282	1.411	95.552						
17	.255	1.275	96.828						
18	.233	1.167	97.995						
19	.213	1.065	99.059						
20	.188	.941	100.000						

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جدول (3) ملخص نتائج التحليل العاملي للمركبات الرئيسية

المركبة	القيم المميزة	قيم الشيوع	النسبة المئوية للتحميل
تخصيص الوقت اللازم لاستخدام الوسائل والتقنيات الحديثة	7.988	.819	39.940
توظيف ادوات التقنية الحديثة	2.127	.806	50.577
ارتباط المنهج مع احتياجات المجتمع	1.359	.804	57.373
الصيانة المستمرة مع مستوى نظافة مقبول	1.126	.798	63.002
اختيار موضوعات المقرر الضرورية	.924	.794	67.623
ارتباط المنهج بثقافة المجتمع	.850	.794	71.871

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اتضح اننا قد توصلنا الى سته عوامل نظراً لكون قيمها العينية (الجزر الكامن) اكبر من (0.8) كما تم التوصل الى نسب تفسير التباينات من التباين الكلى لكل عامل.

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جدول (4) مصفوفة العوامل بعد التدوير

Rotated Component Matrix[a]						
	Component					
	1	2	3	4	5	6
اختيار موضوعات المقرر الضرورية					.860	
الالتزام بالمظهر				.835		
الاتصاف بالعدل والانصاف				.780		
اسلوب وفكر الادارة						
تحفيز الاستاذ ماديا			.785			
تحفيز الاستاذ معنويا			.733			
الارتباط بين الحوافز المادية والمعنوية			.780			
الاهداف قابلة للقياس		.573				
المناهج والمقررات مواكبه لمتطلبات سوق العمل		.756				
ارتباط المنهج مع احتياجات المجتمع		.837				
ارتباط المنهج بثقافة المجتمع		.809				
تخصيص الوقت اللازم لاستخدام الوسائل والتقنيات الحديثه						.772
توظيف ادوات التقنية الحديثة						.764
عدد كاف من معامل الحاسوب	.776					
مكاتب مناسبة لاعضاء هيئة التدريس	.836					
تقديم الخدمات لكافة مؤسسات المجتمع	.612					
استجابة الجامعة للمقرحات والشكاوى	.577					
تحديد متطلبات المقرر منذ البداية					.820	
مدرجات وقاعات بحث جيده	.768					
الصيانه المستمرة مع مستوى نظافة مقبول	.847					
Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.						
a. Rotation converged in 6 iterations.						

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من الجدول (6) اعلاه والذى يبين مصفوفة العوامل بعد التدوير يمكننا تفسير العوامل الستة على النحو الاتي : -

العامل الاول : يضم هذا العامل ستة متغيرات ويسهم في تفسير (20.909%) من التباين الكلى وياتى في المرتبة الاولى .

العامل الثانى : يضم هذا العامل اربعة متغيرات ويسهم في تفسير (14.816%) من التباين الكلى وياتى في المرتبة الثانية.

العامل الثالث : يضم هذا العامل ثلاثة متغيرات ويسهم في تفسير (11.546%) من التباين الكلى وياتى في المرتبة الثالثة

العامل الرابع : يضم هذا العامل متغيرين ويسهم في تفسير (8.849 %) من التباين الكلى وياتى في المرتبة الرابعة.

العامل الخامس : يضم هذا العامل متغيرين ويسهم في تفسير (8.130 %) من التباين الكلى وياتى في المرتبة الخامسة .

العامل السادس : يضم هذا العامل متغيرين ويسهم في تفسير (7.921 %) من التباين الكلى وياتى في المرتبة السادسة .

10 الخاتمة والتوصيات

1.10 الخاتمة

تتمثل اهداف الدراسة في معرفة اهم المتغيرات المؤثرة على جودة الأداء الاكاديمي من وجهة نظر إعضاء هيئة التدريس . تم جمع البيانات بواسطة استمارة اعدت خصيصاً لغرض جمع البيانات من المبحوثين حيث ضمت الاحصاء الوصفى للمبوحثين بواقع عشره اسئله وسته محاور تم فيها استخدام المنهج الوصفى التحليلى للبيانات واستخدام اسلوب التحليل العاملى لتحديد اهم المتغيرات وتم تحليل البيانات عبر برنامج الحزم الاحصائية للعلوم الاجتماعية . وتوصلت الدراسة من تحليل المركبات الاساسية الى ان جميع المتغيرات هم بنفس الاهمية حيث ان الوسط الحسابى للعمر (38.93) بانحراف معياري (8.97). من خلال اجراء التحليل العاملي ولاستخراج اهم العبارات من اختبار العينه تم استخراج قيم الشيوع وهي تقديرات للتباينات في كل مركبة بالنسبة للمركبات الأخرى. اتضح اننا قد

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توصلنا الى سته عوامل نظراً لكون قيمها العينية (الجزر الكامن) اكبر من (0.8) كما تم التوصل الى نسب تفسير التباينات من التباين الكلى لكل عامل.) والذى يمثل مصفوفة العوامل قبل التدوير والتى تتضمن سته (6) عوامل وعند التحليل والتفسير فانه يتم في هذا الصياغ التعامل مع كل عامل بصورة منفصلة ويتم البدء بالتفسير والتحليل مع كل عامل تم قبوله .

2.10 التوصيات

1. ان تركز الجامعات على جانب التدريب والتدريب المتخصص في مجال الجودة.
2. اهتمام الجامعات بجودة الاستاذ الجامعي من خلال المشاركة فى انشطة التنمية المهنية المناسبة بصورة مستمرة ويوظف الوسائل التعليمية الحديثة ومهارات التعلم الالكترونى فى التدريس.
3. اهتمام الجامعات بالبحث العلمي ويجب ان يكون للادارة فكر واسلوب يعكس اسلوب الجودة في الجامعة المعنية وايضا يجب ان تتنوع اساليب واداوات التقييم داخلها وتوظيف اداوات التقنية الحديثة حسب متطلبات المقرر المعنى وان يكون هناك عدد كاف من معامل الحاسوب وتقدم الجامعة خدماتها الى كافة مؤسسات المجتمع بعدالة ودون تمييز

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Toxcicity of the Ethanolic Extract of Jimson Weed (Datura stramonium L.) on Albino Laboratory Mice (Mus musculus L.)

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Abstract

Rats and mice belong to the suborder Myomorpha, family Muridae are the most feared pests. They attack food crops and stored products, destroy or weaken man's constructions and cause health problems. This study was designed to investigate aspects pertaining to Datura (*Datura stramonium* (L.) seeds contents as a botanical rodenticide, aiming to open new horizons in the area of chemical ecology by using Sudanese indigenous plants in the field of crop protection. The experiments were carried out in Central Laboratory for Veterinary Research, Suba, Khartoum, Sudan, in Season 2019 to assess the effect of the Ethanolic extract of datura seeds on albino laboratory mice (3 males and 3 females for each dose). Using four doses (0.33, 1.00, 2.00 and 3.33) mg and distilled water for the control treatment, Complete Randomized Design (CRD) was followed in data analysis and Duncan's Multiple Range Test (DMRT) was used in the comparison of means. Toxicity evaluation was done through certain measurements these were: calculating LD_{50}, LD90 monitor toxicity symptoms and mice activity, weight before and after treatment and blood test. Death occurred 2, 3, and 5 albino mice were scarified after treatment corresponding to dosage levels of 1.00, 2.00 and 3.33 mg /mice respectively. No death cases were recorded at 0.33mg dose and the control treatments. LD_{50} and LD_{90} values were calculated (LD_{50} (1.9 g/kg)) (LD_{90} (9.1 g/ kg) In general the results revealed that significant differences between doses and the control treatment. Also the results showed an increase in toxicity symptoms coinciding with increasing in the doses as well as lack of motor activity. Weight loss has been observed in dose 1.00 mg/g, 2.00 mg/g, 3.33

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mg/g and slightly decrease in dose 0.33 and control treatment . Also there were Changes in the total blood count compared to the control treatment.

Key words: Jimson weed, albino mice, ethanolic extract, bioassay.

المستخلص

الفئران والجرزان من أكثر الثديات ضرراً تهاجم المحاصيل الزراعية والمنتجات المخزونة وتدمر أو تضعف المنشآت وتسبب مشاكل صحية للإنسان.. صممت هذه الدراسة لمعرفة الجوانب المتعلقة بمحتويات بذور السيكران بوصفه مبيد من اصل نباتي، بهدف فتح افاق جديدة في مجال الكيمياء البيئية باستخدام النباتات المحلية السودانية في مجال وقاية المحاصيل . اجريت التجربة في المعمل المركزي للبحوث البيطرية سوبا – الخرطوم - السودان العام م2019 لتقييم تأثير المستخلص الكحولي لبذور نبات السيكران على الفئران (ثلاثة ذكور وثلاث إناث للجرعة الواحدة) باستخدام أربع جرعات (0.33, 1.00 ,2.00, 3.33) ملجم/جم من وزن الجسم وتم استخدام الماء شاهدا، تم إعطاء الجرعات عن طريق الفم بواسطة حقنة. تم استخدام التصميم العشوائي الكامل لتحليل البيانات ودنكن لمقارنة المتوسطات .القياسات التي تم اخذها هي مراقبة اعراض السمية وتم حساب LD_{50} وLD_{90} والنشاط الحركي بعد المعاملة والوزن قبل وبعد المعاملة واخذت عينات لاختبار الدم. بشكل عام أظهرت النتائج وجود فروقات معنوية بين الجرعات والشاهد كما اظهرت النتائج زيادة في أعراض السمية وقلة النشاط الحركي كلما زادت الجرعة. حدث أيضا فقدان في الوزن في الجرعات (1.00, 2.00, 3.33) ملجم/جم من وزن الجسم وزيادة طفيفة في الجرعة 0.33 ملجم /جم من وزن الجسم وفي الشاهد مجموعة التحكم أو السيطرة. كما كان هناك تغيرات في تعداد الدم الكلي مقارنة بالشاهد غير المعامل (الكنترول) .حدثت وفيات بعدد 2 , 3 , 5 بعد المعاملة في الجرعات 1.00,2.00 ,3.33 على التوالي ,وتم حساب قيم LD_{50} (1.9 ملجم/جم)، LD_{90} (9.2ملجم/جم).

Introduction

Rodents have been pests of mankind since the dawn of civilization. They damage human dwellings, stored products and cultivated crops. In some under-developed countries, where it is necessary to store grain in the open, as much as 20% may be consumed by rats (Ware, 1978). The extensive use of pesticides to control such pests has created many problems. Acute, chronic and long –term effects of exposure to pesticides are described, including cancer, genotoxic reproductive, neurotoxic, respiratory and immunotoxic effects. Disruption of endocrine system, other systemic organs (liver, kidney, blood forming system)

and the skin are also mentioned. Pesticides that often implicated in symptomatic diseases are organophosphates, pyrethrins and pyrethroids, carbamate insecticides, organochlorine insecticides, phenoxy herbicides and acute anticoagulants rodenticides (Maroni *et al.*, 2001). At the same time, and because of the continuous and universal use of Warfarin for the past 50 years, most domestic rodents have developed some resistance to it and to the other related Coumarins. Some have also developed cross- resistance to the Indane-dione rodenticides. Of the several rodent species, the Norway rat (*Rattus norvegicus*) has become the most resistant one, especially in larger cities (Ware, 1978).Many rodenticides have been restricted due to the problems of handling safety and to their residual environmental hazards extending beyond acute toxicity, while natural products are likely to be more rapidly degraded and exhibit increased selectivity (Bala, 1996). Plants develop a number of novel secondary metabolic pathways to produce several noxious compounds to withstand and to protect themselves from herbivores attack. These compounds represent an enormous diversity of biodegradable biologically active ones. Screening of plants preparations, followed by bioassay - guided fractionation are considered as successful methods for the discovery of new products (Bala, 1996).

Datura stramonim known by the common names jimson weed or datura is believed to have originate in Americas, but is now found around the world. *D. stramonium* is a foul-smelling, erect annual, freely-branching herb that farms a bush up to 2-5 ft. (1-1.5m) tall.All part of Datura plants contain dangerous levels of the Tropane alkaloids Atropine, Hyoscyamine and Scopolamine which are classified as deliriants, or anticholinergic (Pressel and Hans, 2002). Traditionally it has an important medicinal value throughout the world. Its leaves and seeds are used in different treatment recipes as both the poisonous and medicinal uses

(Aqib and Mohit, 2013).Datura has long been used as an extremely effective treatment for asthma symptoms. The active anti- asthmatic agent is atropine, which causes paralysis of the pulmonary branches of the lungs, eliminating the spasms that cause the asthma attacks. The leaves are generally smoked either in cigarette or pipe. This practice of smoking Datura to relieve asthma has its origins in traditional Ayurvedic medicine in India. After this was discovered during the late 18th century by james Anderson, the English physician-general of the East India company, the practice quickly became popular in Europe. Other medicinal uses for Datura included stimulating abortions, providing relief from sore throat or toothache, and getting rid of parasites (Pennachio 2010). In Sudan, Datura is used as anti-spasmodic, hypnotic and narcotic medicinal plant (Broun and Massey, 1929).

Objectives of the study

The problem was approached through:

i. Rearing albino laboratory mice, *Musmusculus*.
ii. Preparation of Datura seeds powder (DSP) followed by preparation of *Datura* seeds Ethanolic extract (Eth – Extr.).
iii. Bioassay of the extract on the adult albino mice.

Materials and Methods

Site of the experiment

The experiment was carried out at Central Veterinary Research Laboratory, Khartoum, Sudan.

Experimental animals

Laboratory albino mice (*Musmusculus*)115 days age-old at an average weight of 20 g were obtained from the Small Animals Unit - Central Veterinary

Research Laboratory . The rearing cages were placed in the small animals laboratory at room temperature. A diet composed of sorghum grains, *Sorghum bicolor*, was provided daily.

Tested materials

Plant collection and preparation

The plant of Jimson weed (*Datura stramonium* L) were collected from Fadasi, North of Wad Medani town and dried under shade. Jimson weed seeds powder was prepared by using an electrical blender .

Preparation of Datura Seeds Ethanolic extract (Eth. Extr)

One hundred grams of Jimson weed seeds powder were flooded in one liter of ethanol for three days in the darkness , then the solution was filtered by using Buhnner funnel connected to air discharge device. The remaining residues were dried and weighed. The resulting filtrate was poured in a petri dish and left for seven days in darkness to ensure the alcohol evaporation. Datura Seeds Ethanolic extract concentration was calculated by dividing Seeds powder weight to volume.

The calculation procedure was as follows:

Actual weight of powder dissolved in 2 L ethanol = 6 g.

In 1 L. = 6 / 2 = 3 g.

In 1 ml. = 3 /1000 = 0.003 g /ml = 3 mg/ml.

Bioassay

The experimental animals were divided into five groups ; G1, G2, G3, G4 and C control Treatment, each group contains six mice (3 males and 3 females) . Datura Seeds Ethanolic extract (Eth. Extr) was inoculated orally using intubation method for each mice group). Four dosages were selected according to preliminary screening tests with concentrations of 0.33, 1.00, 2.00 and 3.33

mg/mice for G1, G2, G3 and G4 respectively. Mice of group (C) were inoculated with distilled water. The treated mice were followed up for 24 hrs so as to observe the toxicity symptoms, and to determine the mortality rate percentage. Visual evaluation of signs of pain and distress and symptoms of morbidity and moribund condition was done in accordance to protocol set by Rand (2001). Other parameters such as body weight, (Arterial sampling) and activity tests, were also measured to serve as indices for both lethal and sub-lethal effects of the tested aqueous extract.

Statistical analysis

LD_{50} and LD_{90} values were calculated by the probit analysis (Finney, 1990).Complete Randomized Design (CRD) was followed in data analysis and Duncan's Multiple Range Test (DMRT) was used in the comparison of means.

Results and Discussion

Acute Toxicity of Datura Seeds Ethanolic Extract (Eth.Extr)

Treated albino mice were follow up for 24 hrs so as to observe acute toxicity symptoms. Death occurred 2, 3 and 5 albino mice were died after treatment corresponding to dosage concentration levels of 1.00, 2.00 and 3.33 mg/mice respectively. No death cases were recorded at dosage concentration of 0.33 mg (G1) and the control treatment (C). Dosing list of average weights and corrected moralities are given in (Table 1). Calculated LD_{50} and LD_{90} regression line equation and Fiducial limits are given in (Table 2).

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Table 1. Acute toxicity of Datura Seeds Ethanolic extract (DS. Eth.Extr.) to albino laboratory mice *Mus musculus*.

Albino mice		Crude extract		Corrected mortality (%)
Group	Average weight (g)	Concentration mg/ml	Amount administration Dosage mg/mice	
C	18.6	-	-	0
G1	17.7	3	0.33	0
G2	20.0	3	1.00	33.3
G3	19.3	3	2.00	50
G4	22.8	3	3.33	83.3

Table 2. LD_{50} and LD_{90} values (g/kg) of Datura Seeds Ethanolic extract (DS. Eth. Ext.) to albino laboratory mice *Musmusculus*.

Lethal dose	Dose (mg / g orally)	Fiducial Limits at 95% (mg/g)	Equation of regression line
LD_{50}	1.9	0.824-3.585	Y= 5.806 X +3.381
LD_{90}	9.1	6.319-11.861	

Symptomatic signs of toxicity

The experimental mice were showed the following symptoms immediately after inoculation with the Datura Ethanolic extract : idle, fatigue and recumbent position with head tucked into abdomen. Reduced exploratory behaviour, protrusion of eyes, irritation and roughness in the hair. Symptoms occurred directly before death were, rapid breathing rate, hunched posture anorexia, impaired ambulation, muscle atrophy, lethargy and inability to remain upright. These symptoms were typical to those suggested by Rand (2001) (Table 3 and 4) . All of these symptoms appeared but their severity differed from dose to another.

Table 3. Species typical signs of pain and distress in laboratory animals reported by Rand (2001).

Mild to moderate pain	Severe or chronic pain/distress
1) Eyelids partially closed	1) Eye closed.
2) Porphyrin staining around eyes	2) Weight loss
3) Increase aggression towards cage mates liking - biting – scratching – guardining.	3) Depressed unresponsive animal.
4) Reduced exploratory behavior.	4) Sunken or distended abdomen
5) Hunched posture.	5) recumbent position with head tucked into abdomen
6) Sudden running movement.	
7) Change in respiration.	
8) Rough hair coat and hair loss	

Table 4. Signs and symptoms for judging morbidity and moribund condition reported by Rand (2001).

Morbidity (disease/illness)	Moribund condition (state of dying)
1) Rapid breathing rate.	1) Impaired ambulation (unable to reach food and water).
2) Hunched posture.	2) Muscle atrophy.
3) Anorexia (loss of appetite)	3) Signs of lethargy drowsiness - aversion to activity - lack of physical or mental alertness.
4) Diarrhea.	4) Difficulty breathing.
	5) Inability to remain upright.
	6) Emaciation (body weight is not always appropriate).
	7) Prolonged anorexia.

Effect on weight

Mean averages of albino mice before treatment were 18.6 g ,17.6, 20, 19.3, 22.8 and corresponding to dosage levels of DS. Eth. Extr. 0.00, 0.33, 1, 2 and 3.33mg/mice treatment respectively. Mean average weights of albino mice post treatment were 21.5, 18.8, 17.8,18.6, 20.1g corresponding to the administered dose levels of DS. Eth. Extr. respectively (Table 5)

The statistical analysis indicated that differences between DS. Eth. Extr. treatments were significant (Table 5). Comparison of pre-test mean average weights of various albino mice with the mean averages weights after treatment

indicated that, there was a slight reduction in the average weights of the treated albino mice. These results can be attributed to the antifeedant effect of the Ethanolic extract, consequently resulted in body weight loss. There was a slight increase in average weights of albino mice treated with the lowest dosage of 0.33 mg of the extract as the treated mice might have tolerated and were not affected by this dose.

Table 5. Mean average weights of albino laboratory mice pre and post treatment with Datura seeds Ethanolic extract (DS. Eth. Extr.).

Mice group	Treatments dosage levels (mg/mice)	Pre-test mean average weights/ g	Post-treatment mean average weights / g
C	0.00	18.6	21.5a
G1	0.33	17.6	18.8b
G2	1.00	20.0	17.8b
G3	2.00	19.3	18.6ab
G4	3.33	22.8	20.1ab

Means followed by the same letters are not significantly different at probability of 5%

Effect on activity

Means of activity counts per 20 visits were recorded as 10.3, 8.3, 6.6 and 4 corresponding to the dosage levels 0.33, 1.00, 2.00 and 3.33 mg respectively while 16.2 counts per 20 visits were recorded for the control group (Table 6). Symptomatic signs occurred after treating albino mice were impaired ambulation, muscle atrophy, emaciation, lethargy, inability to stand upright, which were typical to the symptoms of morbidity and moribund conditions of laboratory animals reported by Rand (2001). It is obvious that the extract has affected the muscular system, digestive system, respiratory system and nervous system. It is clear that the activity was dose dependent as it decreased with the high dosage levels. Survivors which tolerated low dosage levels regained their normal activity more rapidly than those exposed to high dosage levels (Table 6).

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Table 6 : Effects of different dosage levels of Datura Seeds Ethanolic extract (DS. Eth. Extr.) on the activity of albino laboratory Mice (Musmusclus).

Mice group	Dosage (mg/mice)	No of survivors	No. and Sex	Average activity counts / 20 visits	
				Active	Resting
C	0.00	6	3M, 3F	16.2	3.8
G1	0.33	6	3M, 3F	10.3	9.7
G2	1.0	4	1M, 3F	8.3	11.7
G3	2.0	3	1M, 2F	6.6	13.3
G4	3.33	1	- 1F	4	16

M=Male. F=Female.
Means followed by the same letters are not significantly different at probability of 5%

Effect on blood count and feature

The result of red blood cell count (RBC), Hemoglobin (Hemo) and hematocrit (PCV) are related because they each measure aspects of red blood cells.

Results showed a decrease in RBC , HEMO, PCV which it's reflecting on decreasing activity of tested animals and causes fatigue and weakness (.on the other hand there is an increase in white blood cell count (Table 7).

Table 7. Effects of different dosage levels of Datura Seeds Ethanolic extract (DS.Eth. Extr.) on blood components of albino laboratory Mice (Musmusclus).

Mice group	Blood Parameters								
	PCV	Hemo.	RBC	WBC	LY	NE	Eos	BA	**Mo**
C	47	15.6	85066	2600	48	48	2	1	2
G1	46	15.3	82800	2800	45	50	1	2	3
G2	44	13.7	78100	3100	27	65	2	1	3
G3	41	13.3	74133	3500	21	66	4	2	4
G4	40	12.6	60633	3833	24	67	5	2	4

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Conflict of interests and ethical approval

We declare that we are the authors of this paper have no any kind of conflict of interest regarding publishing the findings of this research,as it followed all kind of international ethical approval methods.

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Anomaly Detection Using Data Mining Techniques: Case Study (Credit Card Fraud Detection)

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Abstract:

Due to the continuous economic growth and the increase in e-commerce sites and other sites that require online payment, the credit card has become very necessary in our lives these days. With the increase in the use of online payment methods, the problem of credit card fraud has increased and therefore there has been a major challenge for banks and online payment service providers to know about fraud transactions. Fraud detection in a credit card is a data mining issue, which is difficult due to two primary factors – first, patterns of legitimate and fraudulent activity frequently shift and, secondly, due to the fact that credit card fraud data sets are heavily distorted. In this study, we designed a model to detect the fraud activity in credit card transactions, three supervised methods were presented including Random Forest, Logistic Regression and Gradient Boosted classifiers. Results suggest that each algorithm can be used extremely accurately to detect credit card fraud. In this paper we worked with European credit card fraud dataset. After the analysis of the dataset we got the accuracy of 99.96% by Random Forest, 99.92% by Logistic Regression and 99.94% by Gradient Boosted algorithm.

Keywords:

Fraud detection, Credit Card, transactions, machine learning, Support Vector Machine, Random Forest, Gradient Boosted.

المستخلص:

نظراً للنمو الإقتصادي المستمر والزيادة في مواقع التجارة الإلكترونية والمواقع الأخرى التي تتطلب الدفع عبر الإنترنت ، أصبحت بطاقة الإئتمان ضرورية جداً في حياتنا هذه الأيام. مع زيادة إستخدام طرق الدفع عبر الإنترنت ، إزدادت مشكلة الإحتيال على بطاقات الإئتمان ، وبالتالي كان هناك تحد كبير أمام البنوك ومقدمي خدمات الدفع عبر الإنترنت لمعرفة معاملات الإحتيال. يعد إكتشاف

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الإحتيال في بطاقة الإئتمان مشكلة تتعلق بالتنقيب عن البيانات ، وهو أمر صعب بسبب عاملين أساسيين – أولاً ، تتغير أنماط النشاط المشروع والإحتيالي بشكل متكرر ، وثانياً ، نظراً لحقيقة أن مجموعات بيانات الإحتيال في بطاقات الإئتمان مشوهة بشدة. في هذه الدراسة ، قمنا بتصميم نموذج للكشف عن نشاط الإحتيال في معاملات بطاقات الائتمان ، وتم تقديم ثلاث طرق خاضعة للإشراف بما في ذلك مصنف الغابة العشوائية (Random Forest) و الإنحدار اللوجستي (Logistic Regression) و تعزيز الدعم (Gradient Boosted) ، تشير النتائج إلى أنه يمكن اعطي كل الخوارزميات دقة عالية للكشف عن الإحتيال في بطاقة الائتمان. في هذا البحث تم العمل علي مجموعة بيانات الإحتيال في بطاقات الإئتمان الأوروبية. بمقارنة مع الخوارزميات المقترحة مع بعض ، تم التوصل إلي أن خوارزمية الغابة العشوائية حققت أفضل النتائج وكانت فعالة في تحقيق أعلى دقة بنسبة 96.90% ، وهذا يشير إلى أن هناك فرصة بنسبة 96.90% للتنبؤ فعلياً بمعاملة إحتيالية ، في حين أن تعزيز الدعم و الغابة العشوائية أكثر فاعلية في إعادة الإستدعاء (Recall) ، وهذا يعني أن هناك إحتمالاً يزيد عن 80% أن تكون المعاملة الإحتيالية المتوقعة صحيحة بالفعل.

من النتائج السابقة يتضح أن خوارزمية الغابة العشوائية لها أعلي النتائج بنسبة 99.96%.

1. Introduction:

Across the globe, there are growing numbers of new companies (Husejinović 2020). Each of these businesses are seeking to give their customers the highest standard of service (Dejan Varmedja *et al*., 2019). Credit card typically refers to a card issued to the customer (cardholder), normally allowing those to buy credit-limited products and services or withdraw cash in advance (Dornadula and Geetha 2019). Card payments in these days are very common form of payment. Card payments on the merchant side are very easy to make by presenting a credit card or on the internet by announcing credit card details: number, expiry date and security code (Husejinović, 2020).

Fraud in credit card transactions is use of an identity by someone other than the account owner and it is illegal and unwanted (Maniraj *et al*., 2019). Such transactions are conducted through gateways of third parties, such as CCAvenue, ICICI Payseal, and PayPal etc. Using the physical card during online payment period is not necessary, only few information concerning the card is sufficient (Kolli *et al*., 2019). One of the ways in which credit card fraud occurs is through access to stolen credit cards, and the other is through the use of card details via an online transaction without the knowledge of the actual card holder. These are not the only challenges to the implementation of a system to detect fraud in the real world. In the real world, there are examples where the

massive flow of payment requests is quickly examined by automated tools that define transactions that need to be approved. Automated learning algorithms are used for tracking transaction behavior, to evaluate all accepted transactions and detect suspicious ones. Credit card transactions are classified into two categories of transactions which are fraudulent and legitimate. Anomalies are generated based on these two categories, and fraudulent transactions are discovered using machine learning algorithms (Kulkarni *et al*., 2019).

Data mining technique is one of the notable and common methods used to solve problem of credit fraud detection. Several techniques are developed and implemented to solve the detection of credit card fraud such as genetic algorithm, artificial neural network frequent item set mining, machine learning algorithms, migrating bird's optimization algorithm, comparative analysis of logistic regression, Support Vector Machine, decision tree and random forest is carried out (Khare and Yunus 2018). Huge financial losses have resulted in fraudulent effects not only on merchants and banks but also on the person using the credits (Vaishnave *et al*., 2019).

The aim of this paper is to examine various machine learning algorithms, such as Random Forest (RF), Logistic Regression Classifier (NBC) and Gradient Boosted (LGB) to determine the algorithm is most suitable for detecting credit card fraud. The actions of these anomalies can be analyzed and the final results compared to verify the best and most suitable algorithm for detecting credit card fraud (Dejan Varmedja & Others. 2019). The algorithm efficiency is measured using the following output matrices: Accuracy, Recall, Sensitivity, Specificity, Precision, F-measure, Cohen's kappa (k), Overall Error.

This paper analyzes the dataset which is taken from Kaggle (Dornadula and Geetha 2019). The dataset contains Credit card transactions which are made by customers during September 2013 in Europe. By monitoring the behavior of transactions, credit card transactions are categorized as fraudulent and non-fraudulent. This dataset includes 284,807 transactions where fraud is 492. There are 31 features in the dataset where 31st is a binary variable with 0 regular transactions and 1 as a fraud transaction.

In this system, each account is monitored separately using appropriate descriptors, and transactions are intended to be identified and flagged as legitimate or normal. The identification will be based on the suspected score produced by the classifier models developed. When a new transaction is underway, the classifier can predict whether the transaction is normal or fraudulent (Sahin and Duman 2011).

The remainder of this paper is structured as follows: Section 2 includes a thorough analysis of credit card fraud, identification of features and performance comparison. Section 3 gives a quick overview of the classification approaches used to build the credit card fraud detection system classification models set out in this paper and proceeds to include descriptions of our methodology. Section 4 presents the findings of the experiments and addresses comparative study. Section 5 concludes the comparative analysis and includes recommendations for possible research areas and sets out directions for future work.

2. Literature Review:

Many authors have dealt with the problem of card payment fraud detection using machine learning techniques. (Husejinović, A. 2020). Performed comparative study in credit card fraud detection techniques using Naive Bayes, C4.5 decision tree and bagging ensemble machine learning algorithms to predict outcome of regular and fraud transactions. The performances of algorithms are evaluated through following performance matrices: precision, recall and precision-recall (PR) curve area rate. dataset is imbalanced as result of low rate of fraud transaction dataset for that reason better indicator for algorithm performance is PR curve than receiver operating characteristic (ROC) rate.

(Dornadula and Geetha 2019). Illustrate the best way to handle imbalance dataset is to use one-class classifiers like one-class SVM. And they observed that Logistic regression, decision tree and random forest are the algorithms that gave better results to detect fraud in credit card.

Authors (Ali Shukur and Kurnaz 2019), tried using ensemble learning methods to construct a model with high recall score and accuracy of highly imbalanced real-world datasets. When dataset was preprocessing using normalization and

Principal element Analysis, both classifiers achieved more than 95.0% accuracy relative to the results obtained prior to preprocessing the data collection.

Similar research domain was presented by Authors (Vaishnave *et al*., 2019). Which designed a model for detecting fraud activity in credit card transactions. Where they have trained and tested datasets using a random forest algorithm and decision trees. The performance of the techniques is measured based on accuracy, sensitivity, and specificity, precision. Results are indicated that the Random Forest Algorithm will provide better results performance with many training data, but speed during testing and application will still suffer.

A study conducted to compare the performance of different unsupervised methods for the detection of credit card fraud (Rezapour, 2019). The advantage of mahalanobis methods over the other two method is that this method does not need to be trained on labeled data and it can identify anomalies based on the minimum covariance. For the future studies both global and local outliers need to be considered for those studies (Khare and Yunus 2018). Examines and tracks the performance of Decision tree, Random Forest, SVM and logistical regression on extremely distorted credit card fraud data. The results obtained thus conclude that the Random forest illustrates the most accurate and high accuracy of 98.6%. With a greater number of training data, random forest algorithm performs better, but speed will suffer during testing and application. It will also help to incorporate more pre-treatment procedures. The SVM algorithm still suffers from the imbalanced data set issue and needs more preprocessing to provide better results on the SVM results is fine, but it could have been better if more preprocessing was done on the data.

The proposed study by authors (Kolli *et al*., 2019) was compared to two existing random forest-based methods for two separate credit card repositories. The efficiency of the model was measured in terms of G-mean, Measure and Aera Under Curve values. The experimental results identified the potential of the proposed model rather than that of the other models.1 for effective detection of credit card fraud, cost-sensitive, random forest-based ensemble learning technique has been proposed by authors. Authors examined the imbalanced existence of credit card data. Misclassification Ratio Based Cost-Function has

been incorporated into the Error Formulation of the developed RF-Bagging Sub-Tress.

The experimental results obtained demonstrated the efficacy of the proposed model in the successful treatment of imbalanced cases in the case of credit card fraud detection.

The proposed model has not been validated for high-dimensional datasets. The proposed model can be expanded by integrating with a number of data-cleaning techniques such as sampling or feature selection (or extraction) algorithms to be applied in high-dimensional datasets.

3. Methodology:

In this study, we used three different Data Mining Techniques to detect fraud in credit card and classify transactions as fraud or legitimate transaction.

The tests are performed and the assessment of these studies is carried out using the confusion matrix and we analyze and evaluate the efficiency of the Random Forest, Logistic Regression and Gradient Boosted ensemble methods using metrics such as: accuracy, recall, sensitivity, specificity, precision, F-measure, Cohen's kappa(k) and Overall error. These algorithms are compared to determine which algorithms offer better results and can be adjusted to recognize fraud by credit card merchants (Lakshmi and Selvani 2018).

3.1 Random Forest Algorithm:

Random Forest algorithm is a supervised machine learning based algorithm that combines many decision trees together to achieve an effective outcome. Decision trees are generated by random forest algorithm based on data samples and the best solution is selected by voting (Abinayaa *et al*., 2020). On the other hand, A random forest is a meta estimator that its a number of decision tree learners on various sub-samples of the dataset and use averaging to improve the predictive accuracy and control over-fitting (Taha and Malebary 2020). Ensemble learning is an algorithm where the predictions are made by combining or labeling various models or related models multiple times. The random forest method operates in a specific manner that utilizes several algorithms, i.e. multiple decision trees, resulting in a forest of trees, thus the term "Random

Forest". The random forest algorithm can be used for both regression and classification tasks (Vaishnave *et al*., 2019). The number of trees in the forest and the outcomes are closely connected to each other as the higher number of trees in the forest contributes to better performance. This algorithm gives better results when there is higher number of trees in the forest and preventing model to over fitting. Each decision tree in forest gives some results. These results are merged together in order to get more accurate and stable prediction.

The following are the basic steps involved in performing the random forest algorithm

1. Choose N random dataset records.
2. Create a decision tree on the basis of these N data.
3. Choose the number of trees you want to use in your algorithm and repeat steps 1 and 2.
4. For classification issues, each tree in the forest determines the division to which the new record belongs. Finally, the new record will be assigned to the category that wins the majority vote (Niveditha *et al*., 2019).

3.2 Logistic Regression:

Logistic regression is a popular supervised learning classifier that is mostly used in data processing, disease detection and economic prediction. Logistic regression performance will determine the probability of a class. The default logistic regression threshold is 0.5 (Zhang *et al*., 2019).

Logistic Regression Model is a generalized form of Linear Regression Model. It is a very good Discrimination Tool. Logistic Regression is a well-set statistical technique because of predicting binomial or multinomial outcomes. Multinomial Logistic Regression algorithm will generate models when the target field is set with two or more potential values (Sahin, and Duman 2011).

Logistic Regression is used to predict binomial and multinomial outcomes for classification problems, with the goal of estimating values of the parameter coefficients using the sigmoid function. And it is used for clustering, and when a transaction is underway, it examines the values of its attributes and determines whether or not the transaction should proceed. Logistic regression comes into play in combating anomalies in linear regression where values greater than 1 and less than 0 were provided (Jain, *et al*., 2019).

Logistic regression is a form of probabilistic model of statistical classification and uses the logistic curve to detect fraud (Shirgave *et al*., 2019).

The picture below illustrates the steps that logistic regression goes through to give you your desired output.

3.3 Gradient Boosting Machine Learning:

GBM is a Gradient boosting framework that uses tree-based learning algorithms. It is designed to be distributed and efficient.

Gradient Boosting Machine (GBM) is based on the traditional Gradient Boosted Decision Tree (GBDT) algorithm, which can increase the training speed of GBDT model without losing its accuracy.

The high performance GBM algorithm can manage large volumes of data efficiently, as well as the distributed data processing. It had been developed by Microsoft as an open source project (Taha and Malebary 2020). GBM uses the Histogram algorithm and the Leaf-wise growth strategy to achieve this effect.

The idea of Histogram algorithm is to transform the continuous floating-point eigenvalues into discrete values (k) and construct a histogram with width k. The training data is then traversed, and the accumulated statistics are counted in the histogram for each discrete value. When selecting a feature, we simply need to traverse the histogram's discrete values to find the optimum segmentation point. GBM removes the level decision tree growth strategy that most GBDT use today, using a leaf-wise approach with limitations on depth. In addition, the level-wise is an inefficient algorithm, because it treats the leaves of the same layer unhindered, bringing a lot of unnecessary overhead.

Leaf-wise strategy finds the leaf with the highest split gain from all current leaves every time, then splits, and so on. As a result, compared to the level-wise, the leaf-wise can reduce more errors and improve accuracy in the same splitting times. Taking into consideration the overfitting caused by leaf-wise, GBM adds to the model a factor-the maximum depth limit.

Bearing in mind, GBM adds to the model a factor-the maximum depth limit. As a result, over-fitting can be avoided. Mean while, high efficiency can also be

guaranteed. GBM optimizes support for category features that could be entered directly without additional 0/1 expansion. The GBM algorithm includes several parameters, termed hyper parameters. The hyper parameters have a significant impact on the performance of GBM algorithm. GBM uses histogram-based algorithms, which bucket continuous feature (attribute) values into discrete bins. This speeds up training and reduces memory usage (Fang *et al.*, 2019). Illustrate how Optimization in Accuracy Leaf-wise (Best-first) Tree Growth. Most decision tree learning algorithms grow trees by level (depth)-wise.

GBM grows the leaf-wise (best-first) trees. The leaf with max delta loss will be chosen to grow. Keeping leaf set, leaf-wise algorithms tends to result in a lower loss than algorithms with level-wise.

When data is small, leaf-wise can cause overfitting, so that GBM includes the max depth parameter to limit the depth of the tree. However, even when defined to max depth, trees still grow leaf-wise.

Benefits of Gradient Boosting:

A. Faster training speed and higher efficiency.
B. Lower memory usage.
C. Better accuracy.
D. Support of parallel and GPU learning.
E. Capable of handling large-scale data.

Dataset Description:

First of all, we have collected our dataset from Kaggle, a data research platform that offers datasets (Maniraj *et al.*, 2019). This dataset contains transactions, occurred in two days, made in September 2013 by European cardholders (Dejan Varmedja *et al.*, 2019). Inside this dataset, there are 31 columns out of which 28 are named as v1-v28 to protect sensitive data.

The features include credit limit, gender, marital status, previous months bills, previous months payments, status of existing account, salary assignments, credit history, other credits existing, purpose, credit amount, present employment, savings account, personal status, other debtors, property, age in months,

Housing, number of existing credits, Job, Telephone, foreign worker, ID, Credit card number, PIN, Time, Amount and Class (Itoo and Singh 2020).

To hold such details private, the PCA transformation of these input variables was done.

Three of these features have not been transformed. The "Time" feature illustrates the time between the first transaction and any other transaction in the dataset.

Feature "Amount" is the amount of the transactions made by credit card. Feature "Class" represents the label, and takes only 2 values: value 1 in case of fraud transaction and 0 otherwise.

Dataset contains 284,807 transactions of which 492 transactions were frauds, and the remainder were actual.

Considering the numbers, we can see that this dataset is highly imbalanced, with just 0.173% of transactions being classified as frauds.

Given that class distribution ratio plays an important role in model accuracy and accuracy, data preprocessing is crucial.

Model Performance Metrics:

The basic performance measures derived from the confusion matrix. The confusion matrix is a 2 by 2 matrix table contains four outcomes produced by the binary classifier. Various measures such as sensitivity, specificity, accuracy and error rate are derived from the confusion matrix.

Trained Data and Testing Data is described in a confusion matrix that illustrates

- **TP**: True Positive which represents the specific data under which consumers are exposed to deception and used for training and have been projected correctly (number of fraudulent transactions correctly classified).
- **TN**: True Negative denotes the data which was not expected and doesn't match with the data which was subjected to the fraud (the number of legal transactions correctly classified).

- **FP**: False Positive is expected but there is no possibility of the data to be subjected to the fraud (the number of legitimate transactions incorrectly classified).
- **FN**: False Negative is not predicted but there is an actual possibility of the data who is subjected to fraud (number of fraudulent transactions incorrectly classified) (Vaishnave *et al.*, 2019).

Accuracy:

Accuracy is also known as the ratio of total number of transactions predicted which are right (Itoo and Singh 2020). On the other hand, Accuracy is determined as the total number of two correct predictions (TP+TN) divided by the total number of the dataset (FP+FN) (Venkata *et al.*, 2018).

$$\text{Accuracy} = \frac{TP + TN}{TP + FP + TN + FN} \qquad (1)$$

Sensitivity:

Sensitivity The proportion of positive values accurately estimated as positive. It is often named the True Positive Rate (TPR) (Itoo and Singh 2020). On the other hand, Sensitivity is calculated as the number of correct positive predictions divided by the total number of positives (Venkata *et al.*, 2018).

$$\text{Sensitivity (Recall)} = \frac{TP}{TP + FN} \qquad (2)$$

Specificity:

Specificity is described as how much accuracy the negative (Normal) cases are classified and in our case it gives the accuracy on classification of legitimate transactions. It is sometimes named called as True Negative Rate (TNR) (Itoo and Singh 2020).

On the other hand, Specificity is determined by dividing the number of right negative predictions by the total number of negatives (Venkata *et al.*, 2018).

$$\text{Specificity} = \frac{TN}{FP + TN} \qquad (3)$$

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Precision provides the accuracy in cases identified as fraud (positive) (Awoyemi, *et al*., 2017)

$$\text{Precision} = \frac{TP}{TP + FP} \qquad (4)$$

F-measure gives the research accuracy which implies it provides the consistency of the tests carried out. To measure the value, it uses both the accuracy and the recall. The optimal value for the f1 score is assumed to be 1 (Itoo and Singh 2020).

F1 score is harmonic mean of precision and recall. Value of F1 score lies between 0 to 1. Higher F1 score indicates good model.

$$\text{F-measure} = 2.\frac{Precision.Recall}{Precision + Recall} \qquad (5)$$

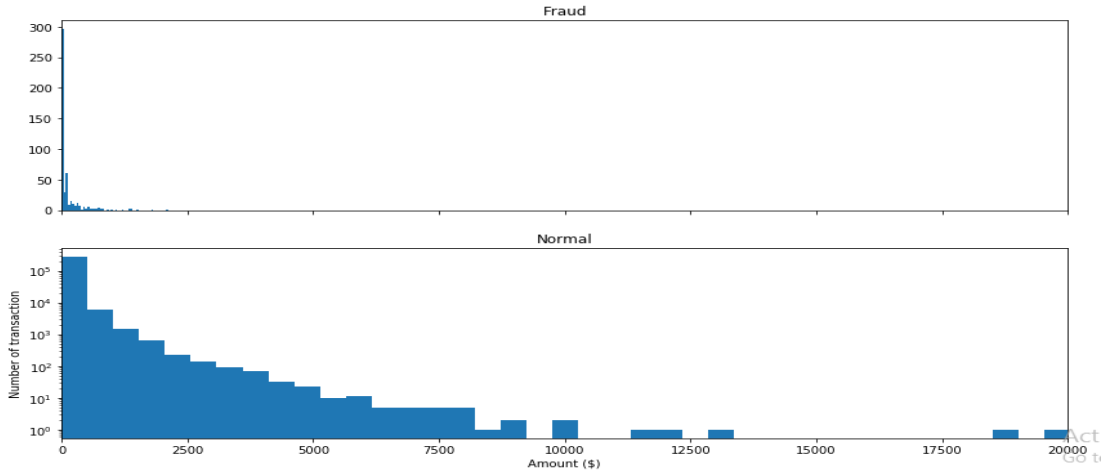

Figure 1: Illustrates the Amount per transaction by class (Normal vs Fraud)

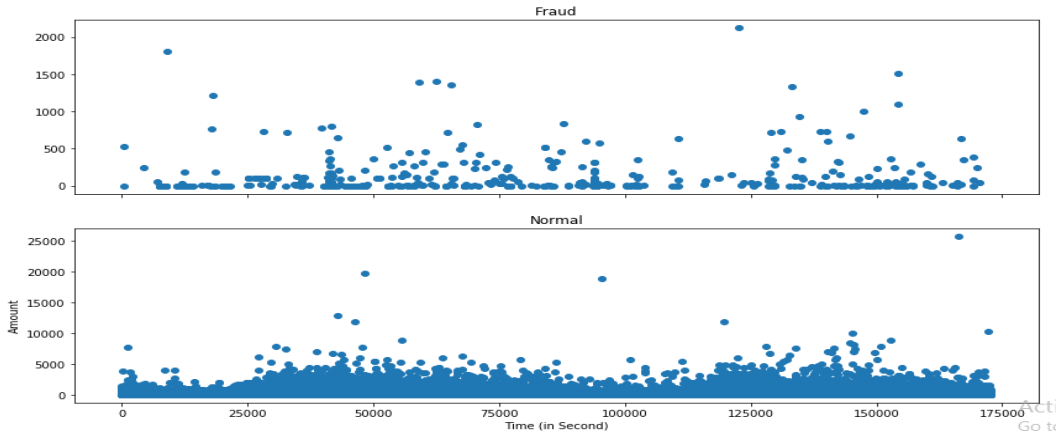

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Figure 2: Illustrates the Time of transaction vs Amount by class

Illustrates the dataset correlation matrix. This matrix explains that the attribute class is independent of the amount and time of the transaction. It is even clear from the matrix that the transaction class depends on the PCA attributes used.

4 Results:

Table 1: Testing Comparison results of proposed algorithms

Metrics	***Classifiers***		
	Random Forest	***Logistic Regression***	***Gradient Boosted***
Recall	80.13%	63.46%	82.05%
Precision	96.90%	89.19%	87.07%
F-measure	87.72%	74.16%	84.49%

Table 2. Performance Rate of proposed algorithms

Algorithms	***Overall Accuracy***	**Precision**	**Recall**
Random Forest	99.96%	96.90%	80.13%
Gradient Boosted	99.94%	87.07%	82.05%
Logistic Regression	99.92%	89.19%	63.46%

In this study, three classifier models based on Random Forest, Gradient Boosted and Logistic Regression Classifier are developed. To evaluate these models, 70% of the dataset is used for training while 30% is set aside for validating and testing. Accuracy, recall, precision, F-measure and balanced classification rate are used to evaluate the performance of the three classifiers. From the results obtained it is clear that Random Forest (RF) dominates in all three proportions with greater accuracy.

Compared to Logistic Regression and Gradient Boosted, random forest algorithm has been effective in achieving higher Overall Accuracy, F-measurement while Gradient Boosted more effective in recall among all the algorithms.

The Table 1 and Table 2 illustrates the performance measure of the random forest, Logistic Regression and Gradient Boosted using two different thresholds: 0.5 and 0.3. In the confusion matrix, class 0 refers to the legitimate transactions and class 1 to the fraudulent transactions. The confusion matrices illustrate six more fraudulent transactions correctly classified using a lower threshold of 0.3.

5 Conclusion:

Financial organizations and banking industries who wish to protect themselves from fraud need to upgrade their technologies from time to time and need to consider new, quicker re-learning and re-skilling in seeking the best approaches that will constantly grow and simple to use and sustain. Machine learning algorithms have to redefine the current fraud detection approaches & previous methods. Random Forest, Logistic Regression and Gradient Boosting algorithms are compared to investigate the best analytical accuracy and increase the efficiency of fraud detection models. These models are tested on same credit card dataset and the accuracy, f-measure, precision and recall is evaluated. From the experiments, the result that was concluded is that all algorithms had the highest results, Random forest algorithms had an accuracy of 99.96%, while Logistic Regression algorithms illustrateed an accuracy of 99.92% and Gradient Boosted illustrateed an accuracy of 99.94%. Random forest and Gradient Boosted Improved achieve the highest performance with an accuracy of 99.96% and 99.94%. Consequently, the results obtained suggest that Random Forest provides the most reliable and high accuracy of 99.96% in credit card fraud detection issue with ULB machine learning dataset. With a greater number of training data, the Random Forest Algorithm will perform better in Overall Accuracy, but speed will still suffer during testing and application for both Random Forest and Gradient Boosted, while the Logistic Regression more effective in time execution among all the algorithms. It will also facilitate the use of more pre-processing techniques. The problem is if the dataset increases more it may lead to over fitting problem. This can be considered as a future

work to avoid the over fitting problem in real-time fraud detection. Our future research will seek to provide a solution for credit card fraud using the combining of different technologies such as Machine Learning, Artificial Intelligence and Deep Learning.

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Seroprevalence and risk factors associated with viral hepatitis C infections using ELISA and Immunochromatography Tests in Eldamazen and Elroseirs Cities- Blue Nile State-Sudan (2018-2020).

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Abstract

Hepatitis C virus (HCV) is a global health problem as the WHO reported 3-4 million people are newly infected with HCV per year and 130-170 million people are chronically infected. The current Hospital based descriptive study aimed to estimate the seroprevalence of antibodies against HCV among study population in Blue Nile State using Immunochromatography Test (ICT), Enzyme-Linked Immunosorbent Assay (ELISA) for detection of HCV antibodies. The study carried out during the period from December 2018 to December 2020.A total of four hundred participants were included.199 (49.75%) of participants were males and 201 (50.25 %) were females. According to Educational level of the study population 40(10%)Illiterate,211(52.75%) were Basic school,20 (5%) were primary school,69(17.25 %)were Secondary school,58(14.5 %) were University and 2(0.5 %) were postgraduate. The prevalence of antibodies against viral hepatitis C among study population was 1.5 %. Chi-square was done to the association among risk factors.

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The study results showed there was a significant association between HCV and education (P.Value = 0.015), Occupation (Value=0.015), *source* of drinking water (P.value=0.015), history of admission at Hospital (P.value =0.010), history of minor or major surgery (P.value=0.01) and history of previous blood transfusion (Value= 0.0312).

The study recommended carrying out more studies and in large number of samples in order to introduce preventive control measure, screening tests and health education.

Key Words: Risk Factors Associated, HCV, ICT, and ELISA.

المستخلص

يعد فيروس الكبد الوبائى ج مشكلة صحية عالمية حيث ابلغت منظمة الصحية العالمية عن اصابة 3-4 ملايين شخص بفيروس التهاب الكبد ج سنوياً و130-170 مليون شخص مصابون بالعدوى المزمنة.تهدف الدراسة الوصفية الحالية المعتمدة على المستشفى الى تقدير انتشار الاجسام المضادة ضد فيروس التهاب الكبد الوبائى ج بين مجتمع الدراسة فى ولاية النيل الازرق باستخدام الاستشراب المناعى(ICT) للكشف عن الاجسام المضادة لفيروس التهاب (ELISA) و المقايسة المناعية المرتبطة بالخمائر م.شملت الدراسة 20).اجريت الدراسة خلال الفترة من ديسمبر 2018-ديسمبر 20HCVالكبد الوبائى ج(مجموعة اربعمائة مشارك.كان 199(49.75%) من الذكور و201(50.25%) من الاناث.على حسب المستوى التعليمى لمجتمع الدراسة 40(10%) امى ,211(52,75%) اساس ,20(5%) ابتدائى ,69(17.25%) ثانوى ,58(14.5%) جامعى و 2(.5%) فوق الجامعى.كان انتشار الاجسام المضادة ضد التهاب الكبد الفيروسى ج بين مجتمع الدراسة 1.5%.تم عمل مربع كاى لتقييم الارتباط من بين عوامل الخطر

ومستوى HCVاظهرت نتائج الدراسة وجود علاقة ذات دلالة احصائية بين التهاب الكبد الوبائ ج .كما اظهرت نتائج الدراسة وجود علاقة ذات دلالة P.value=0.015الوظيفة ومياه الشرب(التعليم معنوية بين التهاب الكبد الفيروسى ج وتاريخ التنويم فى المستشفى وتاريخ العملية الجراحية الصغرى او الكبرى(P.vaue=0.01 . كئلك وجود علاقة ذات دلالة احصائية بين التهاب الكبد الفيروسى ج HCV وتاريخ نقل الدم المسبق(P.value=0.0312).

اوصت الدراسة باجراء المزيد من الدراسات فى عدد كبير من العينات من اجل ادخال اجراءات التحكم الوقائى واختبارات الفحص والتثقيف الصحي .

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كلمات مفتاحية :عوامل الخطورة.المترافقة ,التهاب الكبدالفيروسى ج .اختبار الاستشراب المناعى المقايسة المناعية المرتبطة بالخمائر..

Introduction

Viral hepatitis has emerged as a major public health problem throughout the world affecting hundreds of millions of people (WHO2000, Jazayeri *et al* 2004). Hepatitis C virus (HCV) is a global health problem as the WHO reported 3-4 million people are newly infected with HCV per year and 130-170 million people are chronically infected (Amal Ahmed Mohamed, et *al* 2015, M.Mohd Hanafiah *et al* 2013) .Over 350000 people die each year from HCV related liver disease(Amal Ahmed Mohamed *et al* 2015). In Sudan seroprevalence of HCV was 2.2% in the Gezira state (Mudawi *et al* 2007). The life time cost of an individual infected with HCV in2011 was estimated at US$ 64.490 (Homie Razavi *et al* 2013). Chronic infection with hepatitis C virus (HCV) is the strongest risk factor for hepatocellular carcinoma (HCC) (Elserag *et al* 2012). HCV is a major cause of morbidity and mortality worldwide affects approximately 3% of the world population (Pertz *et al* 2006). HCV accounts for approximately 15 % -20% causes of acute hepatitis (Hui *et al* 2015). Epidemiological studies also indicate that HCV is associated with a number of extra hepatic manifestations including insulin resistance, type 2 diabetes mellitus, glomerulopathies, prophyria cutaneatarda, lymphocytic sialoadenitis, etc (Carrozzo *et al* 2014, Montenegro *et al* 2013 ,Cohen 2000).Chronic hepatitis C (CHC) might be associated with non-Hodgkin's lymphoma (Parti *et al* 1999). HCC which is one of the ten most common cancers worldwide is closely associated with hepatitis C virus(HCV) in some regions (Omer, *et al*,2001). HCV is a small enveloped virus belong to the family flaviviridae genus of hepaci virus ,single strand positive sense RNA virus (Catanese *et al*

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2013,Purcell *et al*,2008, Nican *et al* 2008) . HCV are frequently propagating blood borne pathogens in global community (Umar *et al* 2014) . The fact that risk factors of HCV in a large number of patients are not detected, water can be the source of hepatitis C transmission in these people (WHO 2018,Aqsa Iqbal and Anum Iqbal 2018).

HCV can survive in water for up to 3 weeks which makes in susceptible to be easily transmitted to people with broken skin ,gastrointestinal mucosal lesions (WHO 2018,Aqsa Iqbal and AnumIqbal 2018).

Materials and Methods:

The study was designed as Hospital –based descriptive study , a total of 400 samples from study population were collected and analyzed during the period between December2018 December 2020. Other data such as the clinical, demographical data and risk factors associated with the disease distribution were collected by a well-structured and pretested questionnaire. All participants were screened for anti-HCV antibodies using ICT (Fortress HCV-Ab Rapid Test Cassette) used as qualitative detecting of anti-HCV antibodies and Commercial ELISA Kit fortress for Anti-HCV 4th generation) manufactured by United Kingdom, with high sensitive, inexpensive diagnostic method for detected Anti-HCV antibodies.

Study Location:

The study was conducted in Eldamazen and Elroseirs teaching Hospital.The laboratory was carried out in the Regional Public Health laboratory,Eldamazen , Blue Nile State.

Statistical analysis:

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Chi-square test was done to assess if there asignificant association between HCV infection and risk factors. Data was analyzed using SPSS software program.

Ethical Consideration:

Permission to carry out the study was taken from the ministry of Health Blue Nile State.All participants were informed for the purpose of the study before collection of the specimens and written consent was taken from them.

Sample Collection:

Five ml of venous blood were collected from each participant (400) under aseptic condition and dispended Two ml of blood in to EDTA containers and the other three ml to plain containers which allowed to clot naturally at room temperature. The clotted sample and EDTA sample were spun in a centrifuge at 2500 rpm for 5 minutes to separate the serum and plasma which was used for analysis.

Methods

Immunochromatography for HCV antibodies (HCVAb ICT)

The test cassette was removed from foil pouch and placed on a clean and level surface. pipette dropper was filled with specimen, holding the dropper vertically,then dispensed 1 drop of serum or plasma(about 30*m*l) to the sample well(s) . one drop of HCVAb buffer was added (about 40*m*l).The timer was set up.Results was reading in 15 minutes. Two lines appear.one colored line should be in the control line region(C) and another appearent colored line should be in the test line region(T) indicate positive results.One colored line appears in the control line region(C) and No line appears in the test line region(T) indicates Negative results.

ELISA for HCV Ab

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Preparation of solution: The kit contain reagent for 96 test

Microwell plate ;12strips of 8microwells. Negative control ready to use.

Positive control ready to use .Specimen Diluent . HRP-Conjugate reagent ready to use.

Stock wash Buffer(dilute 1ml to 20ml) 50 ml of concentrated wash buffer to 950ml D.W .Chromogen Solution A ready to use .Chromogen Solution B ready to use. Stop solution ready to use. Plastic sealable Bag .plate cover. Package Inserts.

Procedure:

Reagents were kept at room temperature at least 15 -30 minutes before beginning the test.Well(A1) was left empty as a blank. 100*m*l of sample diluent was added to each well except the blank and mixed gently. 10*m*l of Negative control was dispensed to(B1),(C1) and (D1) then 100 *m*l of Positive control in (E1) and (F1) wells and micro-plates were covered with plate cover and incubated at 37c for 30 minutes. The micro well plate was washed with an automated washer by delivering and aspirating 300*m*l/well of diluted washing solution five times each well. 100 *m*l HRP- conjugate was added in to each well except the blanking well and covered with the sealer. Microwell plate was incubated at 37c for 30 minutes. Each well was washed five times with washing buffer,the plate was turned on to blotting paper or clean towel and taped to get rid of remaining buffer. 100 *m*l of chromogen/substrate mixer (50ml *m*lchromogen-A/50*m*l chromogen-B) was added in to each well,the blank well included. Then incubate the micro-plate at 37c for 15 minutes avoiding light. 50*m*l Sulphuric Acid was added in to each wells. Addition of acid will turn the positive control and positive sample from blue to yellow. The color intensity was measured of the solution in each well at 450 nm filter.

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Interpretation of the Results: Negative results(s/co less than 1)**:**

Samples giving absorbance less than cut-off value are negative for this assay,which indicates that no antibodies to hepatitis C virus have been detected with (Anti-HCV 4th generation Fortress diagnostic)ELISA Kit.

Positive Results(s/co more than 1) :Samples giving a value greater than cut-off value are considered initially reactive, which indicates that antibodies to hepatitis C virus have probably been detected using (anti-HCV4th generation fortress diagnostic) ELISA kits.

Results

Table (1) Sero-positivity of HCV among study population.

Test	Positive	%	Negative	%	No. Population	Total
HCV ICT	8	2%	392	98 %	400	100 %
HCV ELISA	6	1.5 %	394	98.5%	400	100 %

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Table (2) Distribution of ELISA HCV among Different characteristics and Chi -square test:

			HCV ELIS					Total
		Negative	%	Positive	%	Chi square test	Sign	N
	Male	199	97.5%	5	2.5%	1.82	.015	199
Gender	Female	201	99.5%	1	0.5%			201
	< 5	3	100%	0	0	8.41	.015	3
	5-15	140	97.2%	4	2.8%			144
Age group	15-25	74	98.7%	1	1.3%			75
	25-40	131	99.2%	1	.8%			132
	More than 40	46	100%	0	0%			46
Education	Illiteracy	40	100%	0	0%	7.12	.015	40
	Basic	207	98.1%	4	1.9%			211
	Primary	20	100%	0	0%			20
	Secondary	69	100%	0	0%			69
	University	56	96.6%	2	3.4%			58
	Postgraduate	2	100%	0	0%			2
Occupation	Health care worker	93	98.9%	1	1.1%	5.45	.015	94
	Student	168	97.1%	5	2.9%			173
	Others	133	100%	0	0%	0	0	133
Source of drinking water	Stream	116	99.1%	1	0.9%	1.35	.015	117
	Well	272-	98.2%	5	1.8%			277
	Canal	0	0%	0	0%	1.35	0.015	0
	Others	6	100%	0	0%			6
History of admission to hospital	198	196	99%	2	1%	132.23	.010	198
History of minor or major surgery	111	110	99.1%	1	0.9%	144.75	.010	111
History of Previous Blood transfusion	23	22	95.7%	1	4.3%	9.12	0.0312	23

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Table (3) Correlation of the result of ICT and ELISA for HCV

		ELISA HCV		
Count		**Negative**	**Positive**	**Total**
ICT HCV	**Negative**	**392**	**0**	**392**
	Positive	**2**	**6**	**8**
	Total	**394**	**6**	**400**

Sensitivity = 6/6 = 100 %

Specificity = 392/394 = 99.5 %

Positive Predictive value (PPV)= 6/8 = 75 %

Negative Predictive Value (NPV)= 392/392 = 100 %

Discussion

In this study, a total of 400 study population showed HCV 392 samples was Negative in both ICT HCV and ELISA HCV.2 samples being Positive by ICT HCV found Negative by ELISA HCV. The sensitivity, specificity, PPV and NPV as 100%,99.5% ,75% and 100% respectively. The seroprevalence rate of HCV was 1.5% among study population. The overall frequency of HCV among the study population during the study duration was similar to Kuwait HCV 1.4% (Mohamoud YA et-al 2016). The incidence of HCV among study population was lower than in Khartoum HCV 6.78% (MM Badawi *et* al 2018),Egypt HCV 14.7% (DawMA *et al*, KouyoumJianSp *et* al 2018).The seroprevalence of HCV among study population was greater than in Baharian HCV 0.3% (Mohamoud YA *et* al2016) and Qater HCV(Mohamound YA *et al* 2016). Analysis of risk

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factors conducted with HCV infection revealed that there was significant association between HCV(P=0.015) and gender in male more than female. This finding also agree with that observed in Study on a diagnostic Laboratory Based study on frequency and Distribution of viral hepatitis B and C among Sudanese (Morwan M *et al* 2017). There was significant association between HCV(p=0.015) and age group. This finding showed agree with study done by (Amjad Khan *et al* 2019) on Epidemiology of viral hepatitis B and C in Punjab,Pakistan and (Esperance Umum et-al 2017)on prevalence of hepatitis C virus infection and it is risk factors among patients attending Rawanda Military Hospital. There was a significant association between HCV(p=0.015) and Education level. This finding also agree with that observed in study done by (Philip J Wenger *et al* 2014) on assessment of hepatitis C risk factors and infection prevalence in Jail population.

There was a significant association between HCV (p=0.015) and Occupation. This finding agree with study done by (Johan Struve *et al* 1995) among Swedish expatriates. It was evident in this study that a significant correlation between HCV(p=0.013) and infected person with viral hepatitis before. This finding showed agree with study done by (RG.Prefontane *et al* 1994).There was a significant association between HCV and source of drinking water(P=0.015).This showed agree with study done by(WHO 2018,Aqsa Iqbal and Anum Iqbal 2018) on hepatitis C virus can be transmitted through water. There was correlation between HCV(P=0.01) and history of admission at Hospital. This finding showed agree with that study done by (Hussein NR *et al* 2017) among patients attending hepatitis unit in Dulnok City –Iraq and by (EkramW *et al* 2014) among chronic HCV Egyptian patients. There was correlation between HCV(p=0.010) and minor or major surgery. This finding

showed agree with that observed on study done by (CelesteRekerKM *et al* 2014) about risk factors associated with high prevalence rates of hepatitis C infection in Egypt. There was a significant association between HCV(P=0.0312) and history of previous transfusion of blood. This finding showed agree with that observed in study done by (Anjum Hashmi *et al* 2010) about prevalence and factors associated with hepatitis C virus sero-positivity in female individual in Islamabad, Pakistan.

Conclusion

The present study concluded that the overall prevalence of HCV using ELISA technique was 1.5% in Blue Nile State.

Recommendations

More research needs to be done on water as a source of HCV transmission and appropriate precautions should be taken to avoid HCV transmission through blood.

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Variations of serum calcium profile among Premenopausal and Postmenopausal Women in Gezira state, Sudan

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ABSTRACT

Oestrogen deficiency after menopause, as well as age-related processes, alters the rate of calcium resorption in bone and causes of bone loss in postmenopausal women. Our present study aim to compare serum calcium status in pre-menopausal and postmenopausal women. The study was a cross sectional study was done in a Gezira State, Sudan. Among female their means age were (23.73 ± 11.32 years) of pre-menopausal and (55.07 ± 5.67years) post postmenopausal women. Three ml of blood was collected in heparin vacuum tubes and serum calcium was measured by Calcium-O-Cresolphthalein Complexone colorimetric method. SPSS version 23 was used for data analysis. P value < 0.05 was considered statistically significant. The results showed that there was significant difference in mean age (23.73 11.32 years vs. 55.07 5.67 years), weight (62.49 17.13kg vs. 69.32 16.47kg), and body mass index (23.443.16 vs. 27.53 4.21) p<0.05 between premenopausal women and postmenopausal women, but there was no significant different in their height (161.62±0.38Cm vs. 158.70±0.13Cm). Serum calcium showed significantly reduced in postmenopausal women 8.6± 0.64 mg/dl compared to the premenopausal women values10.37± 0.69mg/dl, (P=0.03). However, serum calcium level in

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both group found to be within the normal reference range. This study concluded that the postmenopausal women in Al Gezira State had lower mean values of serum calcium but within the normal serum reference values.

Keywords: ***Postmenopausal women, premenopausal women, Calcium, Menopause.***

المستخلص:

نقص هرمون الأستروجين بعد انقطاع الطمث ، وكذلك العمليات المرتبطة بالعمر ، يغير من معدل ارتشاف الكالسيوم في العظام وأسباب فقدان العظام عند النساء بعد سن اليأس.تهدف دراستنا الحالية إلى مقارنة حالة الكالسيوم في الدم لدى النساء قبل انقطاع الطمث وبعده. أجريت دراسة مقطعية في ولاية الجزيرة بالسودان ، حيث كان متوسط العمر عند الإناث (23.73 ± 11.32 سنة) قبل سن اليأس و (55.07 ± 5.67 سنة) بعد سن اليأس ، تم جمع ثلاثة مل من الدم في فراغ الهيبارين و تم قياس الكالسيوم في المصل بطريقة القياس اللوني Calcium-O-Cresolphthalein Complexone. تم استخدام الإصدار 23 من SPSS لتحليل البيانات ، وتعتبر قيمة p<0.05 ذات دلالة إحصائية ، وأظهرت النتائج وجود فرق معنوي في متوسط العمر (23.73 11.32 سنة مقابل 55.07) 5.67 سنة) ، الوزن (62.49 17.13 كجم مقابل 69.32 16.47 كجم) ، ومؤشر كتلة الجسم (23.443.16 مقابل 27.53 4.21) (p<0.05بين النساء في فترة ما قبل انقطاع الطمث والنساء بعد انقطاع الطمث ، ولكن لم تكن هنالك فروقات معنوية في الطول (161.62 ± 0.38 سم مقابل 158.70 ± 0.13 سم). أظهر الكالسيوم في الدم انخفاضاً ملحوظًا في النساء بعد سن اليأس 8.6 ± 0.64 مجم / ديسيلتر مقارنة بقيم النساء قبل انقطاع الطمث 10.37 ± 0.69 مجم / ديسيلتر ، (P = 0.03) ومع ذلك ، وجد أن مستوى الكالسيوم في الدم في كلا المجموعتين ضمن النطاق المرجعي الطبيعي ، وخلصنا إلى أن النساء بعد سن اليأس في ولاية الجزيرة كان لديهن متوسطات أقل من الكالسيوم في الدم ولكن ضمن القيم المرجعية الطبيعية في المصل.

الكلمات المفتاحية: النساء بعد سن اليأس ، النساء في فترة ما قبل انقطاع الطمث ، الكالسيوم ، سن اليأس.

Introduction

Menopause is the permanent cessation of menstruation, which occurs in women between the ages of 40 and 61, and is marked by monthly alterations that reflect

oocyte loss and subsequent decrease in ovarian hormone production (Prabha *et al*., 2015).Ovarian follicles lose function as a result of menopause, resulting in lower levels of estradiol and other hormones (Mishra *et al*., 2015) Reduced estrogen levels cause increased osteoclast development and increased bone resorption, leading in bone loss and damage of local architecture, resulting in osteoporosis (Deepthi *et al*., 2012). According to Bhattrai and colleagues (Bhattrai *et al*.),a lower amount of serum calcium in postmenopausal women compared to premenopausal women is a crucial indication of bone mass loss (Bhattarai *et al*., 2014).A study from Nepal had also demonstrated the moderately reduced serum calcium in post-menopausal women (LeKhi *et al*., 2012) . During breastfeeding, bone loss occurs; however, as ovulation and menses are re-established, this loss is largely restored during weaning (Bayray and Enquselassie 2013). In this way, the risk of bone mineral loss later in life may be influenced by the chance of pregnancy and lactation. With this foundation, researchers were able to calculate and examine blood calcium and phosphate levels in postmenopausal and premenopausal women, as well as determine the impact of equality in postmenopausal women (Bhattarai *et al*., 2014).The calcium ion is a crucial component of the skeleton's structure. The relevance of diet in the maintenance of bone and joint health is becoming clearer. Osteoporosis may be caused by a nutritional imbalance along with endocrine problems (Bjørge *et al*., 2008). The interaction of calcium absorption from the intestine, renal calcium secretion, and bone calcium uptake and release, all of which are regulated by parathyroid hormone, vitamin D, and calcitonin, determines the extracellular calcium ion concentration (Sheweita and Khoshhal 2007). A number of hormones in the human body regulate bone mineralization and rate of bone turnover. PTH is a hormone that promotes bone resorption

while also assisting in the maintenance of blood calcium levels. Estrogens reduce bone resorption and control the timing of osteoclast apoptosis in women by reducing interleukin (IL)-6 production, which reduces bone resorption and controls the timing of osteoclast apoptosis. Estrogens deficiency, therefore results in a longer life span of osteoclasts [9]

Materials and Methods

Ethical approval:

Ethical approval is issued by the medical ethic committee of the University of Gezira , written consent was obtained from the participants.

Study design

This cross sectional descriptive study.

Study area:

The study was conducted in the Gezira state, Sudan, over the period of (2018-2021).

Sample size:

This study was carried out in 211 (20-49years) premenopausal women and 97 (50-60years) postmenopausal women.

Inclusion criteria:

Healthy adults Sudanese women, their age between 20 to 60 years.

Exclusion criteria:

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All subject suffering from any systemic illness that directly or indirectly affects calcium, pregnant ladies, breast feeding. Subject with history of thyroid problems and bone problems.

Anthropometric measurements:

Weight was measured in kilogram (kg) using electronic digital scale. Height was measured in cemetery (cm) recorded with the subject standing against a wall on which the tape was placed .Body Mass Index calculated as the ratio of weight in kilograms divided by height in meters squared [kg/m^2]. (BMI= weight in kilogram/height in $metre^2$).

Blood Sample:

The blood samples about 3 ml of venous blood were collected in heparin vacuum tubes from each participant between 8:30 am -11 am and transferred to plain centrifuge tube, after the retraction of clot. Serum was used for estimation of total calcium by Calcium-O-Cresolphthalein Complexone colorimetric method.

Statistical analysis:

Data obtained from this study were analyzed using the Statistical Package for the Social Sciences (IBM-SPSS) software for Windows, version 23.0, New York, USA. Mean±SD (standard deviation) all the variables were determined. A Student's t-test was applied to see the significance of difference of parameters between two groups.The results are considered statistically significant when the p value is $p<0.05$Serum calcium levels between 8.5 -10.5 (mg/dl) are considered normal.

Results and Discussion:

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Table 1 showed anthropometric features of the women that participated in the study. There was a significant different in the mean age (23.73 ± 11.32 years vs. 55.07 ± 5.67years), weight (62.49 ± 17.13Kg vs. 69.32 ± 16.47Kg) and body mass index (23.44 ± 3.16Kg/M2 vs. 27.53 ± 4.21Kg/M2) between the premenopausal women and postmenopausal women but there was no significant different in their height (161.62±0.38Cm vs. 158.70±0.13Cm).

Table 1: Comparison of anthropometric features between pre-menopausal and postmenopausal women

Parameters	Premenopausal women (n=211)	Postmenopausal women (n=97)	p-value
Age (years)	23.73 ± 11.32[a]	55.07 ± 5.67[b]	0.001
Height (Cm)	161.62±0.38[c]	158.70±0.13[c]	0.76
Weight (Kg)	62.49 ± 17.13[a]	69.32 ± 16.47[b]	0.01
BMI (Kg/m2)	23.44 ± 3.16[a]	27.53 ± 4.21 [b]	0.032

Values were Means±SD means with rows sharing different letter are significantly different (*p.value <0.05)* sharing common letter non-Significant.

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Table 2 : Variations of serum calcium levels among pre- and post-menopausal women

Variable	Cal(mg/dl)		t	P value
	N	Mean ± SD		
Pre-menopausal (20-49years)	211	9.37 ± 0.69	-2.097	0.03
Post-menopausal (>49years)	97	8.6 ± 0.64		

Table 2 demonstrates the variations of serum calcium levels among pre- and post-menopausal women.

This study found that serum calcium have a 16.87% decreases in postmenopausal women (8.6 ± 0.64mg/dl) when compared to premenopausal women (10.37 ± 0.69 mg/dl) with a statistically significant ($p<0.05$), However, serum calcium level in both group found to be within the normal reference range. This finding of our study is in the line of some studies: study performed by Bhale et al in an Indian (Nicolaysen, *et al*,1953) . In Kaduna State, Nigeria,(Achie, *et al*, 2020). Also observed that postmenopausal women have lower blood calcium levels , as well as (Kalita and Choudhury 2017), revealed that postmenopausal women had significantly lower serum calcium levels than premenopausal women. The serum calcium levels of postmenopausal women were found to be considerably lower than those of premenopausal women. They attributed these findings to lower estrogen levels, which cause osteoblasts, monocytes, and T cells to produce more cytokines, which drive bone resorption

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(Desai *et al*., 2012). In a study of Indian women, it was discovered that postmenopausal women have lower mean serum calcium and a significant increase in IL-6 (Interleukin-6), which is positively correlated with bone turnover markers and negatively correlated with bone mineral concentration. These changes occurred within the first five years after menopause, implying that bone loss is limited to the first decade after menopause (Qureshi *et al*., 2010). The study in Pakistan found significantly lower serum calcium levels in postmenopausal women indicating increase bone turnover compared to premenopausal women (Jada *et al*., 2013). Oestrogens influence bone re-modeling by stimulating osteoblasts, decreasing osteoclast numbers and activity, and synthesizing cytokines that affect bone resorption. Oestrogen deficiency in postmenopausal women can cause calcium loss due to decreased intestinal calcium absorption and renal calcium conservation, as well as a possible increase in gut calcium excretion (Khadka *et al*., 2017). And induces calciuria by increasing the filtered load of Ca^{2}+. Oestrogen receptors have been demonstrated on renal tubules (Davidoff *et al*., 1980) and it may also act directly on the kidney to promote renal calcium maintenance. Estrogen has also been demonstrated to have an effect on parathyroid gland receptors, enhancing PTH release and indirectly preserving renal calcium (Greenberg *et al*., 1987). Reduced calcium absorption has been linked to low levels of 1,25 dihydroxyvitamin D in the blood and gastrointestinal resistance to its action (Pattanaungkul, *et al*, 2000) Reduced intestinal calcium absorption may be due to a decrease in the number of 1,25 dihydroxycholecalciferol receptors after ovariectomy. B.E. (Nordin *et al*., 2004) conducted a study. In healthy postmenopausal women, calcium absorption decreased as they got older, which might be attributed to a reduction in either the active calcium transport or

diffusion components of the calcium absorption system. Due to decreased tubular reabsorption, urinary calcium was shown to be significantly higher in postmenopausal women (Nordin *et al*., 1991) Calcium intake and awareness of calcium requirements in the postmenopausal period are very low in developing countries. Reduced intestinal calcium absorption, increased serum parathyroid hormone concentration, and bone loss are all symptoms of insufficient calcium and vitamin D (Cashman, 2002). Study showed slightly higher mean serum calcium among postmenopausal group compared to premenopausal women. However, they discovered that postmenopausal women have much lower bone density (Prince *et al*., 1991) found that postmenopausal women had considerably higher mean blood calcium levels than premenopausal women in a study of Nigerian menopausal women. Inferring that menopause affects calcium metabolism. (Chinko, *et al*, 2012). M. Suresh et al. discovered that there was no statistically significant difference in serum calcium levels between the two groups (Bassey *et al*., 2000).

Conclusions: The postmenopausal women had lower mean values of serum calcium but within the normal serum reference values.

Conflict of Interest

No conflict of interest

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Assessment of Nurses' knowledge regarding Oxygen Therapy in Ibrahim Malik Hospital, Khartoum, Sudan 2019

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Abstract:

Back **ground:** oxygen therapy is the administration of oxygen as a medical intervention, which can be for a variety of medical conditions. nurses play a vital role in **assessment of need** and administration of oxygen in patients at risk of respiratory dysfunction.This study was conducted to assess nurses' knowledge regarding Oxygen Therapy. The study used ,descriptive hospital based study, conducted in emergency department at Ibrahim malik teaching hospital the study enrolled all nurses available (n=40). During period from (August to December 2019). Data were collected by using questionnaire designed for this study. Data was analyzed using statistical package for Social Sciences (SPSS version 20). **Results:** study revealed that **(**52.5%) and (22.5%) of nurses know hypoxia and low oxygen saturation in blood are indications of oxygen therapy respectively. (57.5%) of nurses know that nasal cannula is device that deliver low flow rate of oxygen, regarding how to assess patient need for oxygen therapy (40%) of nurses stated pulse oximetry. (27.5) of nurses stated that poor perfusion and Hypothermia are a common factors affecting accurate pulse oximetry reading. **Conclusion:** there is a gap in nurse's knowledge regarding oxygen therapy

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Key Words: Nurses, knowledge, Oxygen Therapy

المستخلص:

العلاج بالأكسجين هو إعطاء الأكسجين كتدخل طبي ، والذي يمكن أن يكون لمجموعة متنوعة من الحالات الطبية. تلعب الممرضات دورًا حيويًا في تقييم الحاجة وإعطاء الأكسجين للمرضى المعرضين لخطر ضعف الجهاز التنفسي، أجريت هذه الدراسة الوصفية لتقييم معرفة الممرضيين فيما يتعلق بالعلاج بالأكسجين في قسم الطوارئ بمستشفى إبراهيم مالك التعليمي وضمت الدراسة جميع الممرضين المتوفرين (ن = 40) خلال الفترة من (أغسطس إلى ديسمبر 2019). تم جمع البيانات باستخدام الاستبيان المصمم لهذه الدراسة. وتحليل البيانات بإستخدام الحزمة الإحصائية للعلوم الإجتماعية (SPSS إصدار 20). أوضحت الدراسة أن (52.5٪) و (22.5٪) من الممرضين عرفوا ان نقص الأكسجة وانخفاض تشبع الأكسجين في الدم هي مؤشرات للعلاج بالأكسجين على التوالي، (57.5٪) من الممرضين يعرفون أن قنية الأنف هي جهاز يوفر معدل تدفق منخفض للأكسجين ، فيما يتعلق بكيفية تقييم حاجة المريض للعلاج بالأكسجين (40٪) من الممرضين ذكروا قياس التأكسج النبضي. ذكر (27.5) من الممرضين أن ضعف التروية وانخفاض حرارة الجسم من العوامل الشائعة التي تؤثر على القراءة الدقيقة لقياس التأكسج النبضي.

الخلاصة: هناك فجوة في معرفة الممرضين فيما يتعلق بالعلاج بالأكسجين.

الكلمات المفتاحية: الممرضين، المعرفة ، العلاج بالأكسجين

Introduction:

Oxygen (O2) is probably the most common drug to be used in the care of patient who presents with medical emergencies appropriately 34%of ambulance journey involves oxygen use at some stage. (Murphy. 2001) Oxygen therapy is one of the major interventions used to manage respiratory dysfunction; Nurses play a vital role in the management of oxygen therapy in patients at risk of respiratory dysfunction. (Eastwood, 2012). If oxygen therapy is given inappropriately, it could be fatal. Hence, patients must receive this therapy in an

appropriate, safe, and comfortable way (Adipa et al., 2015). Depending on the basic medical condition of a patient, and whether the condition is acute or chronic, the best amount and method of oxygen delivery system. The selection of the best oxygen delivery system and the oxygen flow rate depends on many factors including the age of patient, the clinical objectives and patient tolerance (Aloushan, 2017). The nurses have very important role in this regard as they should monitor carefully and regularly patients who are connected with oxygen therapy (Lemma, & Weldetsadik, 2015). The failure of nurse to recognize and respond to respiratory dysfunction may result in patients suffering respiratory related adverse events such as unexpected death, cardiac arrest, or unplanned intensive care unit admissions. However delaying oxygen therapy due to need of medical order affect patient outcomes, therefore nurses need to be knowledgeable an important part of nurses role in Oxygen therapy is to assess for early sign of hypoxia and decide whether there is need for supplemental oxygen, however delaying oxygen administration because of need for a medical order may significantly affect the patients' outcomes. Nurses frequently and independently make decisions about the selection management of low flow oxygen therapy devices .indeed, administering supplemental oxygen a timely and appropriate manner is fundamental aspect of patient care. (Eastwood, 2012). Finally Oxygen therapy, like any other drug, is administered to the patients, so there are some barriers that could face the nurses while administering it. These barriers could be related to nurses themselves as; lack of knowledge, lack of awareness in relation to different oxygen devices. Other barriers could be linked to the hospital as; lack of continuous education related to the process of oxygen therapy (Mohamed., 2018).

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Methodology:

Study design: Descriptive hospital based study.

Study area and settings : The study conducted in Ibrahim Malik Teaching Hospital , inception date 1977 located in the center of Sudanese capital (Khartoum) It includes emergency and trauma , pediatric ward , obstetrics &gynecology , theater room , medicine and surgery and orthopedic wards ,medical lab, blood bank , x-ray department and training center. Bed capacity about 600.

The sample size consisted of (40) nurses **included all Nurses staff in emergency department during** study period from (August to December 2019).

Data collection: Structured questionnaire designed consisted of two parts: **Part one:** composed of socio-demographic variables of study population such as (age, gender, and qualification). **Part two:** knowledge of nurses regarding **oxygen therapy** such as indications, patient assessment, oxygen devices and complications of **oxygen therapy**.

Data analysis: The collected data was entered and analyzed using Statistical Package for Social Sciences (SPSS) .

Ethical clearance: The approval was taken from the national university research committee; Permission was taken from the general manager of Ibrahim Malik hospital. The participants were consented verbally after explaining the study and its objectives to them.

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Result:

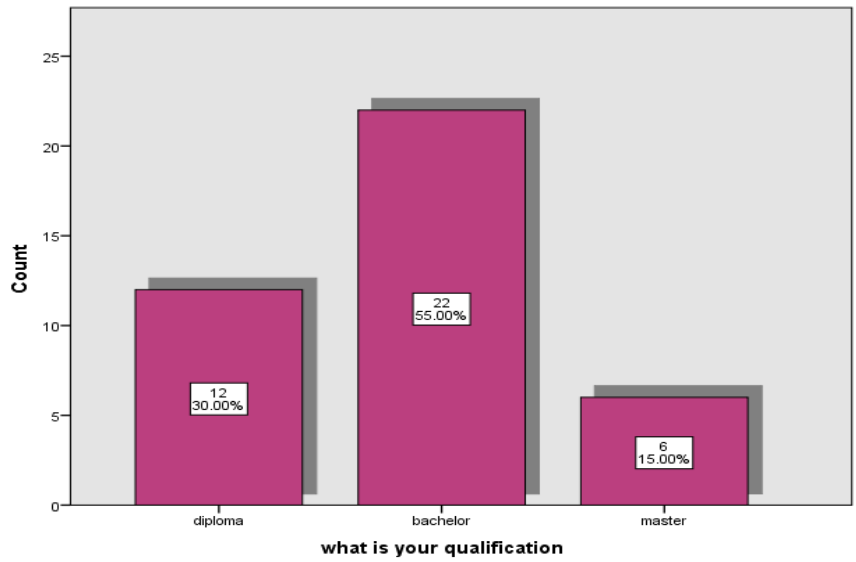

Figure 1 : Distribution of nurses according to their qualification

(55 %) of nurses were having bachelor degree

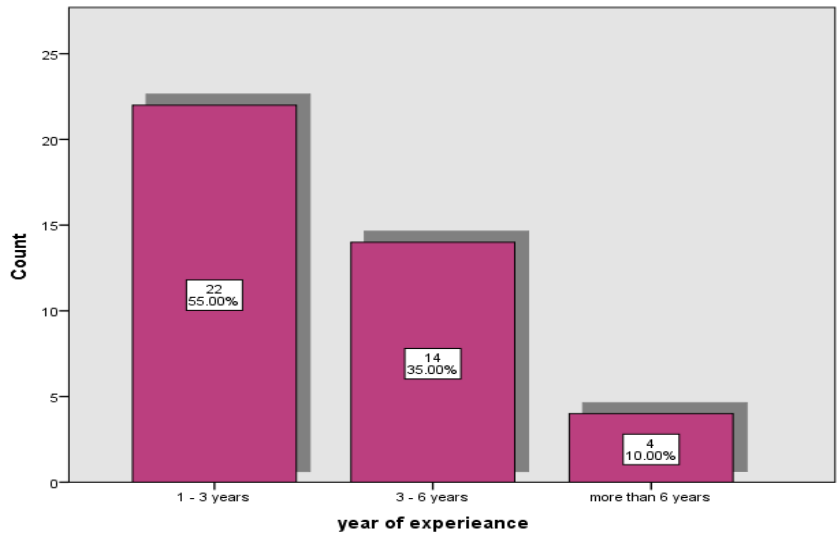

Figure 2: Distribution of nurses according to their years of experience.

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Most of the nurses (55%) were with experience range between 1-3 years followed by 3-6 years

Table 1: distribution of the study sample according to their knowledge regarding major indications of oxygen therapy (n =40)

major indications of oxygen therapy	Frequency	Percent
Dyspnea	6	15.0%
Hypoxia	21	52.5%
chest pain	4	10.0%
low oxygen saturation in blood	9	22.5%
Total	**40**	**100.0%**

Table(1) shows (52.5%) of nurses know hypoxia as indication (22.5%) low oxygen saturation in blood , (15.0%) Dyspnea and (10.0%) chest pain as indication of O2 therapy.

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Table 2: Distribution of nurses according to their knowledge regarding devices that deliver low flow rate of oxyge

Items	Frequency	Percent
nasal cannula	23	57.5%
simple face mask	10	25.0%
partial non re-breathing mask	3	7.5%
non breathing re- mask	4	10.0%
Total	**40**	**100.0%**

about half (57.5%) of nurses said that nasal cannula is device that deliver low flow rate of oxygen follow by face mask (25.0%), non breathing re-mask(10.0%) and partial non re-breathing mask (7.5%).

Table 3: distribution of the study sample according to their knowledge regarding how to assess patient need for oxygen therapy.

Assessment of patient need to oxygen	Frequency	Percent
arterial blood gas analysis(ABG)	17	42.5%
pulse oximetry	16	40.0%
clinical evaluation	3	7.5%
Others	4	10.0%
Total	**40**	**100.0%**

Table (3) shows 42.5% of nurses assess patient need for oxygen therapy by ABG, follow by 40% of them use pulse oximetry.

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Table 4: distribution of nurses according to their knowledge regarding the factors that may affect accurate pulse oximetry reading.

Factors affect accurate pulse oximetry reading	Frequency	Percent
abnormal hemoglobin	8	20.0%
poor perfusion	11	27.5%
Hypothermia	11	27.5%
nail polish	10	25.0%
Total	**40**	**100.0%**

Table 4 shows (27.5) of nurses stated that poor perfusion and Hypothermia are a common factors affecting accurate pulse oximetry reading.

Table (5): distribution of the study sample according to their knowledge regarding clinical manifestations of hypoxia :(n=40).

Items	Frequency	Percent
Cyanosis	15	37.5%
Tachypnea	9	22.5%
Tachycardia	6	15.0%
cold extremities	10	25.0%
Total	**40**	**100.0%**

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Table (5) shows 37.5 of nurses knew Cyanosis as clinical manifestation of hypoxia, cold extremities (25%), Tachypnea (22.5), Tachycardia (15.0).

Table (6): distribution of the study sample according to their knowledge regarding complications of oxygen therapy :(n=40)

Items	Frequency	Percent
Toxicity	14	35.0%
Infection	5	12.5%
co2 narcosis	5	12.5%
all the above	16	40.0%
Total	**40**	**100.0%**

Table (6): shows (40%) of nurses knows the Toxicity as complication of oxygen therapy, followed by Infection and co2 narcosis (12.5%) and (40%) knows all these are complications of oxygen therapy.

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Table (7): Nurses' Knowledge regarding flow rate liter minute delivered by some oxygen devises. (n=40)

Items	Frequency	Percent
Nasal cannula		
1 - 6 L/M	29	72.5%
1 - 7 L/M	5	12.5%
1 - 8 L/M	2	5.0%
don't know	4	10.0%
Simple mask		
3 - 8 L/M	4	10.0%
5- 8 L/M	8	20.0%
6 - 8 L/M	21	52.5%
don't know	7	17.5%
partial re-breather mask		
5 - 11 L/M	1	2.5%
6- 11 L/M	7	17.5%
7 - 11 L/M	4	10.0%
8 - 11 L/M	28	70.0%
Non partial re-breather mask		
9 L/M	8	20.0%
10 L/M	4	10.0%
11 L/M	7	17.5%
12 L/M	21	52.5%
Total	**40**	**100.0%**

Zroog, S.A.,** Mahasn, **M.and** Hajer,**KH (2021) Assessment of Nurses' knowledge regarding Oxygen Therapy in Ibrahim Malik Hospital, Khartoum, Sudan 2019 Al-Butana Journal of Applied Science, (12):118-132.

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Table (7) shows 72% of nurses said that nasal cannula deliver 1- 6 L/M, 52.5% of them said simple mask deliver 5-10L/M, 70% of them said Re-breathing mask deliver 8-15 L/M.

Table (8): Nurses' Knowledge regarding factors affecting oxygen transportation to tissues (n=40)

Items	**Frequency**	**Percent**
cardiac output	9	22.5%
arterial oxygen content	8	20.0%
constriction of hemoglobin	6	15.0%
all the above	17	42.5%
Total	**40**	**100.0%**

Table (8) shows 42% of nurses said cardiac output, arterial oxygen content and constriction of hemoglobin are factors affecting oxygen transportation to tissues.

Discussion: Oxygen therapy is the administration of oxygen as a medical intervention, it is a medication and except in emergency situations is administered when prescribed by a physician, but assessment of need for oxygen in most cases is a nursing responsibility as with other medications, the nurse administers oxygen with caution and carefully assesses its effects on each patient. (Brunner.2004) this study revealed that **(55 %) of nurses were had bachelor degree, (55%) of nurses their experience ranged between 1-3 years followed by 3-6 years and more than 6 years constituting (35%) and (10%), respectively.** (52.5%) of nurses knows hypoxia as indication of oxygen therapy (22.5%) low oxygen saturation in blood , (15.0%) Dyspnea and (10.0%) chest pain as indication of O2 therapy. this Is compatible with Mahmoud et al., who stated that Half of nurses (50%) knows hypoxemia as indication of oxygen therapy, this due to poor knowledge about other indications of oxygen therapy.

(Mahmoud et al., 2016), another study stated that Only (60%) of nurses aware that O2 therapy should be administered to treat and prevent hypoxia. (Zeleke., 2019).

about half (57.5%) of nurses said that nasal cannula is device that deliver low flow rate of oxygen follow by face mask (25.0%), non breathing re-mask(10.0%) and partial non re-breathing mask (7.5%). Study done by Hickey in 2007 reported that Oxygen therapy can be a life-saving intervention, which is widely available and commonly prescribed by medical staff. Patients often receive oxygen therapy in hospital but, like any other drug, oxygen can be dangerous when given in the wrong concentration. (Hickey. 2007)

Nurses knowledge regarding how to assess patient need for oxygen therapy (42.5%) of nurses stated by ABG, 40% of them stated pulse oximetry. in regard Factors affecting accurate pulse oximetry reading, study revealed just (27.5) of nurses stated that poor perfusion and Hypothermia are a common factors affecting accurate pulse oximetry reading, follow by nail polish (25.0) and abnormal hemoglobin (20.0). In comparison with this study, the previous study done in Debre Tabor General Hospital, Ethiopia 37.1% of nurses Not Aware Pulse oximetry monitoring is affected by nails varnish, hypothermia and patient position (Zeleke,2019), another multi-center study done in Serbia in 2016, which emphasized that nurses have low scores in understanding how pulse oximetry works and the conditions that affect reliability and accuracy of the readings. (Milutinović. 2016).

The result shows 37.5 of nurses knew Cyanosis as clinical manifestation of hypoxia, follow by cold extremities (25%), Tachypnea (22.5) and (40%) of nurses knows the Toxicity, Infection and co2 narcosis all these are

complications of oxygen therapy. this result compatible with **Mohamed** who stated that slightly more than quarter of nurses knowledgeable in relation to signs and symptoms of oxygen toxicity and less than fifth for its complications. (**Mohamed., 2018)**

study showed that nurses knowledge regarding Suitable flow rate liter/minute deliver by devices (72%) of nurses stated that nasal cannula flow rate from1 - 6 L/M, (52.5%) of them said simple mask flow rate from 5-10L/M, (70%) stated the re-breathing mask flow rate is 8 -15L/M. this result not compatible with study conducted in Saudi Arabia revealed that nurses group was used the appropriate oxygen devices (Aloushan,2017).

The result showed just (42%) of nurses know cardiac output, arterial oxygen content and constriction of hemoglobin are factors affect oxygen transportation to tissues. In comparison with previous study done in Addis Ababa, Ethiopia, showed lower knowledge like this study. (Weldetsadik. 2015), This might be due to the lack of nurses training regarding **oxygen therapy**, unavailability of oxygen administration guidelines, and increased workload of nurses.

Conclusion and recommendation:

In conclusion, this study demonstrated that there is gap in nurse's knowledge regarding oxygen therapy. most nurses was poor knowledge especially regarding indications and complications, suitable devices and suitable flow rate of oxygen therapy. regular training and educational program should be encouraged to update nurses knowledge on oxygen therapy.

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