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Alton Kopri, Kirkuk, Iraq
University Website: www.uoalkitab.edu.iq
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E-mail: kjps@uoalkitab.edu.iq

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Relation of Vitamin D Deficiency in Women with Polycystic Ovarian Syndrome in Kirkuk

Sundus Abdul kareem Mardan, Jacklen Zaea Khoshaba, Salwa Saadoon
Department of Obstetrics and Gynecology, Kirkuk General Hospital, Kirkuk, Iraq
sunduskareem@yahoo.com, jaklen_khoshaba@yahoo.com, salwa_sadoon484@yahoo.com

ABSTRACT

Polycystic ovary syndrome is one of the most chronic diseases affecting women. Some studies indicate that the level of vitamin D is related to the development of polycystic ovary syndrome. This vitamin-like hormone has a certain effect on insulin sensitivity and restoring reproductive capacity in women with polycystic ovary syndrome. Therefore, it was planned to study the relationship between vitamin D deficiency and PCOS. This study planned to show the relationship between vitamin D deficiency, total cholesterol level, and the appearance of polycystic ovary syndrome in patients attending Kirkuk General Hospital.

Keywords: Vitamin D, Polycystic ovary, cholesterol

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علاقة نقص فيتامين (د) لدى النساء المصابات بمتلازمة تكيس المبايض في محافظة كركوك

سندس عبدالكريم مردان, جاكلين زيا خوشابا, سلوى سعدون مصطفى

قسم النساء و الولادة, مستشفى كركوك العام, كركوك, العراق

sunduskaream@yahoo.com, jaklen_khoshaba@yahoo.com , salwa_sadoon484@yahoo.com

الخلاصة

يعدُ مرض متلازمة تكيس المبايض المتعدد من اكثر الامراض المزمنة التي تصيب النساء. بعض الدراسات تشير الى ان مستوى فيتامين (د) له علاقة بتطور متلازمة المبيض المتعدد الاكياس. حيث أن هذا الفيتامين مثل الهرمون له تأثيرات معينة على حساسية الأنسولين واستعادة القدرة على الإنجاب لدى النساء المصابات بمتلازمة المبيض المتعدد الاكياس. لذلك، تم التخطيط لدراسة العلاقة بين نقص فيتامين (د) و متلازمة المبايض متعدد الاكياس. الهدف من الدراسة: هذه الدراسة خططت لإقامة علاقة بين نقص فيتامين (د)، ومستوى الكولسترول الكلي، وظهورمتلازمة المبيض المتعدد الاكياس في المرضى اللاتي يُرَاجِعنَ مستشفى كركوك العام.

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1. Introduction

The term “polycystic” refers to a condition when many cysts developed in the ovaries of a woman. These cysts or follicles (fluid-filled sacs) contain eggs. The ovaries in the women with PCOS, do not produce enough hormones for the maturation of the eggs. When these eggs fail to escape, the follicles or cysts remain and build up in the ovaries, preventing ovulation. In addition, the ovaries tend to produce excess levels of androgens (male hormones) in women with PCOS, which can also negatively impact ovulation and fertility [1]. Polycystic ovarian syndrome (PCOS) is the most common endocrine disorder in females affecting approximately 5% -10% of women of reproductive age. According to a cohort study conducted based on the criteria of the National Institutes of Health, the prevalence rate is 8.7% while in accordance with the criteria of Rotterdam, the prevalence is 11.2% and this number seems to decrease as the person gets older, especially from the age of 35 onwards. Definition and diagnosis of PCOS are based on criteria including clinical or paraclinical evidence of hyperandrogenism, ovarian dysfunction such as oligo-ovulation and the exclusion of other causes of hyperandrogenism such as adrenal hyperplasia, hyperprolactinemia, and thyroid disorders [2]. Polycystic ovarian syndrome (PCOS) is known to be one of the most prevalent endocrine disorders affecting 15–20% of reproductive-age women and is a primary cause of infertility. The clinical features of PCOS include menstrual irregularity, chronic anovulation, infertility, and hyperandrogenism. Hormonal imbalance in PCOS manifests as hyperandrogenism and hyperinsulinemia, with reciprocal negative effects and this corresponds with the severity of PCOS. Hyperinsulinemia could increase androgen and free androgen production by reducing the binding of androgen with sex-hormone-binding globulin (SHBG) [3]. The prevalence of PCOS can be as high as 30% in women with secondary amenorrhea, 40% in women with infertility, 75% in women with oligomenorrhea and 90% in women with hirsutism [4]. PCOS was believed to be a mere ovarian disorder. Nevertheless, increasing basic and clinical research imply that disruption in the neuroendocrine homeostasis of the hypothalamus-pituitary-gonadal axis drives and contributes to PCOS [5, 6]. Thereby in PCOS, there is an increased gonadotropin-releasing hormone (GnRH) pulsatile secretion from the GnRH neuron network. This, in turn, causes significant disturbances in luteinizing hormone (LH), follicle-stimulating hormone (FSH) and progesterone levels. Moreover, it decreases hypothalamus sensitivity to progesterone negative

feedback regulation. Such disruptions lead to increased androgen synthesis in the theca cells, causing anovulation, ovarian cysts, hirsutism and acne that are prevalent in PCOS [7]. Since obesity and insulin resistance are associated with PCOS in majority of patients, the molecules and hormones secreted by adipose tissue have been assumed to play a role in the pathogenesis of PCOS and therefore, were frequently investigated. It has been shown that adipose tissue plays an important role in the regulation of many physiological processes such as reproduction, immune response, and glucose and lipid metabolism through secretion of a variety of bioactive cytokines such as adipokine [8]. The pathogenesis of PCOS is not fully understood. One of the proposed mechanisms for hyperandrogenism is follicle maturation abnormalities, in which the growing follicle does not progress to a dominant follicle. Follicle maturation depends on the levels of follicle-stimulating hormone (FSH), which are reportedly suppressed to a level below the threshold for aromatase enzyme activation in patients with PCOS, resulting in high androgen levels. Another proposed pathology related to follicle maturation abnormality is reduced follicle sensitivity to FSH stimulation by Anti- Müllerian hormone (AMH) [9]. Moreover, testosterone, low serum 25(OH) vitamin D are also characteristic features in PCOS. It is well documented that 25(OH) vitamin D is a crucial player in follicular development, sensitivity to FSH and Anti-Müllerian hormone (AMH) signalling [7]. Dyslipidemia is also common in PCOS and includes high levels of total cholesterol and LDL, triglycerides and low HDL. Lipid disorders are seen in about 65–81% of these women [10]. Metabolic syndrome, which involves abnormalities in the metabolism of sugar, fat, protein, and maintenance of blood pressure, is an important complication of PCOS [2]. Insulin resistance and the resulting hyperinsulinemia are proposed to be the underlying deleterious causes for the relationship of metabolic disturbances and reproductive dysfunction in PCOS. The metabolic phenotype of PCOS is exacerbated by increased adiposity, and the prevalence of PCOS is greater with overweight and obesity [11]. Adipose tissue dysfunction has been implicated as a contributor to insulin resistance in women with PCOS figure (1.1). However, a substantial number of lean women affected by PCOS have insulin resistance as well, independent of obesity. Vitamin D deficiency has been proposed as the possible missing link between insulin resistance and PCOS [12].

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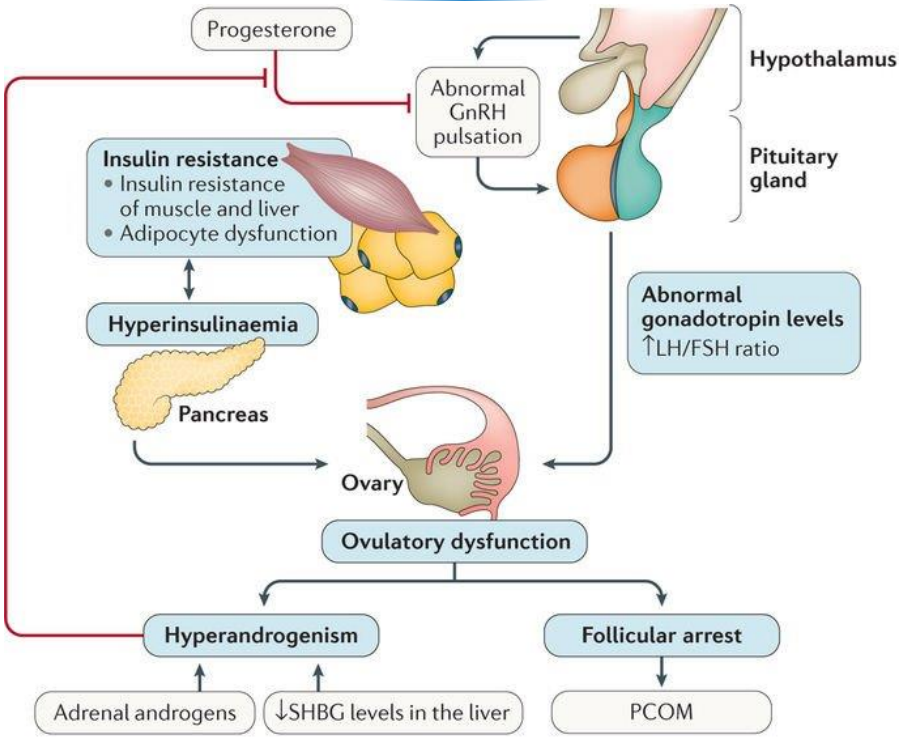

Fig. 1 Pathophysiology of PCOS [13]

2. PCOs and Vitamin D disturbance

Some studies have suggested that there is a relationship between serum levels of vitamin D and obesity and also other metabolic parameters in women with PCOS, including fasting glucose levels, fasting insulin resistance, high blood pressure, lipid disorders, fertility and other clinical and laboratory-related parameters associated with PCOS [14]. Some studies reported that obesity is a well-recognized risk factor in vitamin D deficiency. It was demonstrated an inverse correlation between body mass index and serum 25(OH)D concentrations in PCOS women [15]. Vitamin D receptor (VDR) is distributed across various tissues representing an active role of vitamin D in those tissues. The vitamin D receptor and vitamin D metabolizing enzymes are found in reproductive tissues of women and men. A study reported that vitamin D is involved in female reproduction including polycystic ovary syndrome (PCOS). In PCOS women, low 25-hydroxyvitamin D (25(OH)D) levels are associated with obesity, metabolic, and endocrine disturbances and vitamin D supplementation might improve menstrual frequency and metabolic disturbances in those women. Moreover, vitamin D might influence

steroidogenesis of sex hormones (estradiol and progesterone) in healthy women and high 25(OH)D levels might be associated with endometriosis [16]. Vitamin D is a steroid hormone. Vitamin D precursor 7-dehydrocholesterol is a normal intermediary in the cholesterol pathway and is present in the skin. Ultraviolet radiation induces the conversion of 7-dehydrocholesterol to provitamin D_3, which spontaneously isomerizes to cholecalciferol (vitamin D_3). A small amount of the body's total vitamin D is also derived from diet and/or supplements. This may derive from plants or fungi containing ergocalciferol (vitamin D_2) or fatty fish or cod-liver oil containing vitamin D_3. Vitamin D from the skin and diet is metabolized in the liver by the enzyme 25-hydroxylase (encoded by *CYP2R1*) to 25(OH)D, which is used to determine a patient's vitamin D status into vitamin D sufficient (25(OH)D ≥30 ng/ml; multiply by 2.496 to convert nanograms per milliliter to nanomoles per liter), vitamin D insufficient (25(OH)D 20–29 ng/ml), and vitamin D deficient (25(OH)D <20 ng/ml) [16]. Vitamin D3, a fat-soluble vitamin, can be produced in two ways: by intestinal absorption and endogenous synthesis from a precursor of 17-hydroxyl cholesterol on the skin with sufficient exposure to ultraviolet sunlight [17]. Serum 25(OH)D is the major circulating form of vitamin D and is used as the main indicator of vitamin D status. Its half-life is 2–3 weeks compared to only 4–6 hours for 1, 25(OH)2D [18]. Moreover, this assumption is supported by the finding that the active vitamin D-vitamin D receptor complex regulates over 300 genes, including genes that are important for glucose and lipid metabolism as well gonadal function [19]. Besides its role in calcium and bone metabolism, its deficiency causes a wide range of skeletal and extra-skeletal effects, with impact on glucose homeostasis, cardiovascular disease, cancer, autoimmune diseases and psychological disorders [20].

3. Objective

To establish the relationship between vitamin D deficiency, total cholesterol level, and the appearance of polycystic ovary syndrome in patients attending Kirkuk General Hospital.

4. Material and method

A cross-sectional study was made on 100 women aged 18-45 years old (60 women with polycystic ovary syndrome and 40 women with non-polycystic ovary syndrome as a control

group) selected from women attending Kirkuk General Hospital (Obstetrics and Gynecology Department), during the period from December 2018 to February 2019. Pregnant females, females taking multivitamins or smokers were excluded. A pre-tests questionnaire was used to obtain information from the participants about age, past medical history. A blood sample was obtained by using 5cc syringe, to examine 25-hydroxy vitamin D and total cholesterol levels. Patient with PCOS, females with PCO (ultra-sonographic detection of PCOs (> 12 follicles measuring 2-9mm) along with LH/ FSH ration >1 IU/L with oligomenorrhea (cycles > 35 days) or amenorrhea (fewer than 3 cycles in the past 6 months). In control group, females without PCO (normal female) were included. Controls selected as age-matched females who come as attendants with the patients. A blood sample was taken after at least 10 hours of fasting, for serum cholesterol investigation, serum concentration of 25(OH) D was measured by ELISA technique (LDN immunoassay and services, Germany). Statistical analyses characteristics are presented as mean & SD for continuous variables. T-Test probability interpreted as follows:

P value <0.01: Highly Significant.

$0.1 \leq (P\ value) \leq 0.5$: Significant.

P value > 0.05 : Non- Significant (NS).

5. Results

5.1. Relation of vitamin D with PCOS

Our study shows that serum vitamin D concentrations were highly variable in both PCOS patients and controls, also, there was a significant difference between PCOS patients and the control group concerning vitamin D level. The lowest mean of vitamin D was recorded among PCOS women (13.04±5.4 vs. 20.89±9.39), as shown in table (1.1) and figure (1.2). Normal level of Vitamin D: Deficient: less than 20 ng/ml, Insufficient: 20-29 ng/ml, Sufficient: 30 – 100 ng/ml.

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Table 1 Relation of vitamin D and PCOS

Parameters		PCOS (n:60)	Control (n:40)	T. Test	*P. value*
Serum Vitamin D	Mean	13.04	20.89	3.07	<0.05
	SD	5.4	9.39		

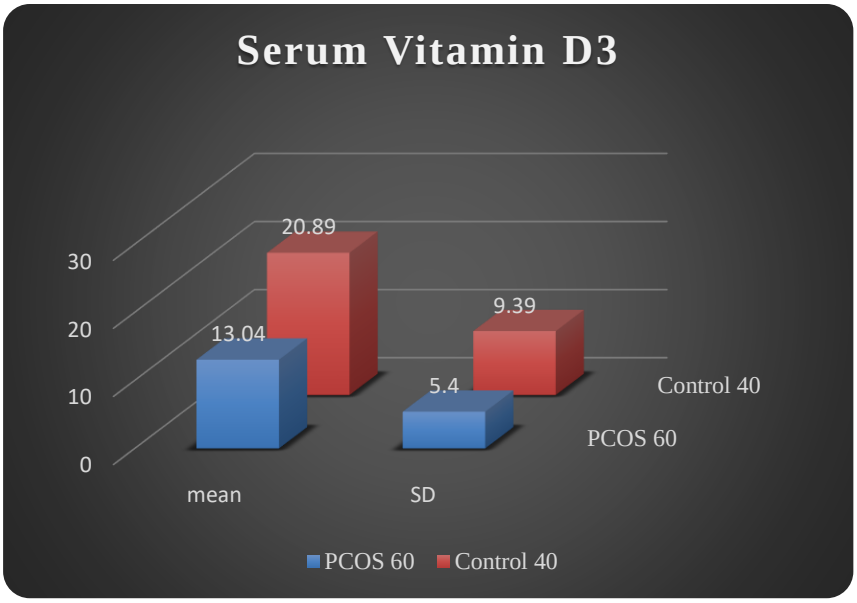

Fig. 2 Relation of vitamin D and PCOS

5.2. The relation between total cholesterol and PCOS

This study showes that the mean of total cholesterol in the PCOS women is higher than the mean in the control group (205.8±14.5 *vs.* 168.1±20.8 mg/dl), as seen in the table (1.2) and figure (1.3).

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Table 2 Relation between total cholesterol and PCOS

Parameter		PCOS Group	Control Group
		60	40
Total Cholesterol (mg/dl)	Mean	205.8	168.1
	SD	14.5	20.8
P- Value		0.01	

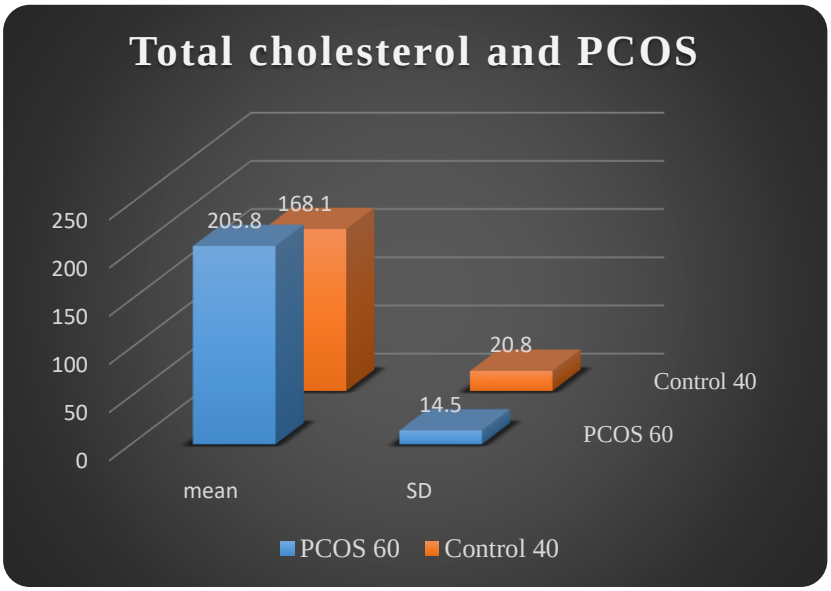

Fig. 3 The relation between total cholesterol and PCOS

5.3. Correlation of vitamin D with cholesterol

Our study shows that there is a highly significant correlation (*p*-value is .000053) between vitamin D and cholesterol in PCOS women and control group as seen in figure (1.4).

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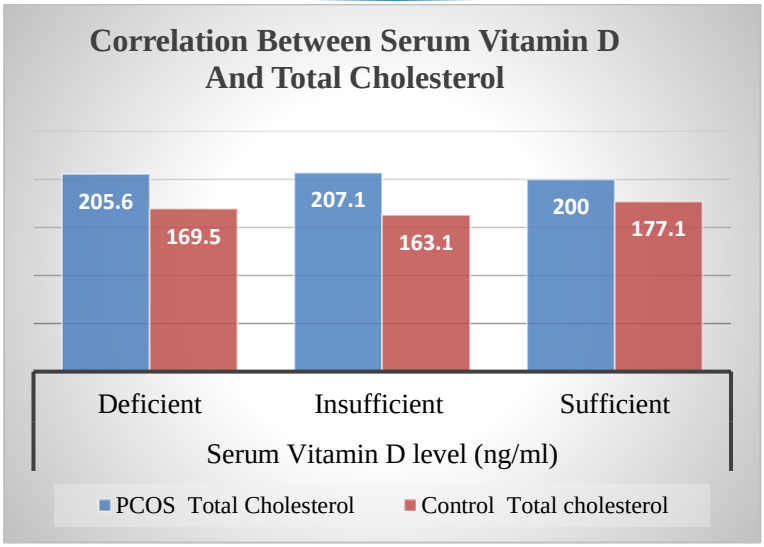

Fig. 4 Correlation of serum Vitamin D with total cholesterol in PCOS and Control group. Normal level of Vitamin D: Deficient: less than 20 ng/ml, Insufficient: 20-29 ng/ml, Sufficient: 30 – 100 ng/ml.

6. Discussion

PCOS is an endocrine disorder with multifactorial aetiology and various clinical manifestations. It's the most common cause of menstrual disorder and anovulatory infertility in women [21]. Our study showed that there was a significant difference between PCOS patients and the control group concerning vitamin D level and the lowest mean of vitamin D was recorded among PCOS women. Bashir *et al.* studies showed there was ascertained association between deficiency vitamin D and metabolic derangement seen in women with PCOs. It's fairly common for were with PCOs. That concomitant deficiency of vitamin D results in resistance to insulin, development of raised BP and biochemical derangements in Total Cholesterol, CRP, level of TG and LDL and HDL in blood [22]. Another study showed PCOs women had more predilection to cardiovascular disease than non-PCOs control (reference quote) [23]. Whereas other studies showed vitamin D higher in PCOs than in controls [24]. One meta-analysis failed to prove low levels of vitamin D in PCOs than non PCO control group [17]. A study by Mazloomi *et al* showed PCOs itself was associated with decreased vitamin D levels independent of other risk factors [15]. Thomson *et al* [26] found that vitamin D deficiency may exacerbate symptoms of PCOS, which was associated with insulin resistance, ovulatory and

menstrual irregularities, lower pregnancy success, hirsutism, hyperandrogenism, obesity and elevated cardiovascular disease risk factors and there is some, but limited, evidence for beneficial effects of vitamin D supplementation on menstrual dysfunction and insulin resistance in women with PCOS. Other study observed that most females are vitamin D deficient but no evidence is available regarding the association of POC with vitamin D deficiency. Moreover, other literature has reported controversial results [22]. Other results suggest that vitamin D treatment might improve glucose metabolism and menstrual frequency in PCOS women [27]. Our study showed that there was a highly significant relation between vitamin D and total cholesterol in PCOS patients and Control group. In a recent study, Rashidi *et al* [2] investigated the relationship between serum 25-OH-Vit D3 level and metabolic parameters in non-obese women with polycystic ovarian syndrome, they divided 88 non-obese women with polycystic ovary syndrome into two groups of normal weight and overweight (based on BMI) and evaluated serum levels of 25 (OH) D, FBS, CRP, TC, TG, LDL, HDL, INS, and IR. They observed that in 84.1% of women, there was a lack of vitamin D, but this finding did not differ significantly between the two groups. Their important finding was a significant correlation between 25 (OH) D and age and HDL serum levels. While Alexandra *et al.* reported that dyslipidemia is also common in PCOS and includes high levels of total cholesterol and LDL, triglycerides and low HDL. Lipid disorders are seen in about 65–81% of these women [10].

7. Conclusion

Our results find a considerable deficiency of vitamin D in both females that are with and without PCOs. Our results suggest that vitamin D treatment might help in treating PCOS as well.

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Preparing and Improving the Properties of Sodium Acrylate Polymer by Adding Dentonite for the Treatment of Desertification Phenomenon

[1]Hamid A. F. Al-Falahi, [2]Estabraq Ali Hameed
[1]Al-Kitab University / College of Engineering Department of Petroleum Engineering/ Kirkuk
[2]Northera Technical University / Al-Hawija Tech. Inst. Department of Petroleum Engineering/ Kirkuk, Iraq
[1]alfalahihamed@gmail.com, [2]chemist.tr258@gmail.com

ABSTRACT

The phenomenon of desertification has a negative impact on the national economy of any country and may usually be obtained for many reasons such as the removal of agricultural land, depletion of soil, overgrazing, methods of poor irrigation, high temperature, and the lack of rainfall. The following paper tackles solving the problem of the lack of rainfall through the use of chemical methods such as preparing sodium polyacrylate and improving its properties by means of adding bentonite and thus obtaining a new and improved water absorption compound. The study concludes that the suitable range of bentonite ratio that is between (0 - 20 wt %) ensures water absorption from 1340 gg - 1 to 1500gg – 1 and thus the researcher confirms that the cross-linked of the compound will not be changed and the absorption of water will be higher. The presence of bentonite with polymer at a perfect percentage contributes to the reorganization of the distribution of the granular size of the polymer sodium polyacrylate—a matter that is reflected on the growing of its ability to absorb water and thus becoming a suitable compound in the treatment of desertification.

Keywords: phenomenon of desertification, Superabsorbent, sodium polyacrylate, bentonite

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تحضير وتحسين خصائص بوليمر الصوديوم اكريلايت من خلال إضافة البنتونايت لمعالجة ظاهرة التصحر

أ. م. د. حامد عبدالله فياض, [2]م. م. إستبرق علي حميد
[1]جامعة الكتاب/ كلية الهندسة/قسم هندسة النفط/كركوك/العراق, [2]الجامعة التقنية الشمالية/ المعهد التقني الحويجة/ كركوك/العراق
[1]alfalahihamed@gmail.com, [2]chemist.tr258@gmail.com

الخلاصة

إن ظاهرة التصحر مشكله لها تأثير سلبي على الاقتصاد الوطني لأي بلد، وقد تحصل عادة لأسباب عديدة مثل إزالة الأراضي الزراعية، استنزاف التربة، الرعي الجائر, أساليب الري الرديئة, ارتفاع درجة الحرارة, وقلة هطول الأمطار. لذا تناولنا في هذا البحث معالجة مشكلة قلة هطول الامطار باستخدام الطرق الكيميائية، ذلك من خلال تحضير بوليمر الصوديوم بولي اكريلايت ومن ثم تحسين خصائصه عن طريق إضافة البنتونايت، وبالتالي الحصول على مركب جديد ومحسن عالي الامتصاصية للماء. وقد توصلنا الى ان نسبة البنتونايت المناسبة تقع ما بين (0 – 20 wt %) لضمان امتصاصية للماء من ($1340\ gg^{-1}$) الى ($1500gg^{-1}$)، والتي نضمن عندها عدم تغيير كثافة التشابك للمركب واعلى امتصاصية للماء. إن وجود البنتونايت مع البوليمر بنسب مدروسة قد ساهم في اعادة تنظيم توزيع الحجم الحبيبي لبوليمر الصوديوم بولي اكريلايت المحضر مختبريا، مما انعكس بالنتيجة على زيادة قابليته على امتصاص الماء، وبالتالي جعله مركبا مناسبا في معالجة ظاهرة التصحر.

كلمات رئيسية: ظاهرة التصحر، فائق الامتصاصية، بوليمر الصوديوم اكريلات البنتونايت.

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1. Introduction

The highly absorbent polymer can be defined as a special substance with hydrophilic groups and a minimal tangle. It is capable of absorbing hundreds of thousands of times from the mass of water and noting the difficulty of removing the absorbed water under pressure—a matter that reflects its excellent specifications.

This polymer has been used for many purposes such as medicine, health, agricultural, and industrial fields in addition to preparation of super absorbent materials [1-4]. Desertification is the degradation of land in arid, semi-arid, and dry sub-humid areas, resulting in the loss of plant life and biodiversity. Consequently, this leads to the loss of soils, the loss of land capacity for agricultural production, and the unsupported life of animals as humans as well. Desertification has a significant impact on the country's economic situation, resulting in a loss of up to $ 40 billion a year in agricultural crops and thus their rising prices [1].

Desertification creates an appropriate atmosphere for intensifying forest fires, raising winds, and increasing the pressures on the most important land resources, namely water. According to the World-Wide Fund for Nature, land loosed about 30% of its natural resources between 1970 and 1995. Desertification is a global problem experienced by many countries around the world. It is known that the decline in the capacity of the earth's biological production or the degradation of a fertile land produced at the rate obtained by conditions similar to the desert climatic conditions. Hence, desertification leads to reduction of the production of plant life. The total desert area in the world is about 46 million square kilometers. Desertification situations can be illustrated as follows:

Desertification and severity vary from region to region depending on the nature of the relationship between the natural environments on the one hand and between humans on the other. There are four degrees or categories of desertification identified by the United Nation's classification of desertification:

- **Poor desertification:** Very little damage or damage to vegetation and soil that does not affect the biological capacity of the environment.

- **Moderate desertification:** It is moderately damaged by vegetation, small sand dunes or small soil sediments, as well as soil salinity, which reduces production by 10-15%.
- **Severe desertification:** It is engendered by the spread of unwanted grasses and trees in pasture at the expense of desired and desirable species. Furthermore, it is caused by the increased activity of erosion—a matter that affects vegetation and reduces production by 50%.
- **Very severe desertification**: It is all about the formation of large, naked and active sand dunes, and the formation of many sediments, salts and soil salts [2].

The causes of desertification are engendered by many influential atmospheric and humanitarian conditions such as:

- The excessive use of the land that leads to soil depletion.
- Deforestation that works on land cohesion.
- Overgrazing that leads to the depravity the land's grasses.
- Poor irrigation methods that go hand in hand with poverty.

This means that the phenomenon of desertification is the transformation of highly productive and large fertile areas to poor areas regarding plant and animal's life; this is engender by either the brutality of man's dealings with them or with climate changes. The state of weakness and the weakness that the environment suffers from is either due to what man does or the lack of other effective natural factors which man does not get income from. Soil is the part that complains and grumbles every day of this bad treatment of the land. There is a difference between land and soil. The soil is the surface of the soil, which is suitable for the growth of the plants, and the roots which are penetrated in order to obtain the nutrients necessary for their growth. Soil is the foundation of agriculture and life. Soil was formed during complex processes and during a time period estimated at millions of years. It is influenced by many factors such as climate, temperature, humidity, wind, as well as agricultural treatment of irrigation, drainage, fertilization, repair and other agricultural transactions.

2. Factors Leading to Desertification

2.1. Climate changes such as:

- High temperature, lacking rain, and scarcity help to accelerate the evaporation and accumulation of salts in the territories.
- Bullets sweep soil and uproot crops threaten soil fertility.
- Sand dunes that cover plowing and planting by wind.
- The rising level of groundwater.
- Agriculture based on rain.
- Dependence on well water in irrigation—a matter that makes groundwater more salinity over time and thus increasing the salinity and desertification of the soil.
- Winds lead to a rapid drying and dehydration of plants especially if they persist for a long time. In addition, they tear and uproot plants especially when shallow roots lead to deforestation.

This may lead us to a more focus on wind, heavy rain, flood, in a sense that it causes erosion of soil, where thousands tons of soil particles containing organic matter, nitrogen, phosphorus, potassium, calcium, sulfur, and other elements are dumped every year. According to this context, the amount of polluted soil is more than the amount of fertilizer plants. Although erosion of soil has been a natural phenomenon since the time of immemorial, it has been increased significantly by man's increasing activities, as well as unconscious factors.

2.2. Removed Vegetation.

2.3. Overgrazing Especially in the Dry Period.

2.4. Unsustainable Agricultural Practices: such as tillage of the soil in times of drought is not appropriate in a sense that it leads to the disintegration of the surface layer of the soil, making them vulnerable to erosion. The drift is divided into two types:

- **Wind Drift:** The wind drift that produces dust and dust storms occurs at any time, depending on the intensity of the wind. It is particularly important in areas where

vegetation is degraded, especially when the wind speed is between 15-20 meters / second or more.

- **Water Drift:** Water erosion is caused by surface water jars or by rain drops. The effect of water erosion is increased when rain is heavy, so that the soil cannot absorb the rainwater and thus it is formed as a result of this flood.

3. Means of Reducing Soil Erosion and Desertification

- Identifying the causes of environmental degradation by means of environmental survey.
- Installing sand dunes which entail the erection of front and defensive barriers as front lines for sand progress.
- Establishing small windbreakers and covering sand dunes with dead vegetation.
- Oil derivatives, chemicals or rubber.
- Planting sand dunes next to suitable plants that blend with the middle of the sand dunes.
- Preserving natural pastures and developing natural vegetation.
- Stopping the expansion of rain fed agriculture at the expense of natural pastures.
- Exploitation of water in agriculture.
- Stop logging and logging for use as an energy source.
- Controlling irrigated agriculture and reviewing current irrigation and drainage methods.
- Dry agriculture, where plants that require little water and are highly drought resistant are cultured.
- Improving soil structure by adding organic matter to it and plowing it with the plants in which it lives.
- Eliminating the tendency to create terraces.
- Plowing land in the first rainy season.
- Creating ponds and lakes in the fields to stop the eruption of water.
- Constructing dams to reduce the strength of the fluid.
- Preserving vegetation and avoid overgrazing.
- Surrounding fields and lands prone to erosion with boulders from trees and shrubs.

4. Ways to Combat Desertification

It is very difficult to re-establish a new life in the desert land or towards comprehensive desertification. Therefore, fertile land must be preserved before it deteriorates and the most effective and economical causes of desertification should be eliminated. This is represented by:

- Regulation of grazing, grazing and mitigation of overgrazing and rangeland development.
- Organizing grazing on all grazing lands by controlling the movement of animals within the grazing area temporarily and spatially
- Trying to stop the sand dunes in several ways, including:

4.1. Mechanical Methods: By creating vertical barriers to the direction of the wind through:

- **Vegetative barriers:** There are many plants that have the ability to install sand. Roasting is the best in the installation process, but the appropriate plant species should be selected in terms of length, branching, root strength and resistance to extreme environmental conditions.
- **Hard barriers:** Using the newly industrialized barriers of walls or trunks of trees and strong interlocking with each other.

4.2. Chemical Methods: Such as oil derivatives in the form of spray that adhere to the surface soil, however; this method has risks such as pollution of soil and water and the negative the impact on plants.

4.3. Maintenance and Protection of Water Resources: Using these resources, rationalizing their use and using modern irrigation methods.

4.4. Developing Human Capacities: Using modern technologies and training specialists, especially in combating desertification such as remote sensing and aerial photography, determining the presence of underground water in the ground, and spreading

environmental awareness among citizens, especially farmers, livestock owners, and pastoralists.

5. Theoretical Background

The process of mixing polymers with liquids with low molecular weight and swelling and then melting them at the end is of great importance in the manufacture of these materials, as well as in the use of different walks of life. On the other hand, it is important to know the effect of different liquids, such as water and others, on polymer models. To answer the question of solvents the polymer melts in any case it is necessary to have a good background concerning the basic rules of polymer interference with low-molecular weight analyzers. In the case of low-weight materials, polymers dissolve in all liquids. Some polymers spontaneously dissolve in some solvents when they are placed in a direct contact with them, while lipid is readily soluble in other solvents. There is usually a common affinity between the polymer and the solvent in some cases and in others there is no such familiarity. The polymerization of polymers is practically observed. However, this process has certain pre-melting properties. The polymer begins to bloom [5], which increases the size and weight of the polymer as a result of the absorption of liquid particles. If we move the polymer model into small parts and then pour a little liquid over it, the swelling will appear at the beginning but after a while we will notice their overlapping with each other to be a homogeneous mixture of the polymer and the liquid absorbed. At this stage, the system is real.

The swelling process involves an inevitable change in the shape and size of the polymer, leading to a sharp increase in the size of the model and thus the swelling process may be limited or unlimited. Unlimited swelling is the process that automatically leads to melting and it is similar to the process of the full mixing of two different liquids such as water, alcohol, water, sulfuric acid and others.

The limited amplification is applicable to our research topic, as it involves the process of mixing polymers with liquids of fine size when it is limited. As such certain phase of absorption of the latter initially takes place, and does not notice the automatic appearance of the solution of the polymer. In other words, chains of the polymer are not separated

completely from one another. As a result, the two separate phases are formed, one from the solvent solution in the pulsed polyamide, and the other from the pure solvent (if the polymer is completely lithium) or a diluted solution of the polymer in the solvent. These two phases separate a clear surface in the equilibrium. It is also necessary to distinguish between the limited swelling of linear and interwoven polymers. The process in the case of linear polymers is similar to that of liquids.

Under certain conditions (such as heat and concentration), the swelling is limited, but the changed conditions may transform the limited swelling to be unlimited. It is recommended to add a small and enough amount of solvent at the beginning to cover the surface of the polymer with a thin layer. This process will lead to a faster polymerization, forming a permeable layer on the bulging surface, and then adding the remaining quantity of the solvent with the continuous stirring until we reach the desired concentration Blow Mold automatically into solution state. In some cases, the polymer is not fully melted. We observe small pieces of the floating polyamide floating in the inside of the dissolved medium. These particles are called Gelites. Therefore, the solutions must be separated in the solution in the absence of the desire to exist during the filter or by centrifugation. Many electrolytes have been synthesized with periodic replicates and these can be decomposed into ions such as acryl polycrystalline and polyethyl acryl acid and dissolve the salts of these acids (soluble in water). One of the most important materials is cross linkedpoly electrolytes. These polymers are brought together by being mixed carefully into the polymer's structure. The factors that indicate the way bulge and breakdown of polymers are affected are enlisted below:

The nature of the polymer and the solvent.

- Polymer chain elasticity.
- The molecular weight of the polymer.
- Chemical composition of the polymer.
- The crystalline structure of polymers.
- Chemical tangling between chains.
- Temperature.

Among many important points that this research tackles are whether the amount of tangling is relatively small. In other words, it examines whether the intertwining bonds are very long and thus the chances of the solvent molecules to penetrate through the polymer chains are high. In this case, some chains are removed from each other, resulting in a swelling of the partially tangle polymer. The greater the density of the tangles is, the more polymers' ability to absorb the solvent is decreased. The interlocking polymer loses its ability to bulge completely when the interlocking bonds become very short [5].

6. Practical aspect

6.1 Materials

- **Bentonite** is one of the important materials used in this research. There are different types of Bentonites (Potassium, Sodium, Calcium and Aluminum). It is used in other large fields such as Cement and Adhesives, Steel, Transformer Oil, Bentonite, Treatment of dermatitis [6]. Bentonite used in the practical part is clay with a layer of aluminum silicate with all active (OH) groups on the surface. It should be dried at 105 ^{O}C before use [7].
- **Acrylic acid**, a monomer is used in the preparation of the polymer, it is purified by refrigeration before being used.
- **Potassium Persulfate** is the catalyst for initiation of the first step of the polymerization process.
- **N, N-methyl enebic acryl amide**, is the substance used as a cross-linker.

6.2 Preparation of high - absorbent Polymer Poly Sodium Acrylate Pentolite

This polymer was prepared laboratory by Inverse Suspension, as well as the slow distillation of the monomer acid to the sodium hydroxide solution at 0 ° C, where it is cooled by a snow bath with constant stirring. By following:

- Adding the amount of bentonite (which we will determine in the experiment) to the sodium acrylate solution.
- Then, cyclohexane with sodium hydroxide and sorbitan monostearate.
- Nitrogen pressure, N (N-methyl enebisacryl amide) and potassium persulphate are placed on the mixture that will stir at room temperature for 30 minutes.
- The mixture will be placed in a water bath where it is slowly heated at 65o C with a continuous movement for 90 minutes
- Filtering the solution and then washing it with methanol for three times.
- Drying in oven 70°C for more than 24 hours until the weight is stabilized and results in a powder which is the highly absorbent compound that is called poly sodium acrylate bentonite.

6.3 Method of Working and Measurements

- We take 3gm from the dry powder prepared and put it in (500 ml) of distilled water at a lab temperature for 4 hours to reach the state of bloating [10].
- We work to separate the water-blown from other elements, which did not absorb the water by filtration.
- The following equation is applied to calculate water absorption (Q_{H2O}) [11].

$$Q_{H_2O} = \frac{m_1 - m_2}{m_1 - m_0} = \frac{m_2 - m_1}{m_1 - m_0} \quad (1)$$

Whereas.
m_0 = weights of clay in the sample (gm).
m_1 = dry sample polymer (3gm).
m_2 = swollen sample.

7. Results and Discussion

The effect of the quantity of bentonite added to the polysodium acrylate compound is shown in Tables (1), (2) and Figure (1). Therefore, we can see that QH2O increases from 1340gg-1 to 1500gg-1, and this occurs when the percentage of the added Bentonite increases (0-20 wt %). We also note that after adding 20 wt% of bentonite, QH2O begins to decrease gradually. The polymerization compound is a bond between the acrylite and bentonite [10],

which plays an important role in the formation of the compound. When the quantity of bentonite is as appropriate as the weights between (0-20 wt %), the tangling density of the compound does not change or it is changed slightly [11]. The super absorbent compound has enough space to absorb and hold water molecules. As the pentonite increases in the compound (25 wt %) or (30 wt %), the density of the entanglement increases and the vacuum begins to shrink [12], making it difficult to receive the water molecules in the compound. Thus, QH2O decreases with the increase of the percentage of bentonite [13].

Table 1 The values of m_0, m_1, m_2 are shown in gram units

No.	Weight of clay in the sample, m0 (gm)	Dry sample polymer, m1 (gm)	Swollen sample, m2 (gm)
1	0	3	4020
2	0.05	3	4127
3	0.1	3	4144
4	0.15	3	4215
5	0.20	3	4200
6	0.25	3	3957
7	0.30	3	3642

Table 2 Q_{H2O} values are shown according to the quantities used in Table (1)

No.	QH2O g.g -1
1	1340
2	1398
3	1428
4	1478
5	1500
6	1440
7	1348

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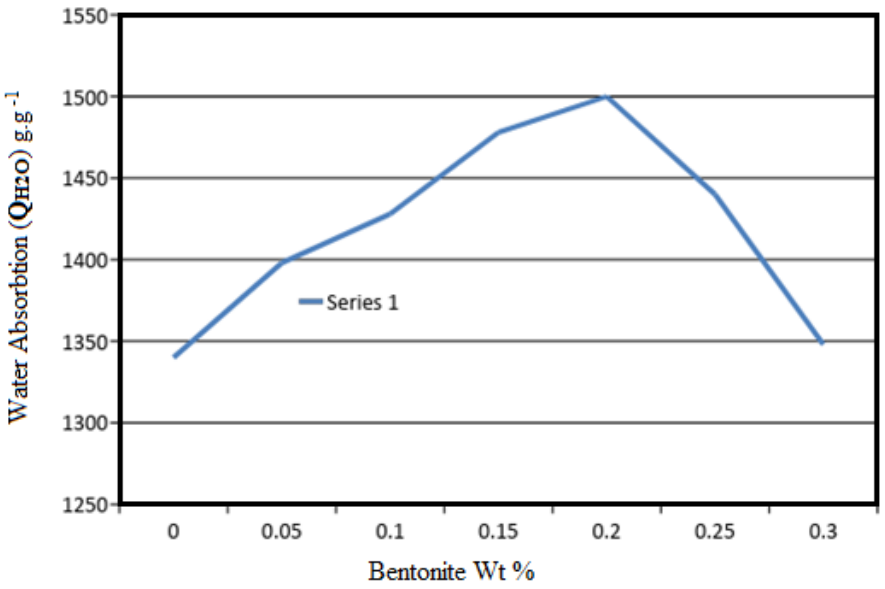

Fig. 1 The relationship between (Q_{H2O}) and the amount of bentonite added (wt %)

8. Conclusions and Recommendations

a. In this paper, a very important phenomenon was discussed: the phenomenon of desertification and how to deal with adding bentonite to the sodium acrylate polymer, where we found that there is a limited quantity of bentonite added to increase the absorption of water and above. The inverse takes place because the density of the entanglement increases, and the void start to shrinkage and finds difficulty in receiving water molecules.

b. When the quantity of bentonite is as appropriate as the weights between 0-20 wt %, the tangent density of the compound does not change, or it is changed slightly. Hence, it has enough void to absorb and hold the water molecules.

c. The erroneous notion must be corrected. In spite of the fact that desertification is the result of a lack of rainfall, there are many and more serious reasons for this phenomenon.

d. Afforestation and application of agricultural activities or cultivation of drought-resistant crops.

e. Strengthening the possibilities of scientific research and training in countries suffering from desertification and drought through the establishment of efficient training programs for the conservation of natural resources.

f. Providing means of training and technology to exploit alternative energy sources, especially renewable sources.

g. The lack of excessive or inappropriate exploitation of land, as well as the less paid attention to the phenomenon of overgrazing and the use of poor irrigation methods.

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An experimentally investigate the effect of physical properties on the production of lubricating materials from crude oils

Hazim Abed M. Al-Jewaree, Omar Adil M.Ali
Petroleum Engineering Department, Al-Kitab University
drhaaljewary@yahoo.com, omarnhh73@gmail.com

Abstract

One of the most important oil derivatives in our time, which all the world seeks to obtain and produce a lot is lubricating oils, which are used for several important purposes and the most important is to keep the thermal engines from damage or collapse due to the phenomenon of friction of the moving parts mechanically at a high temperatures and pressure is relatively high as well as the wear phenomenon This research effort focuses on a comparative study of five types of mix crude Libyan oils (El-Feel Field, Al Wafa Field, Amina Field, Brega Field and Al-Sedra Field) for produced the lubricated oil experimentally . Test carried out on the production the lubrication oil by measuring the physical properties include: normal boiling point, pour point, specific gravity (Sp. gr.), standard density (API), dynamic viscosity (η), kinematics viscosity (ν), Acentric factor and Watson factor (K or K_w).

It's found from the practical results of the production the lubricating oil from crude oil for atmospheric distillation of crude oil practically depends on measurement two physical properties very accurately Watson factor first and then the API. The results from the tests showed that, mix crude oil of Amena, El-Sedra and El-Feel fields suitable than others for production the lubricated oil at atmospheric and then use the vacuum distillation columns. Other results observation, that's two others types are impossible to produce the lubricated oil. Also, the results observed that's the useful mole percentage of lubricated oil cutoff has range very

small from 2 to 17 % for these types of Libyan crude oils, this percentage will be increase when use vacuum distillation with added some additives materials.

In addition, practical results have been found that not all the cutoff produced from atmospheric distillation within the range of temperatures between 370 and 550 ^{o}C are lubricating oils, but other compounds are oil derivatives suitable for different fuel depending on the chemical structure of these extracts. The final conclusion of this work is that any crude oil with a light Arabic class (has a relative density API less than 38 and a K_w lower than 12.1) is suitable for the production of lubricated oils from the crude oil.

Keyword: physical properties of crude oil, lubricated oil, Libyan crude oil

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دراسة عملية لتوضيح تأثير الخواص الفيزيائية لإنتاج الزيوت من النفط الخام

[1]أ.د.م. حازم عبد محمد الجواري, [2]م.م. عمر عادل محمد علي
[1]رئيس قسم هندسة النفط – كلية الهندسة – جامعة الكتاب, [2]مقرر قسم هندسة النفط – جامعة الكتاب,
[1]drhaaljewary@yahoo.com, [2]omarnhh73@gmail.com

الخلاصة

من اهم المشتقات النفطية في وقتنا الحاضر الذي العالم جميعا يسعى الحصول عليها وانتاجها بكثرة هي زيوت التزيت والتي تستخدم لعدة أغراض مهمة واهمها هي الحفاظ على المحركات الحرارية من التلف او الانهيار بسبب ظاهرة الاحتكاك لاجزائها المتحركة ميكانكيا عند مستوى عالي من الدرجات الحراية وضغط مرتفع نسبيا وكذلك التقليل بعض الاحيان أو القضاء على ظاهرتي الاحتكاك و البلى للمعادن الذي يحدث نتيجة هذه الحركة الميكانكية المستمرة للاجزاء الصلبة مع بعضها البعض والتي قد تعمل لمدة 24 ساعة في اليوم .وبناءً على ذلك ، يركز هذا الجهد البحثي على دراسة مقارنة لخمس أنواع من االنفوط الخام الليبية وهي مزيج نفطي لكل من (حقل الفيل ، حقل الوفاء ، حقل أمنة ، حقل البريقة وحقل السدرة) لإنتاج الزيوت التزيت عمليا بالاعتماد على التقطير الجوي للنفط الخام وكذلك قياس الخواص الفيزيائية لهذه القطفاتً.ثم التقطير الفراغي للقطفات التي يتم الحصول عليها ضمن المدى من درجات الحرارة بين 370 الى 550 مئوي.

نلاحظ من النتائج العملية لانتاج زيوت التزيت وجد ان عند التقطير في برج الجوي والذي يتبعه تقطير تحت الضغط الجوي للنفوط الخام عمليا تعتمد كمية الانتاج لزيوت التزيت على خاصيتن فيزيائيتن يجب حسابهما بدقة وهما معامل واطسون اولا ثم بعد ذلك على الكثافة النسبية العالمية كما موضح في الجدول الثاني وان امكانية أنتاج زيوت التزيت لمزيج النفط الاول و الثالث والخامس ممكنة جدا وبنسب معقولة ويزداد لو استخدمنا التقطير الفراغي للنسب المتبقية بعد درجة الحرارة الاكثر من 600 مئوي والتي سوف تزداد من النسبة الوزنية لقطفات زيوت التزيت ولايوجد قطفات معتبرة لزيوت التزيت للنفوط

الخام للمزيج النفطي للحقل الثاني والرابع وقد وجد هناك فرق واضح بين النسب الوزنية للقطفات التي تحتوي الاوزان الجزيئية لزيوت التزيت التي هي ضمن المدى لدرجات الحرارية للدراسات السابقة ضمن برج التقطير الجوي وبين حقيقة الكميات المنتجة من زيوت التزيت ضمن البرج الضغط المتخلخل.

وايضا تم التوصل من النتائج العملية ان ليس كل المركبات المنتجة من التقطير الجوي ضمن المدى لدرجات الحراة بين 370 و550 مئوي هي عبارة عن زيوت التزيت وانما هي مركبات أخرى عبارة عن مشتقات نفطية تصلح كوقود مختلف اعتمادا على التركيب الكيميائي لهذه القطفات. والاستنتاج الاخير من هذا البحث ان النفوط الخام ذو الصنف العربي الخفيف والمتوسط (اي لها كثافة نسبية قياسية أقل من38 ومعامل واطسون أصغر من 12.1) صالحة لانتاج زيوت التزيت من النفط الخام باستخدام برج التقطير الجوي والمتخلخل توالياً.

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1. Introduction

It is important to determine the physical and chemical characterizations of crude oil through a crude oil assay, since they are used in different areas in the petroleum refining industry. The most common applications of petroleum assays are:

1. To supply engineering companies with detailed crude oil analyses for their process design of petroleum refining plants.
2. To determine if during refining the crude oil will meet environmental and other standards.
3. To provide extensive detailed experimental data for refiners to establish the compatibility of a crude oil for a particular petroleum refinery.
4. To anticipate if the crude oil will fulfill the required product yield, quality, and production.
5. To help refiners to make decisions about changes in plant operation, development of product schedules, and examination of future processing ventures. The schematic diagram of refinery process is illustrated in the next figure.

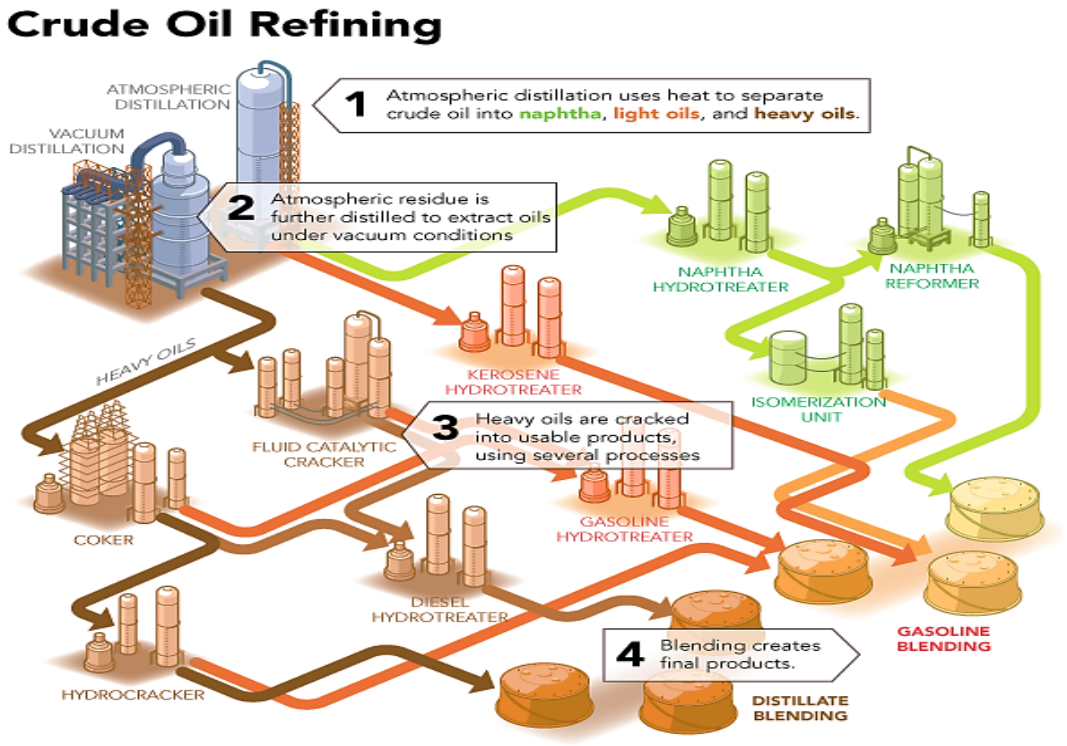

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Fig. 1 Production Process Schematic for Crude Oil Refining [10]

A crude oil assay is a compilation of laboratory (physical and chemical properties) and pilot - plant (distillation and product fractionation) data that characterize a specific crude oil. Assay analyses of whole crude oils are carried out by combining atmospheric and vacuum distillation units, which when combined will provide a true boiling - point (TBP) distillation. These batch distillation methods, although taking between 3 and 5 days, allow the collection of a sufficient amount of distillation fractions for use in further testing. The values of the distillation ranges of the distilled fractions are usually defined as summarized in the next table.

Table 1 Typical Distillation Range of Fractions in Petroleum Assays

TBP Distillation Range (° C)	Distillate
TBP – 71	Light straight - run naphtha
71 – 177	Medium straight - run naphtha
177 – 204	Heavy straight - run naphtha
204 – 274	Jet fuel
274 – 316	Kerosene
316 – 343	Straight - run gasoil
343 – 454	Light vacuum gasoil
454 – 538	Heavy vacuum gasoil
370 – 550	Lubricated oil
R538 ° C +	Vacuum residue

On the basis of their refinery product classifications. The most common distillation ranges used in international assays of crude oils are reported in Table 1. There are various types of assays, which vary considerably in the amount of experimental information determined. Some include yields and properties of the streams used as feed for catalytic reforming (naphtha) and catalytic cracking (gas oils). Others give additional details for the potential production of lubricant oil or asphalt. At a minimum, the assay should contain a distillation curve (typically, TBP distillation) for the crude oil and a specific gravity curve. The most complete assay includes experimental characterization of the entire crude oil fraction and various boiling - range fractions. Curves of TBP, specific gravity, and sulfur content are normal data contained in a well – produced assay [13&14].

It is clear that light and heavy crude oils have remarkable differences. Heavy petroleum is characterized by low API gravity, large amounts of impurities, and low distillates yields; light petroleum is of much better quality. In general, the lower the API gravity (i.e., the heavier the crude oil), the higher the impurities content and the lower the distillates yield. Such properties make processing of heavy petroleum different from that used for light crude oil refining. In general, light crude oil is rich in light distillates, and heavy crude oil, in residuum. However, the petroleum composition may vary with its API gravity and origin. Physical properties and exact chemical composition of crude oil also vary from one source to another [Halder & et.al, 1984 and Malone, 1989]. Lubricated oil depend on viscosity. Viscosity is defined as the force acting on a unit area where the velocity gradient is equal at a given density of the fluid. Viscosity is strongly depending on the temperature. With increasing temperature, the viscosity has to be stated for a certain temperature. It is the characteristic of a liquid which relates a shearing stress to the viscosity gradient it produces in the liquid. Lubrication oils are identified by Society of Automotive Engineers (SAE) number. The SAE viscosity numbers are used by most automotive equipment manufacturers to describe the viscosity of the oil they recommend for use in their products. The greater or higher the SAE viscosity numbers, the more viscous or heavier is the lubricating oil (Coyler, (2000)). Viscosity numbers are given in terms of say bolt second universal, SSU. The addition of certain additives is for the improvement of viscosity-temperature characteristics. The important functions of lubricants are as follow (James, 2006).

1. It reduces wear and tear of the surfaces by avoiding direct metal to metal contact between the rubbing surfaces, i.e. by introducing lubricants between the two surfaces.
2. It reduces expansion of metal due to frictional heat and destruction of material.
3. It acts as coolant of metal due to heat transfer media.
4. It avoids unsmooth relative motion.
5. It reduces maintenance cost.
6. It also reduces power loss in internal combustion engines.

A lubricating oil becomes unfit for further use for two main reasons: accumulation of contaminants in the oil and chemical changes in the oil. The main contaminants are water content, soot, carbon and lead. Lubricated oil usually consists of a base fluid, generally of petroleum origin, combined with additive chemicals that enhance the various desirable

properties of the base fluid. Base fluids are essentially obtained from two main sources: the refining of petroleum crude oil and the synthesis of relatively pure compounds with properties that are suitable for lubricants. Oil from the automotive sources will include mono and multi-grade crankcase oils from petrol and diesel engines, together with industrial lubricants that have been inadequately segregated may also be included (Gergel and La Tour, 1977). Lubrication oil is used to provide a film between the moving parts of machine and engines to prevent wear with little or no loss of power. The conventional steps in lubricating oil manufacture are pretreatment of the crude oil charge, followed by distillation of the crude in two steps (an atmospheric tower and vacuum tower), deasphalting (as required by the nature of the crude oil charge), dewaxing, solvent extraction, filtering and blending including mixing various additives with the final lubricating oil (Nadkarni, 1991). The prime objective in the production of lubricating oil is the separation of wax distillate and cylinder stock without any decomposition or cracking of the lubrication oil fractions, thus a vacuum distillation unit is used to separate the wax distillate and the bottom stock at a lower temperature (Concawe 1993). The properties which make the high boiling paraffin hydrocarbon suitable for lubricating manufacture include stability at high temperatures, fluidity at low temperature, only a moderate change in viscosity over a broad temperature range and sufficient adhesiveness to keep it in place under high shear forces. The vacuum tower produces some fuel oil overhead which is sold as a separate product or sent to another area of the refinery for further processing and blending (Concawe 1997). The two main products from the vacuum tower are wax distillate and cylinder stock which is the bottom product. Both streams contain desirable lubricating oil constituents as well as by-products. The wax distillate is charged directly to the dewaxing unit. The vacuum tower bottoms, or cylinder stock are charged to deasphalting unit. These two fractions from the basic stock for lubricating oil manufacture (Hamad, 2005). Refining engineers analyze the True Boiling Points (TBP) curves of the cuts present to determine the behavior of the crude distilled and various saleable products [Liang & et.al, 2010]. Abdolhossein & et.al (2013) study the effect of interfacial tension and miscibility of the CO_2 in Iranian crude oil and at vacuum distillation system. Recently, Al-Jewaree, 2017 investigate a comparative work to measure the physical properties by a modern software with the practically laboratory process results for several types of crude oil. The results were very close and the difference is simple.

2. Experimental method:

The first step in petroleum refining is usually a desalting operation, followed by heating in a furnace where the oil is partially vaporized. The mixture of hot liquid and vapor enters a fractionating column operating at slightly above atmospheric pressure. This device separates groups of hydrocarbons according to their boiling range. A heavy black residuum is drawn from the bottom of the atmospheric tower. Because the residuum tends to decompose at temperatures above 700°F (371°C), higher boiling oils such as lubricating oils must be distilled off in a separate vacuum fractionating tower. The greatly reduced pressure in the tower markedly lowers the boiling points of the desired oil compounds. Bottom materials from the vacuum tower are either used for asphalt or are further processed for other materials such as bright stocks. The fractions separated by crude distillation are referred to as "straight run" products. Petroleum lubricating oils are made from the higher boiling portion of the crude oil that remains after removal of the lighter fractions. They are prepared from crude oils obtained from most parts of the world. These crude oils differ widely in properties. An example of the complexity of the lubricating oil refining problem is the variation that can exist in a single hydrocarbon molecule with a specific number of carbon atoms. A paraffinic molecule with 25 carbon atoms, representing a compound falling well within the normal lubricating oil range, would have 52 hydrogen atoms and could have about 37 million different molecular arrangements. The schematic diagram of two types of distillation tower are shown in figure 2, which are needed for production the real weight percentage of lubricants.

Standard ASTM D-2887 is a simulated distillation standard up to approximately 540°C (1,000°F) atmospheric equivalent boiling point. However, recent efforts have focused on extending the range up to 650°C (1,200°F). This test method is one of a number of tests conducted on a crude oil to determine its value. It provides an estimate of the yields of fractions of various boiling ranges and is therefore valuable in technical discussions of a commercial nature. The fractions produced can be analysed as produced or combined to produce samples

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for analytical studies, engineering, and product quality evaluations. The method used in this work to obtain the experimental percentage weight curve was performed under conditions established in ASTM D 482.The properties of most light weight distillate Arab oil are: API grade density and specific gravity at 15.6 ^{o}C, Watson factor and other physical properties are measured under standard ASTM D1298.

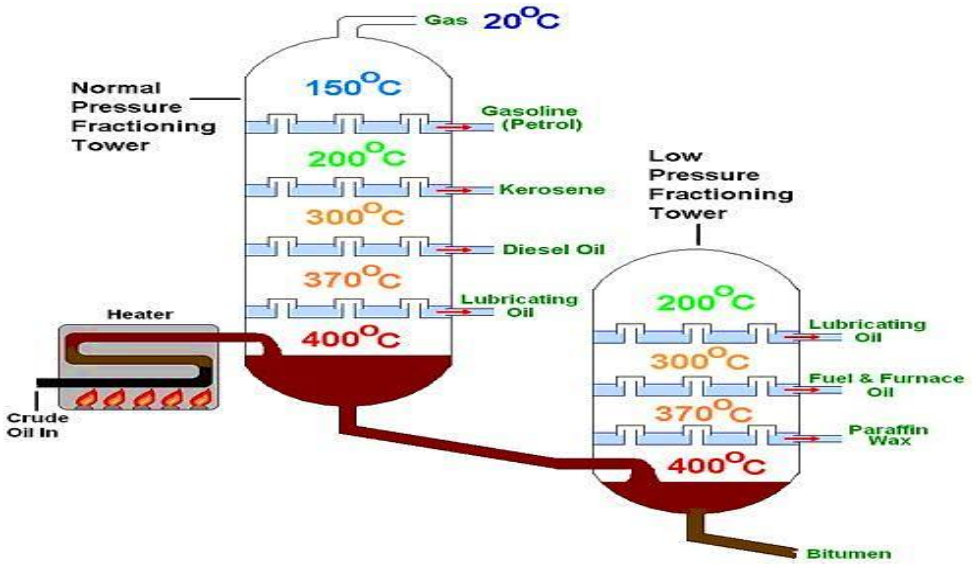

Fig. 2 Schematic diagram of two distillation towers [10]

3. Results and Dissuasions:

Five types of Libyan crude oil are used for our experimental work to examine the possibility of production the lubricated oil. This done by measured the physical properties at laboratories of Libyan petroleum Institute. These types are named as follow: Blend-1 is El-Feel oil field mix, Blend-2 is El-Wafa oil field mix, Blend-3 is Amena oil field mix, Blend-4 is El-Brega oil field mix and Blend-5 is El-Sadra oil field mix. The experimental results for above physical properties to these types of Libyan crude oil are done by automatic atmospheric distillation column as illustrated in next figure.

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Cutoff oC	Cumulative Yield wt.% [Blend1]	Cumulative Yield wt.% [Blend2]	Cumulative Yield wt.%% [Blend3]	Cumulative Yield wt.% [Blend4]	Cumulative Yield % [Blend5]
5 - 50	3.9	9.8	2.6	5.78	3.96
50 – 70	5.15	17.61	4.75	6.83	5.66
70 -90	7.2	21.9	7.22	8.95	7.64
90-110	11.43	31	9.74	11.44	10.75
110-130	16.35	37.4	12.78	14.93	14.39
130-150	20.5	43.22	16	19.48	17.43
150-170	28.73	48.65	18.9	23.7	21.1
170-190	31.24	53.2	22.15	31.2	23.57
190-210	35.65	55.3	24.87	36.54	26.85
210-230	40.24	58.73	28.23	40.64	30.33
230-250	44.85	61.86	32.07	44.86	33.57
250-270	48.73	63.67	35.44	48.8	37.65
270-290	52.88	65.1	39.13	52.9	41.12
290-310	56.78	68.83	42.85	55.65	44.86
310-330	61.2	70.22	45.74	59.2	48.73
330-350	64.13	72.57	48.78	62.4	52.44
350-370	67	74.8	50.06	65.74	56.92
370-410	71.8	77.65	51.11	73.36	60.45
410-430	74	79.8	55.83	75.24	64.62
430-450	77.54	82.48	63.42	77.56	68.55
450-470	83.25	84.55	67.65	80.72	70.83
470-490	89.65	86.55	69.87	84.2	73.66
490-510	90.45	90.36	71.68	86.3	80.25
510-530	91.87	93.47	73.47	88.46	82.34
530-550	93.5	95.1	75.56	92.26	83.8
550-570	95.3	97.54	78.93	94.34	86.53
570-590	96.5	99.1	80.22	98.67	88.1
590-610	100	100	83.57	100	90.35
>610			100		100

Table 2 The results of atmospheric distillation for five Libyan crude oils

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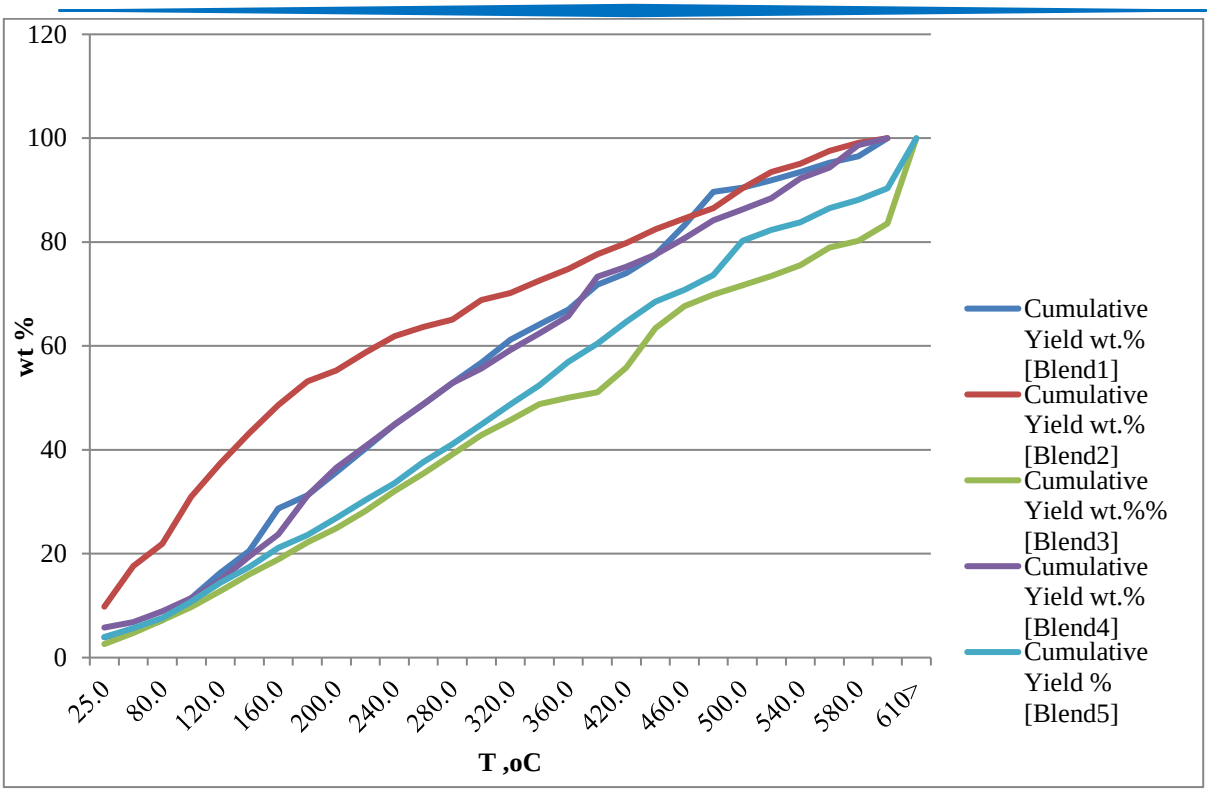

Fig. 3 The cumulative yield of cutoff wt % for the range of distillation temperature to the five Libyan crude oil mix Blends

Table 3 The results of the range of Lubricated oil cutoff to both methods of distillations the suitable range of temperature from 370 to 550 ºC

Blend	API	Wt % of Lubricated oil Cutoff by Atmospheric distillation	Actual wt.% of Lubricated oil by Vacuum distillation	Watson Factor
Blend-1	38.4	21.75%	16.75%	11.85
Blend-2	56.3	17.48%	1.78%	12.57
Blend-3	36.7	24.45%	14.15%	12.3
Blend-4	42.6	18.9%	4.9 %	12.1
Blend-5	37.8	23.35%	14.75%	12

The results for five Libyan crude oils are drawn in the next bars figures. It can be deduce from this results, that's very different in physical properties due they comes from different area and each of them has different geology and history. They have different API and Watson factor and these leads to different weight percentage of lubricated oil as summarized in table 3.

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In petroleum industry, API gravity is widely used to qualify the petroleum fractions which was introduced by the American Petroleum Institute (API). The API gravity is defined as: [8]

API gravity = [141-5\ S.G (60 ^{o}F)] – 131.5

Generally, API gravity values are higher for light hydrocarbon fractions and lower for heavy hydrocarbon fractions. Sometimes, it has been used as an input parameter with Watson characterization factor (Kw) to predict the properties such as molecular weights and kinematic viscosities of the fractions. But in our work these two parameters has predict and indicate the lubricated oil cutoff.

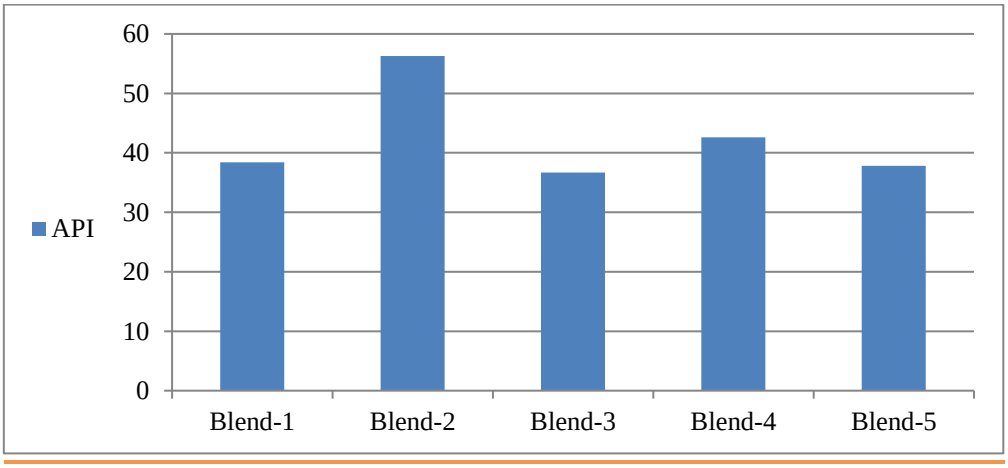

Fig. 4 Bar graph shown the experimentally of API to the five Libyan crude oil mix

The Watson characterization factor ***(K_w)*** is one of the oldest characterization factors originally defined by Watson et al. of the Universal Oil Products (UOP) in mid 1930s. This parameter is defined as [7]:

$$K_w = \frac{T_b^{1/3}}{SG} \quad \text{where } T_b = \text{normal boiling point } {}^{o}R$$

The naphthenic hydrocarbons have K_w values between paraffinic and aromatic compounds. In general, aromatics have low K_w values while paraffin's have high values. The minimum value is found about 11.8 for El-Feel oil mix field and another's two Blends

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(4& 5) has value less than 12.1, that's means these crude oils have a paraffinic – naphthenic compounds. While Blends (2 & 3) have paraffinic compounds only because the K_w more than 12.1.

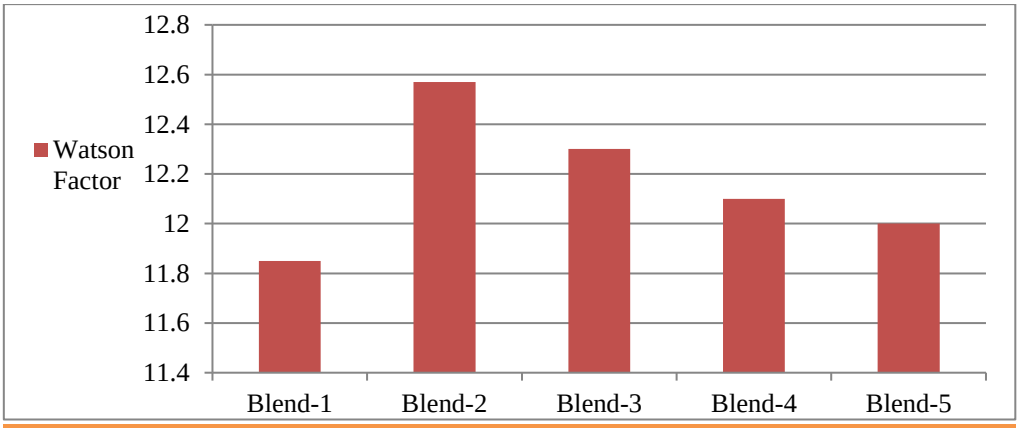

Fig. 5 Bar graph shown the experimentally of Watson factor [Kw] to the five Libyan crude oil mix

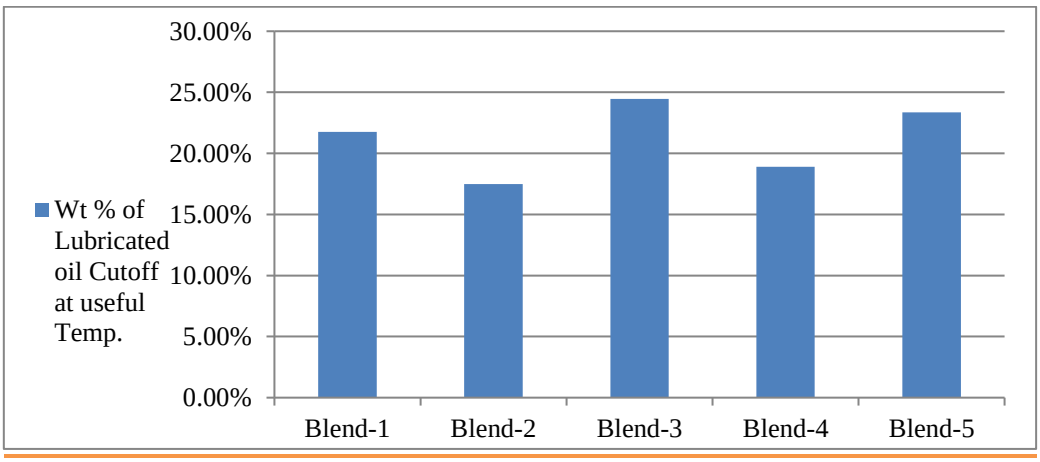

Fig. 6 Bar graph shown of lubricated oil cutoff from the Atmospheric distillation at useful range of temperature

Normally, the heavy hydrocarbons in crude oil undergo a cracking process beyond 370°C; the cracking process where heavy hydrocarbons start to decompose in to small hydrocarbon chains. To avoid this decomposition of hydrocarbons, the further distillation operations after atmospheric (the distillation above 370°C) are conducted under vacuum or at reduced pressure.

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The vacuum distillation not only helps to avoid the cracking of hydrocarbons, but also reduces the boiling points of heavy hydrocarbons in order to achieve more and more boiling points for the crude oil without any significant cracking. The vacuum distillation column in the lab work at pressure from 100 to 250 mm consist of (1) the feed input crude oil, (2) vacuum distillation column, (3) the lubricated oil cutoff and (4) control pressure valve as illustrated in figure 7.

Fig. 7 Vacuums distillation for the useful cutoff come from the range of 370 to 550 ^{o}C

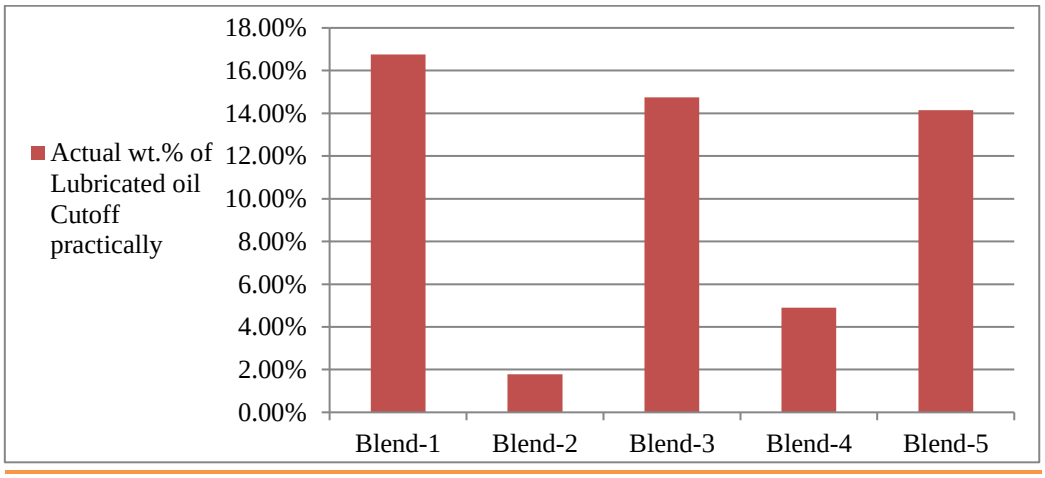

Fig. 8 Bar graph shown actual wt% of lubricated oil gain from vacuum distillation

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The results of vacuum distillation are illustrated that's, blends (1,3 and 5) are suitable for production the lubricated oil cutoff due the API no. less than 40 and Watson factor less than 12.1.

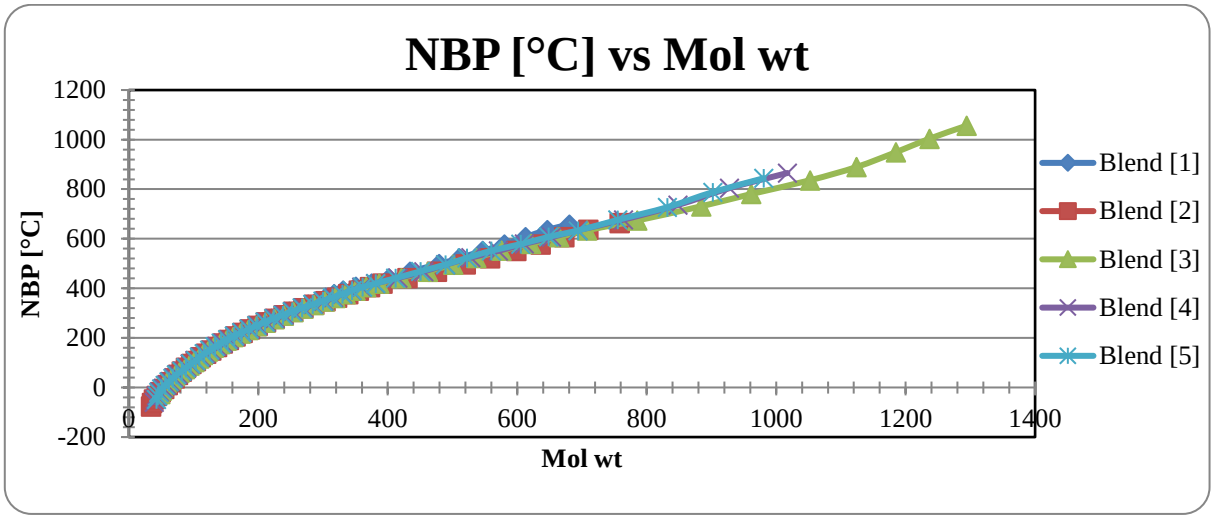

Fig. 9 Normal boiling Point with Molecular weight for different Libyan Blends

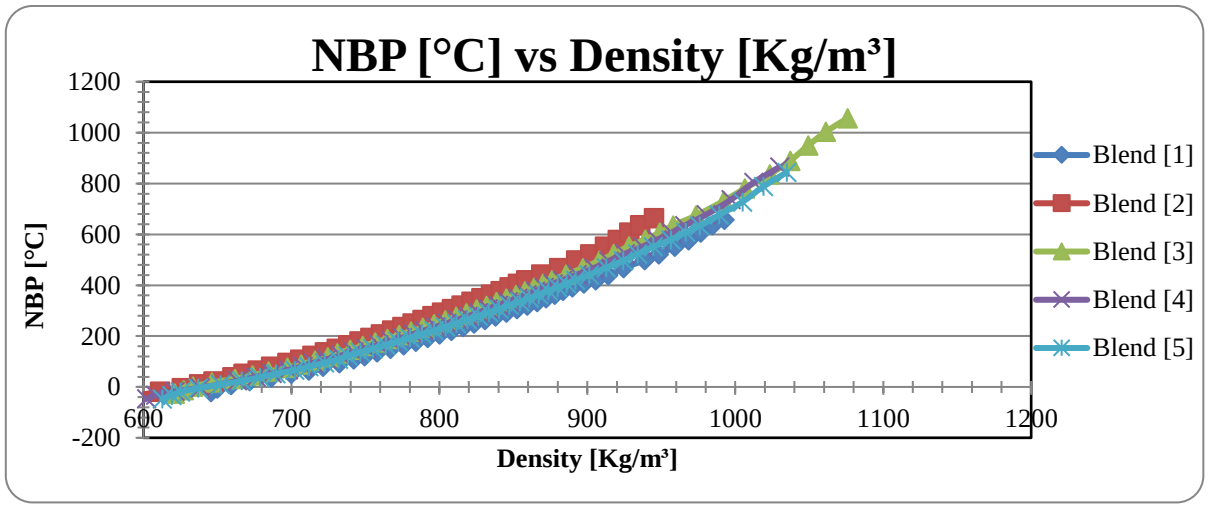

Fig. 10 Normal Boiling Point with density for different Libyan oil Blends

It's clear from the above results at atmospheric distillation of five types of crude oil. Blend-3 has a wide range of molecular weight from 22 to 1295 gm\mole due to the lowering stander specific gravity API=36.7 with small different on Blend 5 at the normal boiling oil temperatures. Blends 2 and 4 has lower molecular weight range for the same range of cutoff

temperatures. Also, as shown in figure 7, the Blend -3 has a high range of cutoff densities from 600 to 1076 kg\m^3 and these also indication for suitable lubricated oil cutoff.

The normal boiling point is very important to approach the possibility of production the lubricated oil by examine the molecular weights of distilled crude oil in the range between 370 to 550 C^o, ^{at} atmospheric distillation.

4. Conclusions

It can be concludes from this research work, that's the experimental results of the production of lubricating oil from any crude oils found that when the atmospheric distillation of crude oil practically results depends on two physical properties must be calculated accurately Watson factor first and then on the specific relative density API as shown in table 3. Also, the possibility of production lubricating oils from the Blend-1, Blend-3 and Blend-5 are suitable for atmospheric distillation and this increasing, if we use the vacuum distillation. There is a clear difference between the weight percentages of the plate's cutoff, which are containing the molecular weights of the lubricated oils within the range of temperature degrees [370 to 550 ^{o}C] in the atmospheric distillation tower with the actual that the quantities produced from the lubricating oils to each crude oil by vacuum distillation tower. The final conclusion of this research is that crude oils classify of medium and low light Arabic crude oil (i.e., API less than 38 and Watson factor less than 12.1) are suitable for the production of lubricating oils.

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Effects of the Applied Pressure and Pressing Speeds on the Total Resistance of the Compressibility Process

Hazim Abed Mohammed Al-JEWAREE
Department Petroleum Eng. - Faculty of Engineering, Al-Kitab University
drhaaljewary@yahoo.com

ABSTRACT

The compaction apparatus is used in this study to measure the total resistance of particles during the compressibility process for approaching the real resistance of the particles in the ball mill and to simulate the grinding in an actual ball mill in order to be used for design purposes. The apparatus consists of two punches and a large die which a single punch pressing. The size reduction is measured because it gives an indication to the total resistance and the grinding product of the coarse particles of white cement clinker manufacture by Alkhomes refractory. The effect of the compaction applied pressure and compaction velocity are studied. Results indicated that the high total resistance (Tr) occurred at high compaction speed, low applied pressure and at increase the weight of a compacted material.

Keywords: compressibility process, pressing speeds, compaction particles resistance, total resistance

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تأثير الضغط المسلط وسرعة الضغط على المقاومة الكلية التي تنتج من الجزيئات اثناء عملية الانضغاطية

أ.د.م. حازم عبد محمد الجواري[1]
رئيس قسم هندسة النفط – كلية الهندسة – جامعة الكتاب[1]
drhaaljewary@yahoo.com[1]

الخلاصة

تم في هذا البحث دراسة تأثير الضغط المسلط والسرعة التي يتم بها تسليط الضغط على مقاومة الجزيئات الكبيرة الحجم خلال عملية الانضغاطية باستخدام قالب كبير متكون من مكبس علوي متحرك ومكبس اخر في الاسفل ثابت داخل أسطوانة تم تصميمه لهذا الغرض وهذا يصب في الوصول الى حقيقة ما يحدث من مقاومة للجزيئات داخل الطواحين ذات الكرات الصلبة والتي تلعب دور هام في عملية الطحن للجزيئات حيث تم استخدام جزئيات مادة السمنت الكلنكر المصنعة في مصنع السمنت لمدينة الخمس الليبية ذات الحجوم الكبيرة. أثبتت النتائج الخاصة بهذا البحث ان أكبر مقاومة تبديها الجزيئات عندما تكون سرعة الانضغاط عالية وايضا عندما يكون قيمة الضغط المسلط قليلة مقارنة بالكمية الموضوعة داخل الطواحين .

1- Introduction

Compressibility is the ability- of the material to reduce the volume under pressure; this is nearly what happens in the crushing and grinding of the coarse panicle inside the ball mill. Therefore, coarse particles of white cement clinker are used a and these particles need more than 100 kN to approach the compaction condition. While maximum capacity is 100 kN for our Instron machine.

The compression of powdered or granular material into cohesive mass during the formation of a compact is widely used. As pressure is applied, re-arrangement of powder particles takes place, within die, so that the large void are filled and interparticle; friction may be sufficient to cause fragmentation of the weaker particles. Further increase in pressure is believed to cause elastic and plastic deformation of the particles which also cause a fragmentation of the same primary particles. Therefore, it is considered that if particles of known size are compressed and then allowed to disintegrate, evidence of fragmentation or interparticle bonding might be obtained.

Size reduction is an important step in many processes by which raw materials are converted into final products. It may be the first operation in a chemical process or the last step before product packaging. Examples may be taken as; the preliminary grinding of phosphate rock in phosphoric acid-production, and the final grinding of clinker in the manufacture of cement. In chemical industry, size reduction is usually carried out to increase the surface area because in most reactions involving solid particles, the rate is directly proportional to the area of contact with the second phase.

2- Materials and Methods

Using a laboratory sieving machine (Retsch Ltd, UK) white cement clinker manufactured by Al-Khomes* cement industry from the following raw materials, 10 % sand, 10% clay and 80% limestone is classified into (-1100+900 µm), (-2000+1800 µm), (-2500+2100 µm), (-2800+2500 µm), (-3550+3350 µm) and (-4500+4000 µm). These fractions are the normal

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sizes of narrow range as follows; 1000, 1900, 2300, 2650, 3450 and 4250 µm. Compression is produced using a hydraulic universal testing machine (Model 1190, Instron Ltd, High Wycombe, U.K) fitted with 67.2mm stainless steel die diameter. It is decided to use hardened steel (55) for the punch and die cylinder to withstand the large applied-pressure and abrasion. By honing the die-wall with a fine stone, the groves in the surface had a depth of less than 0.5µm and 0.6µm, at the end of the experimentation. After every compaction measurement the die is demounted, and if damage to the die wall is perceptible to the naked eye, the die is honed, honing oil removed by rinsing with methyl ethyl ketone (MEK) followed by ultrasonic cleaned in ethanol and acetone in turn. The clearance between the die-wall and the punches is 0.2mm in the majority of tests.

3- Results and Discussion

It is possible to examine the grinding of the product of white cement clinker by compression process, if the size reduction ($\overline{\Delta X}$) during compressibility process was measured. This size reduction ($\overline{\Delta X}$) in the coarse particles is calculated from the following formula:

$$\overline{\Delta X} = \overline{X2} - \overline{X1} \qquad (1)$$

Where:

$\overline{X1}$: The mean particles size diameter after compression process.

$\overline{X2}$: The mean particles size diameter before compression process.

Both mean particles diameters ($\overline{X1}$ and $\overline{X2}$) are calculated from the moment of the sum of all the elementary areas of thickness (dx) about ordinate equals the sum of all the moments:

$$\overline{X} = \frac{\sum Xi \cdot \Delta Q}{\sum \Delta Q} \qquad (2)$$

Where:

Xi is the average size and ΔQ is the weight percentage in range (Alien, 1981).

When compaction pressure, P, is applied to the top punch a resisting pressure builds up in the powder or other materials, especially in the zone where the face of the moving top punch meets the wall of the die. The total resistance (Tr) has been found an important factor to cause a size reduction and the increment of the specific surface area. The total resistance of a compacted material consisted of:

a) Structure of the compacted material resistance (Sr).
b) Friction resistance (Fr). This includes the interparticles and particle-die wall frictions.
c) Air- entrapped resistance (Ar).

The best term that explains the total resistance (Tr) is (1/r), where (r) is the reduction ratio or the compaction ratio. Reduction ratio is calculated from the following formula:

$$r = 1 - \frac{H_f}{H_o} \qquad (3)$$

Where:

(Hf) is final height of a compacted material and (Ho) is initial height of a compacted material.

Various compaction parameters are examined to find the success of this process to causing the size reduction and to approach the total resistance which effects the grinding of the coarse particles in the ball mill. These compaction parameters are studied separately and as shown respectively:

a) Weight of a Compacted Material:

The compression of white cement clinker, feed size fraction is 2650μm and 4250μm, have been conducted in a large die (see Fig. 1) under constant applied pressure (25.375 MPa) and constant compaction speed (0.5 cm/min.). The chosen weight in this study comprises a single bed (0.25 layers (L), 0.5L and O.75L) and packed bed (1L, 2L, 3L and 4L) as represented in Fig. 2. The weights are multiplied by the number of the layers.

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The cumulative Weight percentage is calculated for each weight of fraction size and plotted versus the particle size for each fraction using the highly recommended method suggested by Hukki (1975), Abdul-Wahab (1990) and Limwong (2004). This method includes the plotting of the overall cumulative weight versus the size distribution of a cumulated product on a log-log scale and thus producing smooth curves. The curves are shown in Figs. 3-9. These figures show the distribution curve for the compaction product of feed fraction 2650 µm for various weight of a compacted material and compaction pressure, these curves are the same for another size particle.

In Fig. 3, it is shown that the distribution curve of 0.25 layers is a smooth convex curve, which is due to absence of the effect of interparticle friction force and the die-wall friction force. But Figs 4 and 5 illustrate the distribution curves of 0.5 and 0.75 layers, while the particles friction began to effect on the compaction process. Therefore, a slightly scattering on the convex curve happened. In the compression of cement clinker as layers, the distribution curve is largely scattered on the smooth convex curve as shown in Figs. (6-9). Thus scattering, because, of the friction forces began to influence strongly the compaction process.

But fig. (10) Represents how the total resistance (Tr) varies from a single bed to a packed bed for feed sizes (4000-4500 µm). However, the total resistance increases with the increase of the weight of compacted material, and this leads to a decrease in the reduction of particle size as concluded from Fig. (11). Actually, at the single bed (0.25, 0.5 and 0.75 layer) the particles are fragmentated easily because the total resistance is very small due to absence of friction resistance and air-entrapped resistance, so, this will lead to a high fragmentation to the particles as shown in fig. (11). The results for sizes (4000-4500 µm) of this section are tabulated in table (l) (Al-Khomes is a city located east of Libya).

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Fig. 1 Compressibility die of coarse particles.

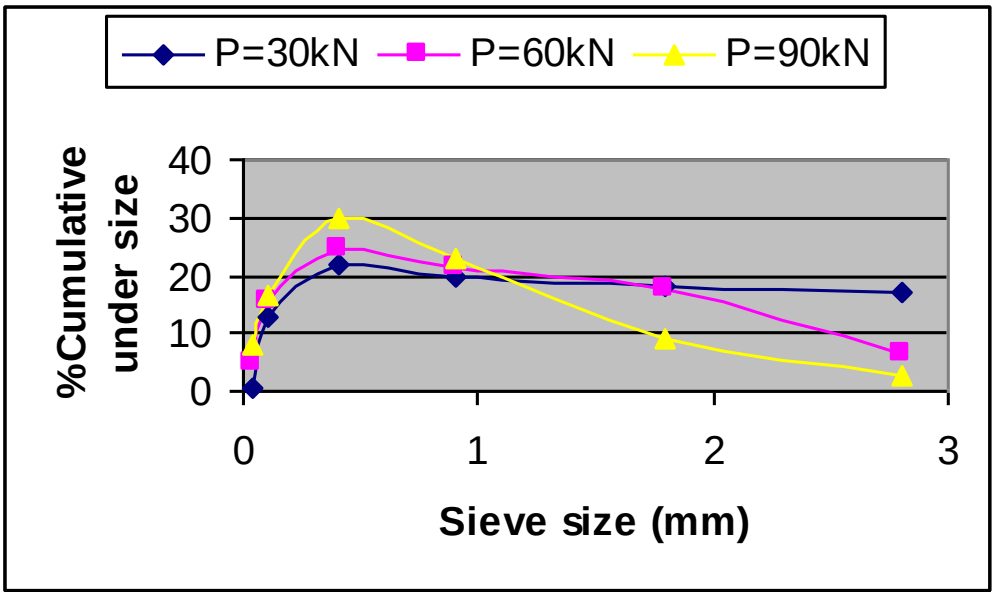

Fig. 2 Size Distribution of Cement Clinker for Different Compaction Applied Force (P) to The Feed Size (-2800+2500 µm) of 0.25 Layer.

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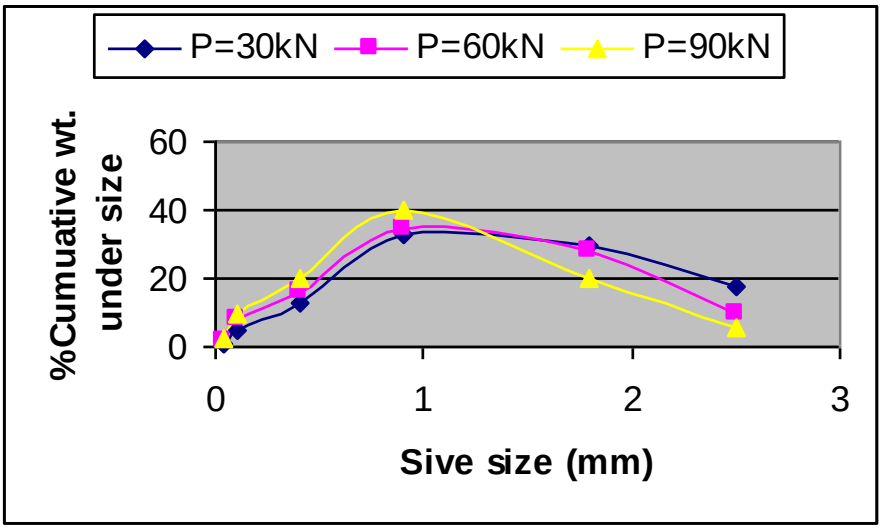

Fig. 3 Size Distribution of Cement Clinker for Different Compaction Applied Force (P) to The Feed Size (-2800+2500 µm) of 0.5 Layer.

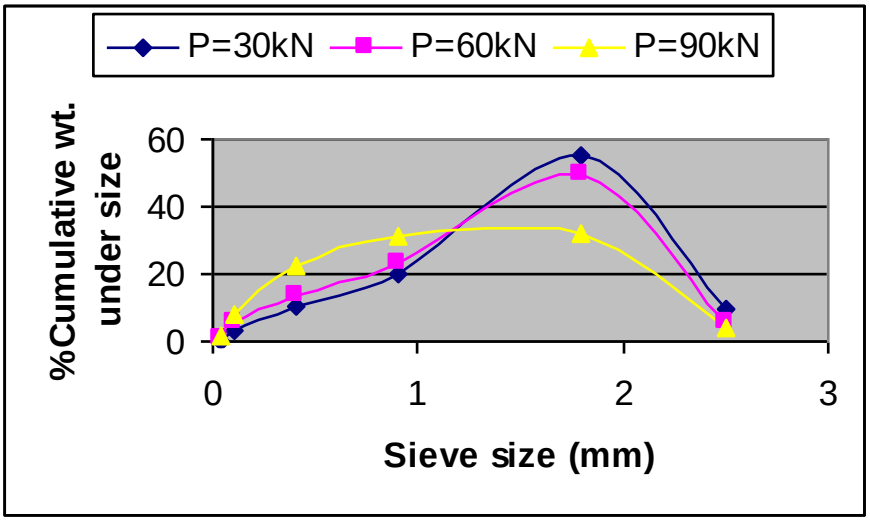

Fig. 5 Size Distribution of Cement Clinker for Different Compaction Applied Force (P) to The Feed Size (-2800+2500 µm) of 0.75 Layer.

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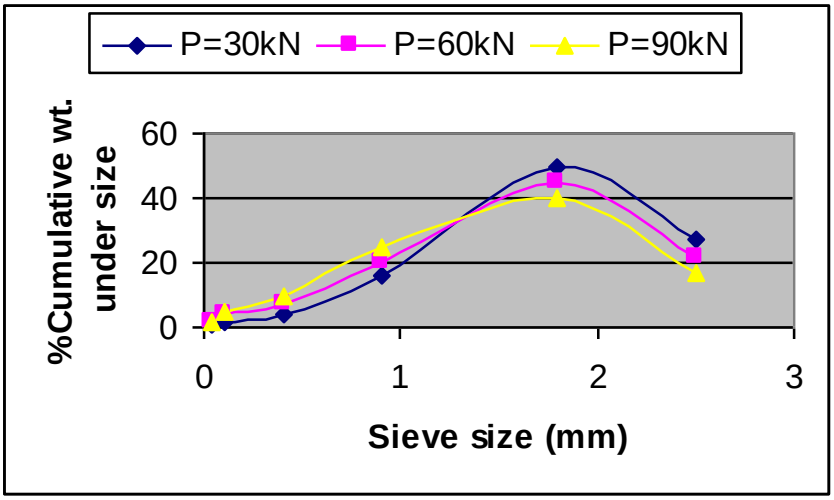

Fig. 4 Size Distribution of Cement Clinker for Different Compaction Applied Force (P) to The Feed Size (-2800+2500 µm) of 1 Layer.

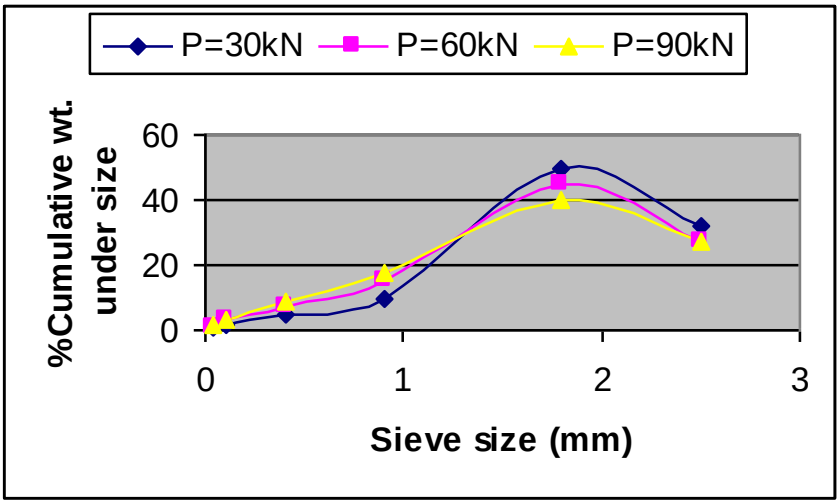

Fig. 5 Size Distribution of Cement Clinker for Different Compaction Applied Force (P) to The Feed Size (-2800+2500 µm) of 2 Layers.

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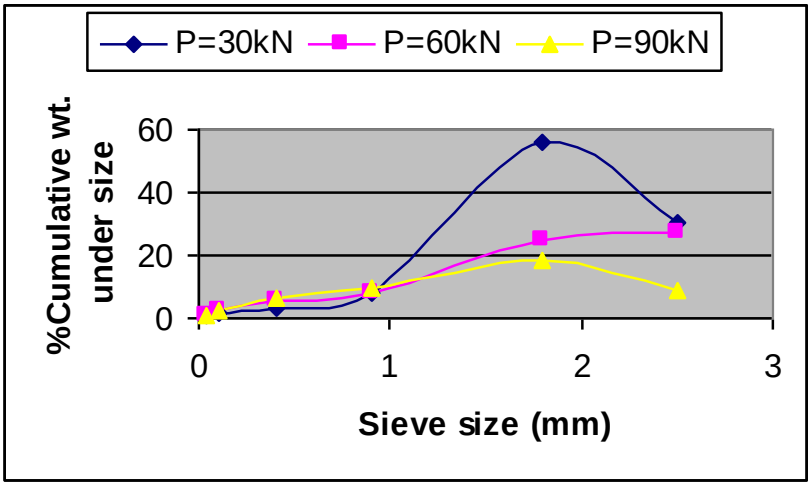

Fig. 6 Size Distribution of Cement Clinker for Different Applied Force (P) to The Feed Size (-2800+2500 µm) of 3 Layers.

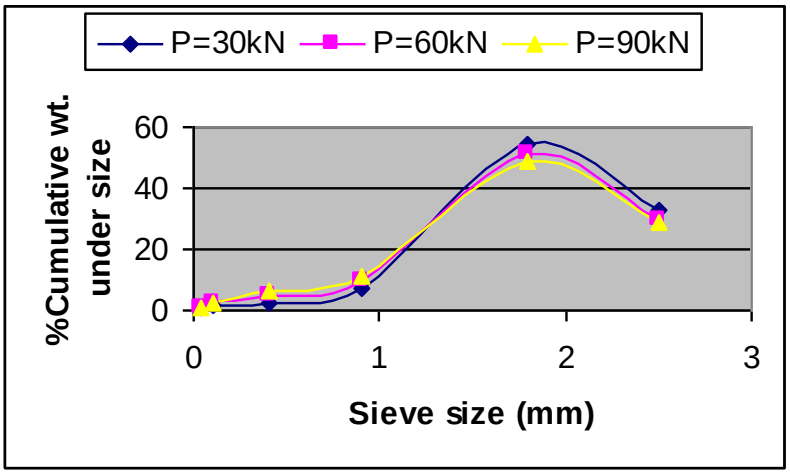

Fig. 7 Size Distribution of Cement Clinker for Different Applied Force (P) to The Feed Size (-2800+2500 µm) of 4 Layers.

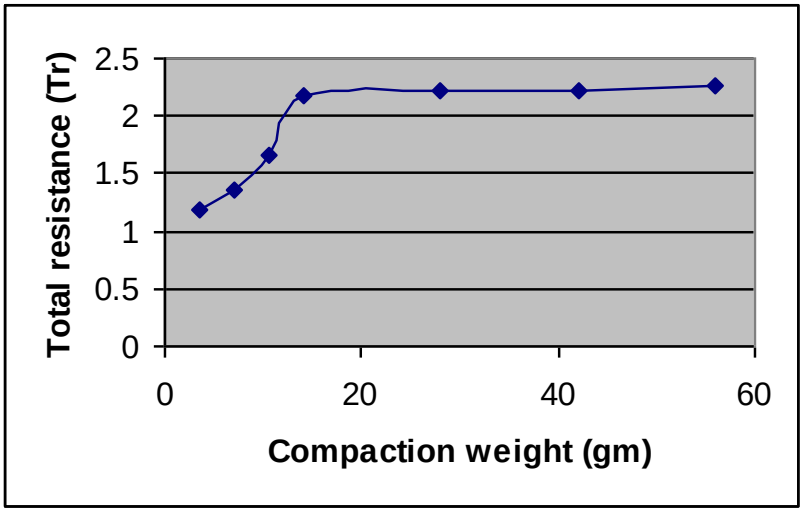

Fig. 8 The Total Resistance (Tr) During Compacted Different Weight of Cement Clinker for Feed Size (-4500+4000 µm).

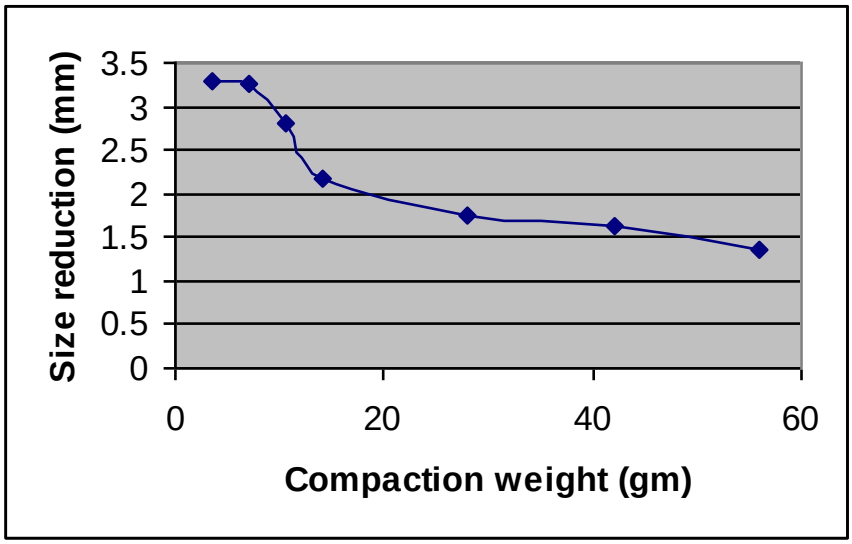

Fig. 9 The Variation of Size Reduction (X) During Compression of Different Weight of Feed Size (-4500+4000 µm) of Cement Clinker.

b) Compaction applied pressure:

Since the compaction applied pressure more than any other factor largely controls the density and the resulting mechanical properties of final products, knowledge of the relationship between compaction applied pressure and the material properties is very important.

To estimate the increase of size reduction for a particle size distribution, a better description should be given for fragmentation process. Fragmentation has been defined as the,-ton-nation of smaller, discrete particles from initial material. This implies that the characterization method should give direct information about the number of cleavages in particle after submission to compaction pressure.

A sieve fraction of white cement clinkers is used, which has a size range of 4000 - 4500µm with weight represent as the fourth layers. The compaction velocity is constant (0.5 cm/min) and the compaction applied pressure has a range from 2-25 MPa in this study. The total resistance (TR) decreased with increasing the applied pressure as seen in Fig. (14). It can be concluded from this figure that the curve becomes linear while it reached the critical pressure of 10 MPa and the high total resistance takes place at low applied pressure due to the high structure resistance (which represent the total elasticity of the wholly compact) and the friction resistance. However, this relation will lead to a linear relation between the size reductions with increase of the compaction applied pressure as shown in Fig. (15). Actually, the interparticles friction and particle-die wall friction forces are responsible for increasing the fragmentation of coarse particles.

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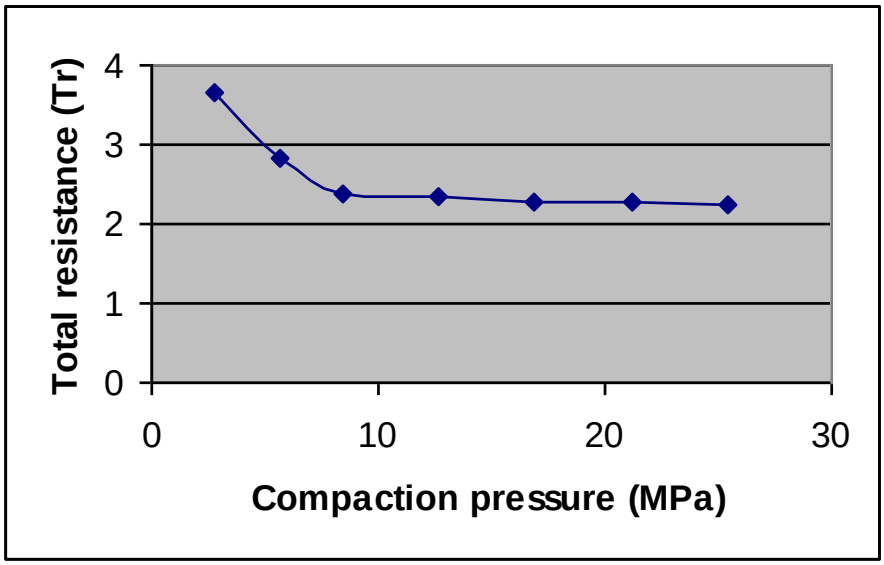

Fig. 12 The Variation of Total Resistance (Tr) with the Compaction Pressure for Feed Size (-4500+4000 µM) of Cement Clinker.

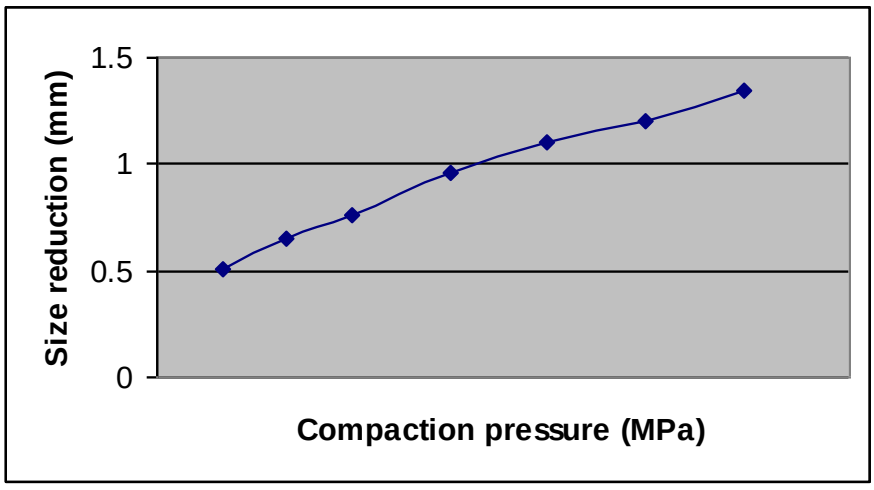

Fig. 15 Represents the Relationship between the Size Reduction with the Compaction Applied Pressure for Feed Size (-4500+4000 µm) of Cement Clinker

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d) Compaction velocity:

Air entrapped inside the pores of the powder compact was found to be a source of cracks in powder compacts and is called laminations (Long and Alderton 1960, James and Newton 1983, and At-Jewaree and Chandler (1990)). This was attributed to the high compaction velocity, which was absent in the last work. In this work, the size reduction ($\overline{\Delta X}$) is examined at different compaction velocities and the effect of air entrapped to the fragmentation of the coarse particles. However, the entrapping of air inside the pores of the particles is found to increase the total resistance of the powder during the compressibility process as shown in Fig. (16). this resistance will lead to a small fragmentation of the coarse particles, because they reduce the total applied pressure which reached to the single particles. Supporting the above evidence, it is found that the size reduction decreasing with the increasing of the compaction velocity as illustrated in Fig. (17). The test is done at constant applied pressure up to 25.375 MPa and a constant weight equal to 44 gm as four layers to a size range from 2100 to 2500µm, but at different speed ranging from 0.5 to 50 cm/min.

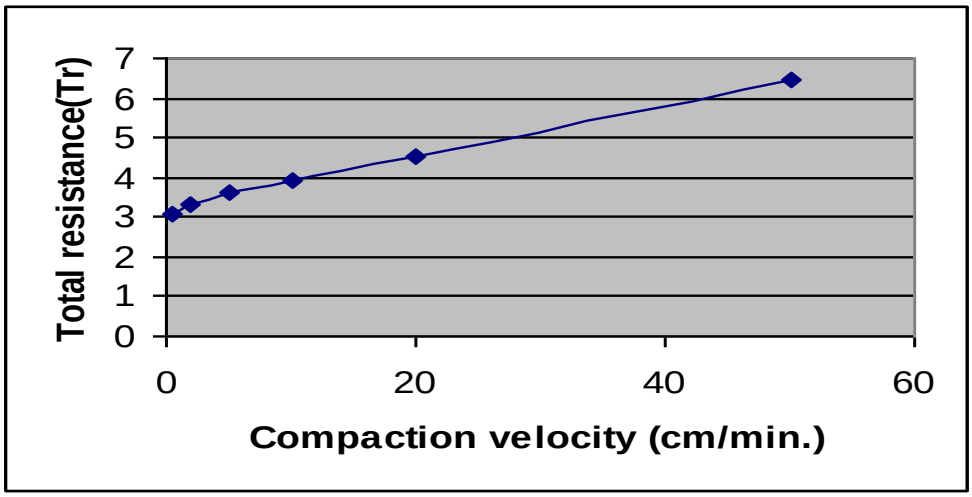

Fig. 16 Represent the Relationship between the Compaction Velocities and the Total Resistance (Tr) for Feed Size (-2500+2100 µm).

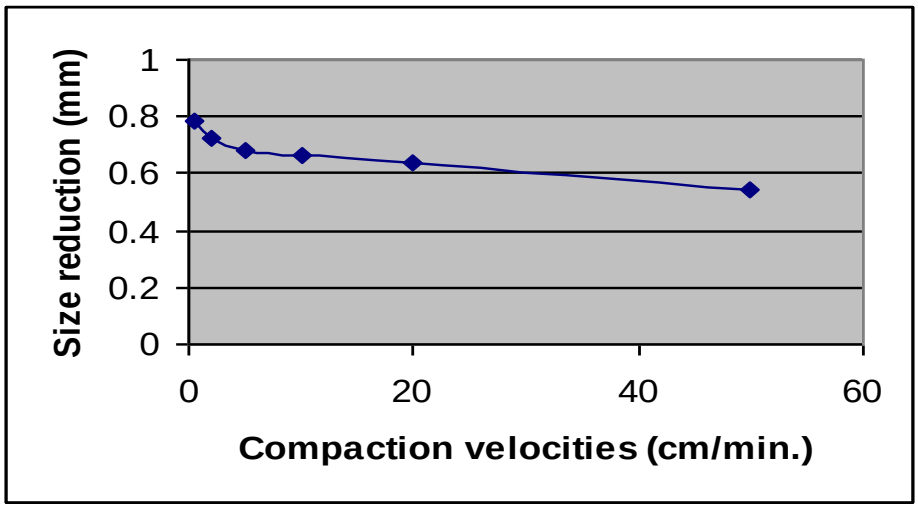

Fig. 17 The Variation of the Size Reduction of Particles with the Compaction Velocities for Feed Size (-2500+2100 µm).

4- Conclusions

The following conclusions are drawn out from the present study:

1) The increment at the size reduction (ΔX) means decrease in the total resistance of the compact materials. It is found that the maximum in the reduction size of the coarse particles at higher applied pressure, slower compaction velocities and at reducing the weight of compacted material (see Figs. 11, 15 & 17).
2) It is possible to estimate the total resistance Tr (1/r) during the powder compaction by measuring the inverse of the compaction ratio (r). The total resistance is mainly depending on the structure of the compacted material and the particle frictions.
3) It is obvious that for a certain particle size, the higher the compaction load, the more fragmentation will occur (see Fig. 15). On the other hand, one should forget that fragmentation cannot take place when porosity drowns near zero. Thus, considering fragmentation to be a function of particle size and porosity, it is clear from Fig. (13), that the large particles have more fragment than the smaller particle of white cement clinker.

4) It may be concluded that compaction apparatus is good enough to cause a size reduction in the coarse particles and for approaching the real total resistance of the materials inside the ball mill.

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Gynecological cancer: Evaluating of Most Prevailing Subtypes of the Disease with Highlighting their Management in Kirkuk City

[1]Alaa Othman Sedeeq, [2]Bassima Sadiq Ahmed.

[1]Medical Oncology, Oncology Department. Kirkuk oncology- hematology Center

[2]Clinical Biochemistry, college of pharmacy university of Sulaimani

[1]alaajaff@yahoo.com, [2]Basima.ahmed@univsul.edu.iq

ABSTRACT

Background: Gynecological cancers are group of cancers which occur in female reproductive tract. The corner stone in treating and eliminating this cancer depends mainly on early detection and perfect surgical staging of the disease. Objective: This study focuses on assessing the incidence, stage and treatment pattern of those cancers in Kirkuk city. Methods: A total of 100 females with cancer of gentelial tract were collected from Kirkuk Oncology Center in periods between 2016 November to 2018 August. Results: Most common types of gynecological cancer in this study were: uterine cancer 49%, Ovarian cancer 35%, cervix cancer 6%, GTN 8%, and vaginal cancer 2%. While, the peak age incidence were: uterine and vaginal cancer at age 50-59 years (73.5%, 50%) Ovarian cancer at age 40-49 years 42.9%, and cervix cancer at age 60-69 years 50%. Majority of cases operated by gynecological & obstetrician surgeons were about (62%), and nearly all of patients underwent TAH+BSSOO (92%) with only 2% of cases had PLND. A two years follow up shows recurrence rate of 32%, 28.6%, and 100% for each of uterine, ovaries, and cervical cancer consecutively. Conclusion: Gynecological cancer occurs in younger age group with relatively aggressive stage and high recurrence rate in Kirkuk city.

Keywords: Gynecological Cancer, PLND, Kirkuk

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سرطان النساء : تقييم أكثر الأنواع السائدة من المرض مع تسليط الضوء على طرق علاجها في مدينة كركوك

د.الاء عثمان صديق , د.باسمه صادق احمد
[1]دائرة صحة كركوك امركز الاورام .[2]جامعه سليمانيه\ كلية الصيدلة
[1]alaajaff@yahoo.com, [2]Basima.ahmed@univsul.edu.iq

الملخص

السرطانات النسائية هي مجموعة من السرطانات التي منشائها من الجهاز التناسلي للأنثى. الكن الاساسي في علاج هذا السرطان والقضاء عليه يعتمد بشكل أساسي على الكشف المبكر والتدريج الجراحي المثالي للمرض.**الهدف:** تركز هذه الدراسة على تقييم حالات الإصابة بالسرطان ونوعها وطرق علاجها في مدينة كركوك. **الطريقة:** تم جمع ما مجموعه 100من الإناث المصابات بسرطان الجهاز التناسبي من مركز كركوك التخصصي لعلاج الأورام في فترة ما بين نوفمبر 2016 إلى أغسطس 2018.**النتائج:** أكثر أنواع سرطان النساء شيوعًا في هذه الدراسة هي: سرطان الرحم 49٪ ، سرطان المبيض 35٪ ، سرطان عنق الرحم 6٪ ،ورم الأرومة الغاذية الحملي(GTN 8 ٪)، وسرطان المهبل 2٪. في حين كانت أعلى معدلات الإصابة بالمرض في الاعمارالاتيه: سرطان الرحم والمهبل عند سن 50–59 سنة (73.5 ٪ ، 50 ٪) سرطان المبيض عند سن 40–49 سنة 42.9 ٪ ، وسرطان عنق الرحم في سن 60–69 سنة 50 ٪. غالبية العمليات الجراحيه التي خضع لها المرضتم من قبل طبيبات النسائية والتوليد (62 ٪) ، وخضع جميع المرضى تقريبا لعملية استئصال الرحم الكامل مع المبيضين وقناتي المبيض(92% BSSOO + TAH ٪) مع فقط من الحالات كان اسئصال العقد اللمفاويه في الحوض(2 ٪ PLND). تظهر متابعة لمدة عامين معدلات رجوع المرض بالنسب الاتية 32 ٪ ، 28.6 ٪ ، و 100

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٪ لكل من سرطان الرحم والمبيض وسرطان عنق الرحم على التوالي.**الخلاصة:** يحدث سرطان النساء في الفئة العمرية الأصغر سنا مع مرحلة عدوانية نسبيا وارتفاع معدل التكرار في محافظة كركوك.

الكلمات المفتاحية: سرطان النساء, PLND, كركوك

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1- Introductions

Gynecological cancer consists of group of cancer that involve (uterus cancer, ovarian cancer, cervix uteri cancer, vaginal cancer, valval cancer and placenta site cancer) with most frequent site of cancer start from Endometrial comprising 6% of all cancers in women followed by Ovarian cancer in the second place and cervical cancer in the third place among women in the United States [1]. It is clear that an improvement in outcome of these malignancies can only be achieved if early diagnosis is achieved, there is accurate prediction of progression and response, and new treatment options reflecting the molecular pathogenesis and progression are developed [2].

In 1976, the American Joint Committee adopted the classification of the International Federation of Gynecology and Obstetrics (FIGO), which is the format used in the Annual Report on the Results of Treatment in Carcinoma of the Uterus, Vagina and Ovary, which is published every 3 years. This report has used the FIGO classification with periodic modifications since 1937, the last being 2009. Numerous institutions throughout the world contribute their statistics for inclusion in this voluntary collaborative presentation of data [3]. The TNM categories have therefore been defined to correspond to the FIGO stages. Some amendments have been made in collaboration with FIGO, and the classifications now published have the approval of FIGO, the American Joint Committee on Cancer (AJCC), and all other national TNM committees of the international union against cancer (UICC) [4].

Treatment of uterine and ovarian cancer have historically begun with surgical staging and cytoreduction. Thorough surgical staging is essential, as subsequent treatment will be based directly on the surgical stage. In ovarian cancer Cytoreduction, or debulking, refers to removing as much gross tumor as technically feasible. “Optimal cytoreduction” (now defined as <0.5 cm largest residual tumor, or even better no gross visible residual disease) confers a significant survival advantage [5]. Low-risk endometrial cancer {Histologic grade 1 or 2, Cancer limited to the endometrium (a subset of stage IA disease), and Cancer that is not a high-risk histologic type (eg, clear cell, serous, or carcinosarcoma) Surgery is the standard treatment. Lymphadenectomy to be discussed in low risk patients. Sentinel node mapping could be performed but it is not a standard of care. For Intermediate-risk endometrial cancer (Cancer

confined to the uterus and invading the myometrium (a subset of stage IA or stage IB) or cancer that demonstrates occult cervical stromal invasion (stage II) excludes women with serous or clear cell cancers, which are considered to be high-risk histologic types regardless of the stage at presentation. A subset of women is considered to have high intermediate-risk based on certain pathologic criteria: 1-The Gynecologic Oncology Group (GOG) defines high intermediate-risk based on age and any of three pathologic factors: {1-the presence of deep myometrial invasion, grade 2 or 3 histology, or the presence of lymph vascular space invasion (LVSI). Women have high intermediate-risk disease if they are: ≥70 years with one risk factor, age 50 to 69 years with two risk factors, or age ≥18 years with all three risk factors Post-Operative Radiation Therapy in Endometrial Cancer (PORTEC) trials define high intermediate-risk by two of three clinicopathologic factors present: age >60 years, outer half myometrial invasion, and grade 3 histology [6]. Adjunctive RT in early stage intermediate risk endometrial carcinoma decreases the risk of recurrence, but should be limited to patients whose risk factors fit a high intermediate risk definition [7]. Surgical management is generally limited to patients with disease limited to the cervix or with limited involvement of the upper vagina. Depending on the clinical stage, fertility goals, and physical condition of the patient, surgical treatment ranges from cone excision of the cervix, to simple hysterectomy, to radical trachelectomy (where the cervix and parametria are removed with preservation of the uterine corpus), to radical hysterectomy [8]. The gestational trophoblastic neoplasia (GTN) refers to various histologic entities that have the ability to invade locally and/or metastasize. These conditions include persistent or invasive hydatidiform moles, placental site trophoblastic tumors, and choriocarcinomas [9]. GTN is a highly curable disease that can be effectively managed with single ethotrexate or actinomycin D) - or multiagent chemotherapy (EMA/CO protocol). Nonetheless, some women succumb from GTN primarily due to late presentation, delayed diagnosis of primary or recurrent disease, or drug resistance. Therefore, educating primary care physicians and gynecologists about the signs and symptoms of GTN is essential in decreasing adverse outcomes related to this disease. In addition, careful follow-up of all women with GTN is important to ensure that recurrence is detected promptly, at a time when it is curable. Moreover, the discovery of novel therapeutics may decrease drug toxicity, enhance treatment efficacy, and improve the management of women with chemo resistant disease [10]. Management of vulvar squamous cell and adenocarcinomas is wide radical excision (radical hemi/vulvectomy) with or without regional

lymph node dissection to radical vulvectomy with bilateral groin LN dissection or a pelvic exenteration for T4 tumor can be considered. Neoadjuvant combination chemotherapy and radiation therapy should also be considered for these advanced-stage patients Treatment for Stages II, III, and IV is definitive radiotherapy with concurrent platinum-based chemotherapy. treatment of vaginal cancer is consist of irradiation of groins with a radical hysterectomy with upper vaginectomy and LN dissection, or an upper vaginectomy and parametrectomy with LN dissection if the uterus has previously been removed. Radiation without surgery has equivalent outcome for tumor that involve the upper two-thirds of the vagina, it can include Concurrent platinum-based chemotherapy [11].

2- PATIENTS AND METHODS

It is retrospective-prospective observational study. The samples are collected from Kirkuk Oncology Center in period between 2016 November to 2018 August. A random selected sample of 100 female patients were diagnosed with cancer of genital tract and managed in the previous mentioned centers were and evaluated. Collected data included full questionnaire regarding (age and clinic-pathological assessment (such as cancer type, tumor size, histological type, lymph node status, TNM staging, and type of surgery and recurrence of disease). In addition, we followed those patients for any signs of recurrence during the 2-year time of our study in the center.

The first step of the data collection was general information collected from the hospital records via patient database provided in their files in the registry unit at the hospital. Completion of the full questionnaire for each patient was done during their requested visits to the hospital, either for receiving treatments and follow up sessions or merely for this study.

3- Results

A total of 100 patients with gynecological cancer were reviewed in this study. As shown in Figure 1, uterine cancer accounts as 49%. Followed by ovarian cancer 35%, cervix cancer 6%, Gestational trophoblastic neoplasia GTN about 8%, and finally vaginal cancer 2%.

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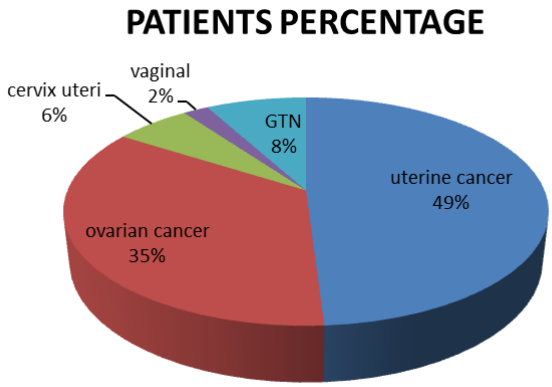

Fig 1 Patents Distributions according to Gynecological Cancer Type

A total of 49 patients with uterine cancer were distributed according to their age. Three quarter of patients (no=36) were at age of (50-59 years old), about 0ne fifth (no=10 patients) were at age (60-69) years old and only (6.1%, no=3) were above 70 years old as shown in figure 2.

Majority of patients with ovarian cancer (42.9 %, no=15 patients) were at age 40-49 years old, (28.6, no=10) were at age 50-59 years old and (17% no= 6) were at age 60-69 years old as shown in figure 3.

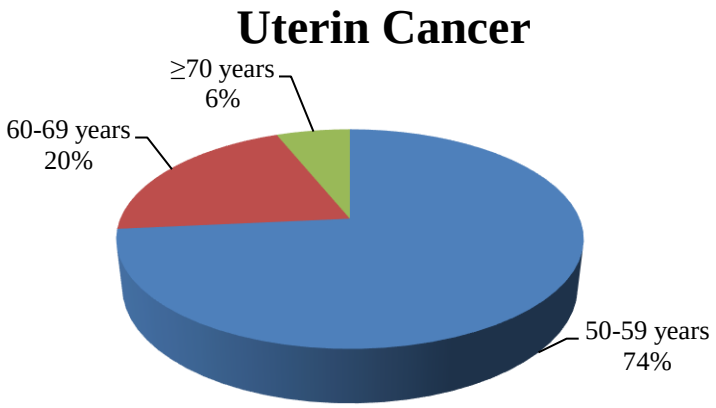

Fig 2 Distribution of Patients with Uterine Cancer according to their Age.

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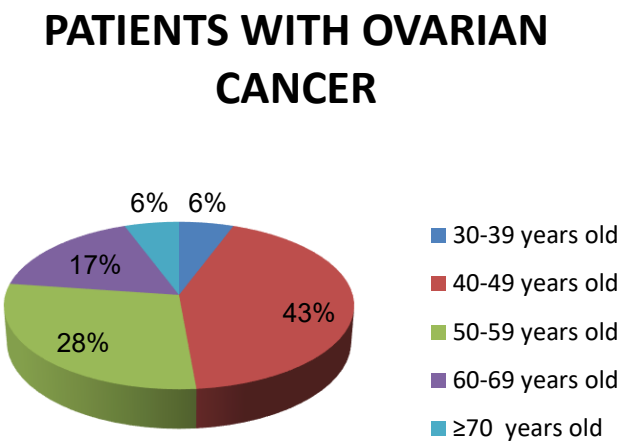

Fig 3 Distribution of Patients with Ovarian Cancer according to their Age

As shown in figure 4, half of the patients with cervix uteri cancer were at age 50-59 years old and about one third at age of 60-69 years old.

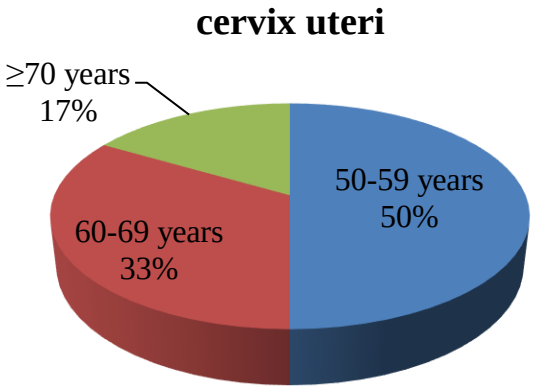

Fig 4 Distribution of Patients with Cervix Uteri Cancer according to Age

As illustrated in figures (5,6), patients with vaginal cancer were mainly presented at age above 50 years old, whereas patients with GTN were mainly presented between age group 20-35 years old (62%, no= 5).

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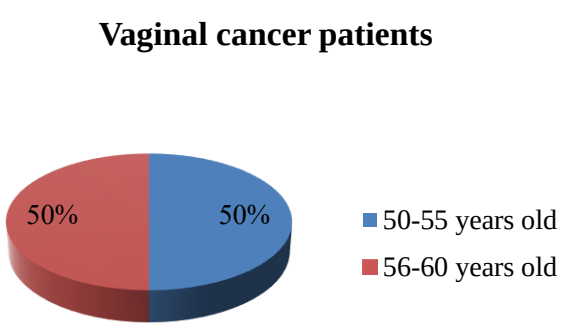

Fig 5 Distribution of Patients with Vaginal Cancer according to their Age.

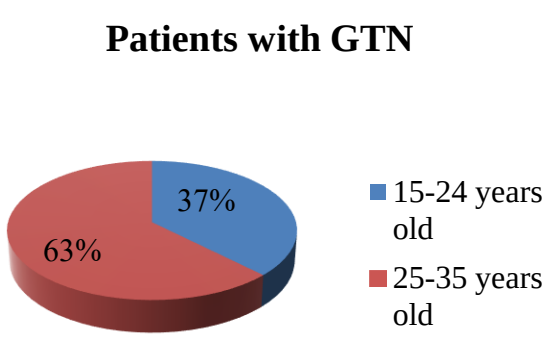

Fig 6 Distribution of Patients with GTN according to their Age.

A total of two third of patents (No=62) their surgery was done by gynecological & obstetrician surgeons, and only one third (38), their surgery was done by general surgeons.

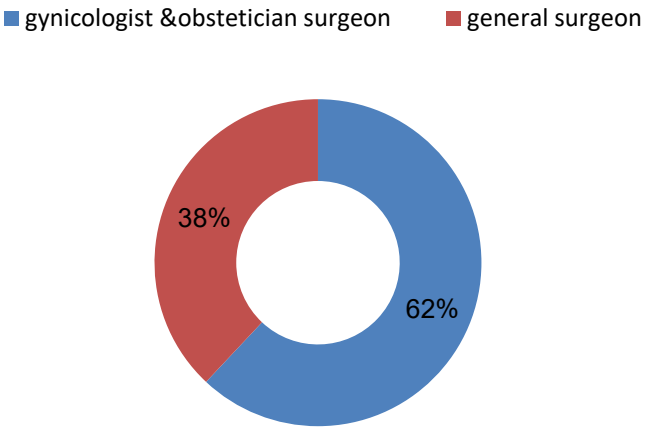

Fig 7 Distribution of Patients according to Surgeon Specialty.

About 90 patients with (uterine cancer, ovarian cancer and cervix cancer) were reviewed. For the type of surgical procedure which was selected, the majority of them (92%, No=83) underwent TAH+BSOO and only (2.2% no=2) underwent TAH+BSOO+PLND. As showed in figure 7.

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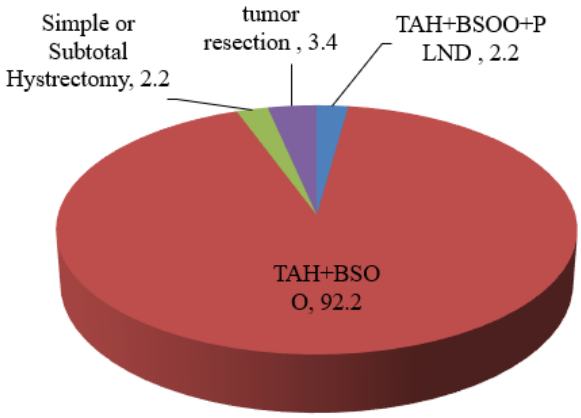

Fig 8 Patients Distribution according to Type of Surgical Procedures in Patients with (uterine cancer, ovarian cancer and cervix. uterine cancer)

As shown in figure 9 , about two third of patients with uterine cancer (no=28 patients) were in stage II and III , two third of ovarian cancer patients were in stage (II ,III) (NO= 21%) and four fifth of patients with cervix cancer in stage IV of cancer .While there is only one third (15 patients)with uterine cancer in stage I , one quarter (7 patients) with ovarian cancer in stage I and about zero patients with cervix cancer in stage I.

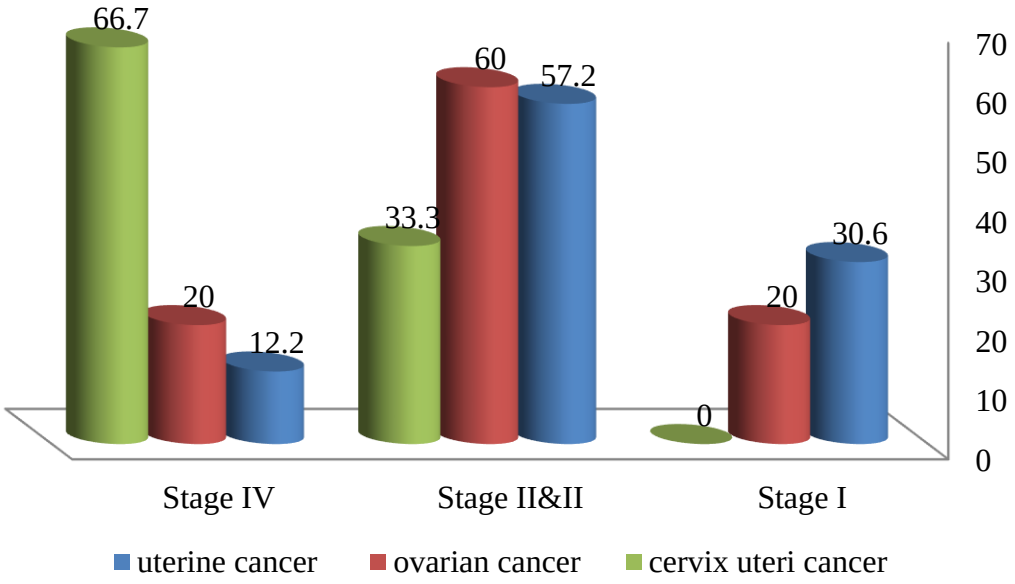

Fig 9 Patients distribution according to disease stage and type of cancer

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The reoccurrence rate for stage I uterine cancer were (26.7, no=4), ovarian cancer (32.14 no=1), while in sage II, uterine cancer (32.14 no=9), ovarian cancer (28.6 no=6) and (100% no =2) for cervix uterine as shown in figure 10.

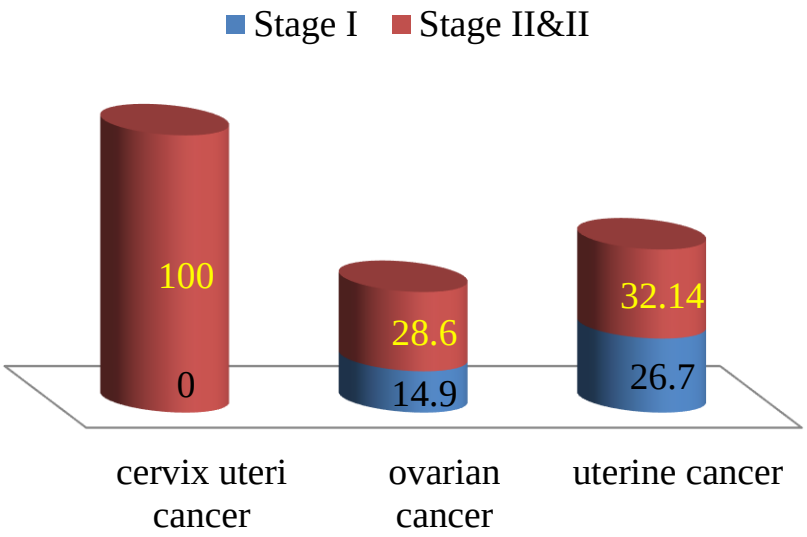

Fig 10 Patient Distributions according to Reoccurrence Rate for Stage II, I and III

As shown in figure 11, distribution of patients according to site of disease reoccurrence were as follows; for local metastasis, uterine cancer (16.3%, no=8), ovarian cancer (5.7%, no=2) and cervix at (50%, no=1). Distribution of patients with distant metastasis were: uterine cancer (8.1%, no=4), ovarian cancer (17%, no =6) and cervix uteri (50%, no=1).

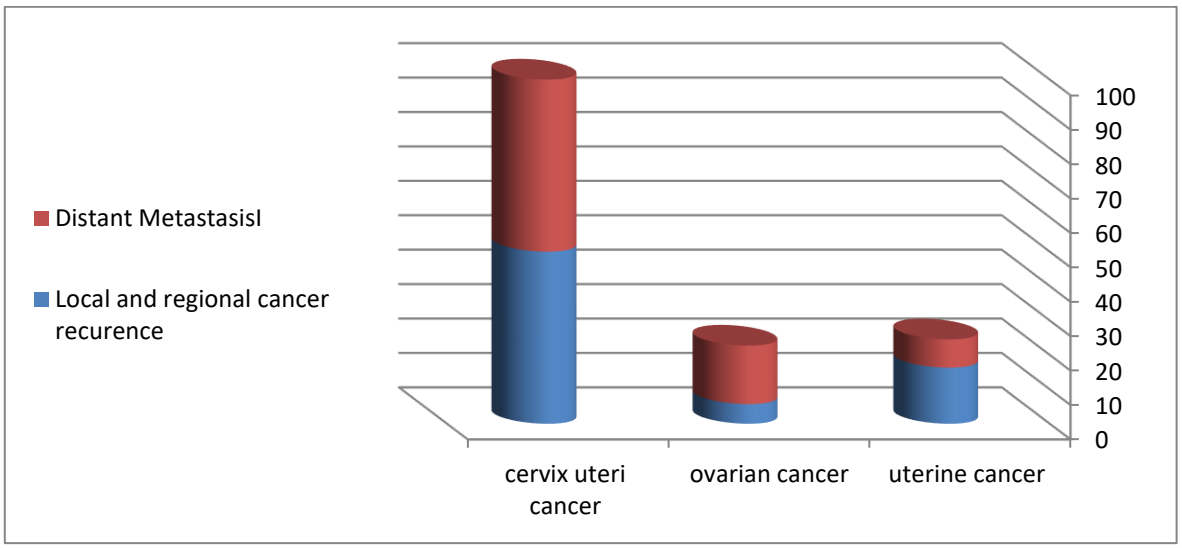

Fig 11 Patients Distribution according to Cancer Type and Site of Diseases Reoccurrence.

4- DISSCUSIONS

Worldwide, Cervix uteri cancer is the most commonly diagnosed type of Gynecological cancer in 28 high developing countries (USA, Europe, and etc.) Followed by uterine cancer in second place and ovarian cancer in third place [11]. In this study, uterine cancer found to be most frequent gynecological cancer. Gynecological cancer occupies about 50% of the cases followed by ovarian cancer 30% of the cases and finally, cervical cancer about only 6% .

Screening program for both ovarian and cervical cancer, were well established worldwide due to high incidence of the previously mentioned cancers and relatively high sensivity rate of these test. Screening for cervical cancer in high developed countries utilize screening for The HPV (human papilloma virus) with a Pap smear in early sexually active female (between ages 21 -29 years) [12]. The UK Collaborative Trial of Ovarian Cancer Screening (UKCTOCS), use transvaginal ultrasound and annual CA-125 test as screening tool in women between ages of 50-74years [13]. Peak age incidence of Cervical cancer is most frequently diagnosed in women between the ages of 35 -44. It rarely develops in women younger than 20 years old [14]. Also, according to Globe can data the Peak age incidence of uterine cancer in United Kingdom is age group (75-79years old), [15] while incidence peak age in our study, is age group 50-59 years old. Ovarian cancer rates are highest in women age 55-64 years about one quarter of the case [16]. Albeit in our population, the peak age incidence is-age group 40-49 years old.

Surgical treatment of ovarian cancer, including systematic lymphadenectomy, should be performed only at gynecologic oncology specialized institutions in order to ensure accurate staging of the tumor. According to the data from the Japan Society of Obstetrics and Gynecology tumor registry (2012), pelvic and para-aortic node dissection are currently performed only for about 40% of patients with early stage ovarian cancer in Japan [17].

In an Italian study of over 500 patients with stage I endometrial cancer demonstrated no difference between those patients who underwent lymphadenectomy and those who did not. Disease-free survival was 80% in the lymphadenectomy group compared to 82% in the no lymphadenectomy group [18]. The Italian study was criticized for a disproportionate use of adjuvant treatment in the no lymphadenectomy group and the 16% of patients randomized to

lymphadenectomy actually had lymph nodes removed. Evaluation of over 12,000 patients from the Surveillance, Epidemiology and End Results (SEER) database found an improved 5-year disease specific survival with lymphadenectomy in stage IB grade 3 and higher [19].

With the thought that lymphadenectomy may be of benefit in the higher risk group, the GOG has proposed a prospective trial to evaluate the role of lymphadenectomy in high risk patients [20].

In contrary, in this study only 2% of patients underwent pelvic lymph node dissection with total abdominal hysterectomy and bilateral salpingeo-opherectomy. This might be one of the causes of relatively high 2 years reoccurrence rate about 36% in uterine cancer, 45% ovarian cancer and 100% in cervical cancer. On the other hand, Korean studies show only 14% recurrence rate in patients with endometrium cancer underwent TAH+BSOO+PLND [21]. According to Japanese study, the 2 years reoccurrence rate of ovarian cancer in spite of recent progress in treatment strategy, is still the leading cause of death among cases of gynecologic cancer. Generally, 70% of advanced stage of ovarian cancers relapse even in stage I or II patients. The relapse rate is 20%–25% [22]. According to Thailand study, the reoccurrence rate of cervical cancer was comparable with this study; approximately, half of the reoccurrences were mostly local and distant metastasis cases encountered in 49.3% [23].

5- Conclusions:

There is a great difference in demographical characteristic of gynecological cancer in Kirkuk city. It was presenting in younger age group patients with relatively aggressive stage and high recurrence rate. This requires paying attention to establish our own applicable treatment guideline.

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Pattern of Cystoid Macular Edema in Erbil

[1]Muhsen Ahmmed Ali Al-jubouri, [2]Ahmed Kareem Joma

[1]M.B.Ch.B. H.D.Ophthalmology,Kirkuk General Hospital,

[2]Kirkuk, Iraq, M.B.CH.B. F.I.C.M.S. (Ophth) I.C.O, Hawler Medical University, College of Medicine, Erbil, Iraq

[1]muhsen_mw@yahoo.com, [2]ahmedeye66@yahoo.com

ABSTRACT

Cystoid Macular Edema (CME) in its various forms can be considered one of the leading causes of central vision loss in the developed world. It is not a disease itself, It represents a common pathologic sequel of the retina and occurs in a variety of pathological conditions such as, diabetic retinopathy, central or branch retinal vein occlusion, intraocular inflammation and following cataract extraction. This study was done to investigate the pattern of CME in patient attending Erbil Teaching Hospitals.

This is a hospital base prospective study that included 61 patients (75 eyes) conducted at Erbil Teaching Hospital and Rigor Teaching Hospital for six months. All patients underwent a comprehensive assessment including medical and ophthalmic history and detailed ophthalmic examination including slit lamp examination, intraocular pressure measurement (IOP), Best corrected visual acuity (BCVA), dilated fundus examination and Optical Coherence Tomography (OCT) examination.

It was found that of the 61 patients 32 (52.5%) were females and 29 (47.5%) were males. The mean age (56.4±10.8) years. Out of the 75 eyes included in the study, 41 eyes (54.66%) had diabetic retinopathy, 10 (13.34%) eyes had CME following cataract operation (Irvine-Gass syndrome), 8 eyes (10.67%) had BRVO, 6 eyes (8%) were had CRVO, 5 eyes (6.66%) had Age related Macular Degeneration, 3 eyes (4%) with uveitis, and 2 (2.67%) had Retinitis Pigmentosa. The average macular thickness was (415.6± 107).

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It was concluded that diabetic retinopathy is the most common predictive factor of CME, followed by cataract surgery. CME is more severe in diabetic retinopathy, CRVO and after cataract surgery.

Keywords: Cystoid Macular Edema, diabetic retinopathy, cataract surgery, retinal vascular diseases.

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انماط وذمة الشائبة الصفراء الكيسية الشكل في اربيل

[1]محسن احمد علي الويس الجبوري, [2]أحمد كريم جمعة

[1]دبلوم عالي طب وجراحة العيون, مستشفى كركوك العام, [2]بورد طب وجراحة العيون, استاذ مساعد كلية الطب \ جامعة هولير الطبية

[1]muhsen_mw@yahoo.com, [2]ahmedeye66@yahoo.com

الخلاصة

وذمة الشائبة الصفراء الكيسية الشكل بانواعها المختلفة، يمكن ان تعتبر واحدة من هم الاسباب التي تؤدي الى فقدان البصر المركزي في العالم المتقدم. انها ليست مرضا بحد ذاتها، وانما تعتبر كمحصلة لامراض الشبكية الشائعة، وتحدث في العديد من الحالات المرضية كاعتلال الشبكية السكري وانسداد وريد الشبكية الرئيسي او الفرعي والتهابات مقلة العين وبعد عمليات رفع ساد العين .هذه الدراسة اجريت لبحث انماط وذمة الشائبة الصفراء الكيسية الشكل في المرضى الذين يرتادون المستشفيات التعليمية في مدينة اربيل .

هذا البحث هو دراسة استطلاعية في المستشفيات وتضمنت ٦١ مريض (٧٥ عين)، واجريت في مستشفى هولير التعليمي ومستشفى رزكاري التعليمي ولمدة ستة اشهر ، وفيها كل المرضى اخذ منهم تاريخ طبي شامل، واخضعوا لفحوصات العيون والتي تضمن فحص العين بالمجهر وقياس ضغط العين وقياس حدة البصر وفحص الشبكية والعصب البصري بعد التوسيع والفحص بجهاز) او سي تي .

من الواحد والستون مريض الذين شملوا بهذه الدراسة ٣٢) ٥٢،٥ (%مريض كانوا نساء و٢٩)٥٠،٤٧%) مريض كانوا رجال. معدل العمر كان (٤٣،٥٦ (سنة. من هذه الخمسة وسبعون عين التي شملت بهذه الدراسة ٤١)٦٦،٥٤ (%عين

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كانت مصابة باعتلال شبكية العين السكري و ١٠)٣٤،١٣%) عيون كانن مصابات بوذمة الشائبة الصفراء الكيسية الشكل بعد عملية رفع ساد العين (او ما يسمى بمتلازمة ايرفين كاس) و ٨) ٦٧،١٠ (%عيون كانن مصابات بانسداد وريد شبكية العين الفرعي و ٦) ٨ (%عيون كانن مصابات بانسداد وريد شبكية العين الرئيسئ و٦) ٦٦،٦ (%عيون كانن مصابات بانحطاط الشائبة الصفراء المتعلق بتقدم العمر وعينان (٦٧،٢ (%كانتا مصابتان بانحلال شبكية العين الصبغي. معدل سمك الشائبة الصفراء كان (٦١،٤١٥ (مايكروميتر .

من اهم استنتاجات البحث ان مرض اعتلال شبكية العين السكري من أكثر العوامل المسببة لوذمة الشائبة الصفراء الكيسية الشكل وياتي بعدها عمليات رفع ساد العين، وكانت وذمة الشائبة الصفراء الكيسية الشكل اكثر حدة في حالات اعتلال شبكية العين السكري وحالات انسداد وريد شبكية العين الرئيسي وبعد عمليات رفع ساد العين.

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1. Introduction

Cystoid Macular Edema (CME) in its various forms can be considered as one of the leading causes of central vision loss in the developed world [1]. Its first recognized and described in 1974 [2]. It is not a disease itself, rather the endpoint of a variety of processes that lead to the accumulation of fluid in the central retina [3], it represents a common pathologic sequel of the retina and occurs in a variety of pathological conditions such as; diabetic retinopathy, central or branch retinal vein occlusion, intraocular inflammation and following cataract extraction (Irvine-Gass) [4], approximately 20% of the patients who underwent uncomplicated phacoemulsification or extracapsular cataract extraction develop angiographically proven CME [5].

The inflammatory conditions in which CME may occur include intermediate uveitis, HLA B27 associated acute anterior uveitis, sarcoidosis, birdshot retinochoroidopathy, Behcet's syndrome, toxoplasmosis, Eales' disease, idiopathic vitritis, Vogt-Koyanagi-Harada syndrome, and posterior scleritis [6-10].

Other causes of CME like retinitis pigmentosa, gyrate atrophy, age related macular degenerations, viteromaculare traction syndrome, macular epiretinal membranes, tumor's such as heamangioblastoma and choroidal heamangioma and may caused by medications such as topical Adrenaline 2%, topical latanoprost and systemic nicotinic acid [11].

Cystoid Macular Edema is the result of accumulation of fluid in the outer plexiform and inner nuclear layers of the retina with the formation of fluid filled cyst like changes [11]. The pathologic process varied from transudation, exudation to liquefaction necrosis, disruption of the blood-retinal barrier at the retinal vasculature and retinal pigment epithelium were noted in CME. The possibility that disruption of the blood-retinal barrier and microinfarction play important roles in the formation of the macular cysts [12]. There are indications that Müller cell swelling may also contribute to CME development (particularly in cases without significant angiographic vascular leakage. Vascular leakage occurs after a breakdown of the blood-retinal barrier during traumatic, vascular, and inflammatory ocular diseases, and allows the serum to get into the retinal interstitium. Since intraretinal fluid distribution is restricted by two diffusion barriers, the inner and outer plexiform layers, serum leakage from intraretinal

vessels causes cysts mainly in the inner nuclear layer while leakage from choroid/pigment epithelium generates (in addition to subretinal fluid accumulation) cyst formation in the Henle fiber layer [13].

2. Materials and Methods

This hospital based, prospective, nonrandomized clinical study was carried out at Hawler and Rizgary Teaching Hospitals in Erbil between March 2013 and March 2014. The study protocol was in accordance with the Declaration of Hawler Medical University and was approved by ethic committee of Hawler medical University.

The patients were recruited into the study if they had significant CME (>320 μm) as measured by OCT (NIDEK, Model RS 3000 NAVIS-EX, Japan), as in Figure (2), decrease of visual acuity to 6/12 or more on snellen chart, and one of predictive factors of CME. The diagnosis of each patient was confirmed by OCT showing significant CME, as defined in the introduction.

The exclusion criteria were the absence of significant CME and any opaque media that prevent visualization of the retina by OCT (sever corneal scar, sever cataract and vitreous hemorrhage).

All the patients underwent ophthalmologic examinations, including measurements of best-corrected visual acuity (BCVA; Snellen chart at 6 m), intraocular pressure (IOP; GoldmannApplanation Tonometer, Model AT 900; Haag-Streit, Bern, Switzerland), slit-lamp examination of the anterior segment, dilated fundus examination by Volk lens +90 D or +78 D, and examination by OCT to prove the diagnosis of CME and to measure macular thickness.

Seventy-five eyes of 61 patients with CME were recruited in to the study, Informed consent was obtained from all patients.

Statistical analyses were performed using a commercially available statistical software package (SPSS for Windows, Version 16.0, SPSS, and Chicago, IL, USA). Visual acuity was converted into the logarithm of the minimum angle of resolution (logMAR) for statistical calculations. Univariate categorical analyses were performed using Student's t-tests and Pearson's Chi-square tests, and a p-value of <0.05 was considered statistically significant.

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3. RESULTES:

Out of sixty-one patients (75 eyes) who were included in our study, 29 were males (47.5%) and 32 were females (52.5%) as in the table (1).

Table 1 no. and percentage of sample by gender group

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	29	47.5	47.5	47.5
	Female	32	52.5	52.5	100.0
	Total	61	100.0	100.0	

Mean age of our sample was (56.43±10.8) years ranging from (17-72) years. The age grouping and distribution of study sample were shown in Figure (4) below.

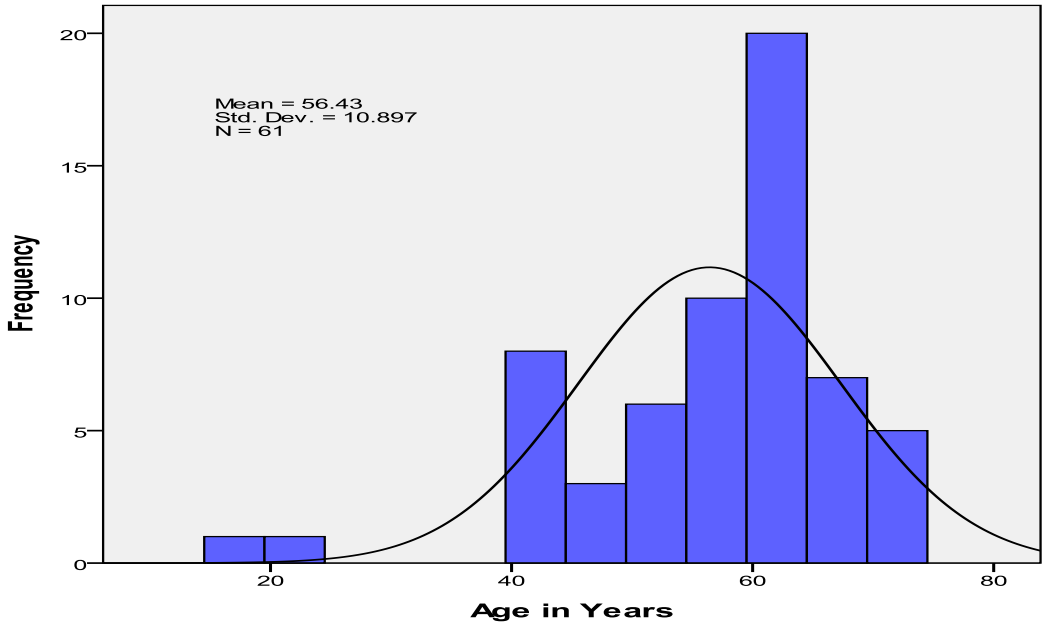

Fig. 1 frequency of age group of sample.

Of the 61 patients, 14 (23%) patients had bilateral CME, 12 (85.76%) of them had Diabetic Retinopathy (regardless of stage).

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Out of 61 patients 32 (52.7%) had diabetes mellitus and 29 patients were nondiabetics, in those 61 patients included in this study, 35 (57.37%) patients had systemic hypertension.

Of the 61 patients, 14 (23%) patients had bilateral CME, 12 (85.76%) of them had Diabetic Retinopathy (regardless of stage), in those 61 patients included in this study, 35 (57.37%) patients had systemic hypertension. In the study sample, 17 (27.86%) patients had hyperlipidemia.

By studying the predictive factors of the 75 eyes that included in the study, 41 eyes (54.66%) were diagnosed to have diabetic retinopathy, which is the most common predictive factor for the development of CME, followed by 10 (13.34%) eyes cataract operation (Irvin Gass syndrome), then 8 eyes (10.67%) were diagnosed to have BRVO, 6 eyes (8%) were diagnosed to have CRVO, 5 eyes (6.66%) had Age related Macular Degeneration, 3 eyes (4%) with uveitis, and lastly 2 (2.67%) were had Retinitis Pigmentosa. Figure (2).

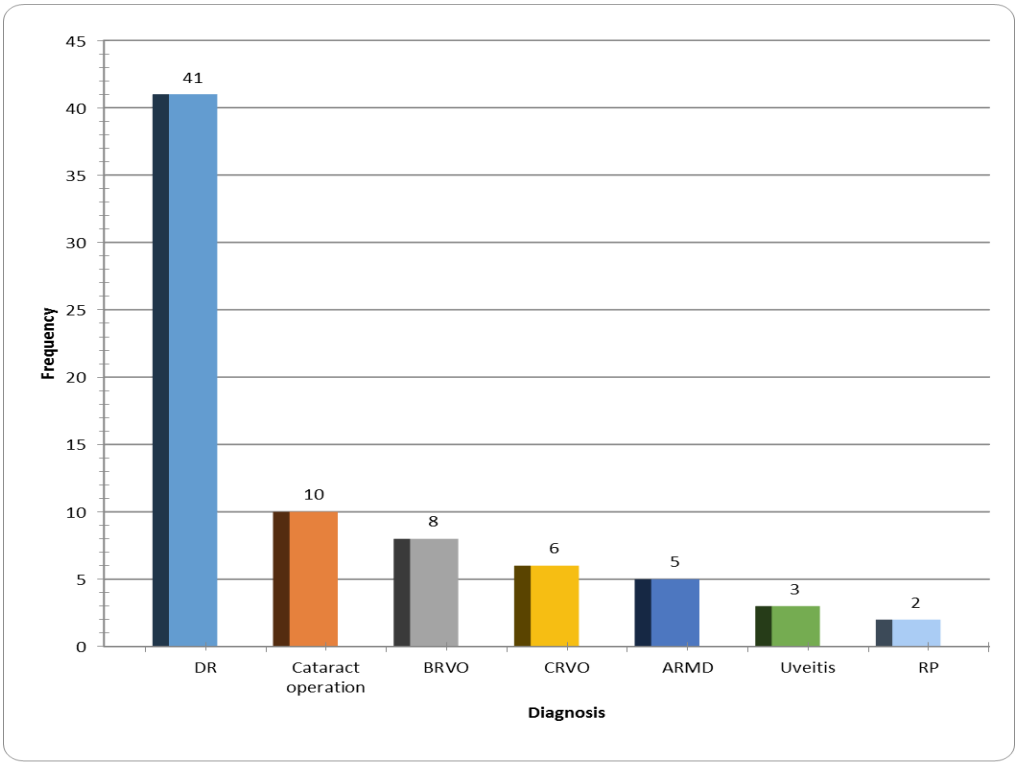

Fig. 2 the frequency of CME by predictive factors.

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The mean average macular thickness at 6mm in eyes with Diabetic Retinopathy were (442.12 ± 123.66), in eyes with CRVO were (419.15 ± 121.74), in eyes with BRVO were (360.78 ± 42.43), in eyes with intermediate uveitis were (338 ± 8.17), in eyes with age related Macular Degeneration were (338.71 ± 68.56), in eyes with Retinitis Pigmentosa were (361.33 ± 62.93) and in eyes with CME after cataract surgery were (412.74 ± 57.33), and the p value (0.206) which is statistically not significant. Table (2).

Table 2 Average Macular Thickness among predictive factors.

Diagnosis	Mean	Std. Deviation
DR	442.1165	123.66744
CRVO	419.1481	121.47642
Cataract operation	412.7444	57.33812
RP	380.8333	62.93250
BRVO	360.7778	42.43484
Uveitis	353.5556	14.65825
AMD	338.7111	68.56576
Total	415.6163	107.01552

P value=0.206 The mean central thickness of macula at 1mm in eyes with Diabetic Retinopathy were (493.6 ± 176.77), in eyes with CRVO were (568 ± 170.78), in eyes with BRVO were (395 ± 92.79), in eyes with uveitis were (348 ± 34.03), in eyes with age related dacular Degeneration were (269.2 ± 125.314), in eyes with retinitis pigmentosa were (478.5 ± 166.17) and in eyes with CME after cataract surgery were (499 ± 112.82). The mean thickness

of the macula in different sites of it, was centrally at 1mm (486.6 ± 166.1), which is the thickest area, superiorly at 3mm, (452.75 ± 115.1) and at 6mm, (386.05 ± 146.4), inferiorly at 3mm, (429.01 ± 150.9) and at 6mm, (368.97 ± 102.3). Nasally at 3mm, (444.49 ± 148.2) and at 6mm, (374.19± 125), temporally at 3mm (438.76 ± 156.3) and at 6mm, (377.72 ± 120.8). p value (0.001). Figure (10).

4. DISCUSSION:

Cystoid Macular edema is a condition of enormous medical and socioeconomic importance because of its high prevalence and occurrence in a large number of pathologic conditions. It is the endpoint of a variety of pathophysiologic processes that can be effectively managed by recognizing and addressing the pathogenic factors that are operative in a given clinical setting.

The present hospital based prospective study which was done in Erbil city show the mean age of patients with CME was 56 years, and around this age, DM, and systemic hypertension, that cause diabetic retinopathy and hypertensive retinopathy respectively, that represent common risk factors for the development of CME, and this finding was reported by a study done in Iran [14].

Regarding gender difference, 47.5% of patients were males and 52.5% of patients were females, the prevalence of CME was higher in females than males. The possible explanation could be that female sex is a significant risk factor for the development of diabetic maculopathy as reported by English town study [15], also hypertensive retinopathy seen more in females than males as reported by a study done in Iran [14] where 45.8% of females and 32.6% of males had retinopathy, and study done in Jordan [16] (48% of females and 42% of males had retinopathy).

Diabetes mellitus was present in 32 (52.5%) of the study patients, and about 41 (54.66%) of eyes with diabetic retinopathy, and 12 (37.5%) of diabetic patients with bilateral CME. This match a study done in Erbil city by Mustafa [17] in 2011 revealed that the prevalence of diabetic retinopathy was high (15%) among diabetic patients and about (20%) of them develop CME.

In this study 35 (57.37%) patients had systemic hypertension. This could be explained by high prevalence of hypertensive retinopathy (48.5%) in Erbil city based on a study done in the city at 2012 by Said [18], also arterial hypertension is a risk factor for development of central and branch retinal vein occlusion, central retinal artery occlusion and retinal hemorrhage, that are predictive factors of CME.

Hyperlipidemia was found only in 17 (27.86%) of the patients with CME, this was consistent with United Kingdom study [15] that showed no significant association between serum cholesterol and maculopathy, but this finding didn`t match the Germany study [19], that showed significant association between maculopathy and high serum cholesterol. The possible explanation could be due to low attendance of those patients with CME and high serum cholesterol, and unreliable laboratory results with inappropriate preparation of patients for the biochemical investigation.

In the present study the frequency distribution of the 75 eyes of CME which were included in the study among the predictive factors was as following; 41 eyes (54.66%) were diagnosed as diabetic retinopathy, which is the most common predictive factor for development of CME, followed by 10 (13.34%) eyes with CME following cataract operation (Irven Gass syndrome), then 8 eyes (10.67%) were diagnosed as BRVO, 6 eyes (8%) were diagnosed as CRVO, 5 eyes (6.66%) were diagnosed as age related macular Degeneration, 3 eyes (4%) had uveitis, and lastly 2 (2.67%) had Retinitis Pigmentosa. It`s known that diabetes mellitus is a common disease, and the prevalence of diabetic retinopathy is high (15%) of the diabetic patients and (20%) of patients with diabetic retinopathy had developed CME as shown in a previous study done in Erbil city by Mustafa [17] in 2011.

Colin J. [20] (2007) and Cable M. [21] (2012) postulate that, Cystoid macular edema (CME) is one of the most common causes of vision loss after cataract surgery. Its pathogenesis is likely multifactorial, but inflammation caused by surgical manipulations appears to be a major cause. In this study 10 (13.34%) CME occurred after cataract extraction, and this is consistent with previous studies done by Eriksson U. et al [22], in 2011, Perente I [23] et al, in 2007, and Kim SJ. et [24] al , in 2008 showed that between 4% and 20% of healthy eyes develop CME (diagnosed by OCT) after cataract surgery, but most patients experience little or no reduction in visual acuity.

Measurement of macular thickness in the study patients, revealed that, the average macular thickness was higher in diabetic retinopathy, it was statistically nonsignificant, but the values of retinal thickness in diabetic retinopathy were consistent with the values of previous study done in Erbil city in 2012 by Ahmed [25].

In the present study, the macular thickness measured at 1mm (central), 3mm (superior, inferior, nasal and temporal) and 6mm (superior, inferior, nasal and temporal) using spectral domain OCT, and found that the severity of macular edema was more centrally, and lessen gradually as it`s goes peripherally in the macula, (the central area at 1mm was the thickest area, followed by area at 3mm, and lastly at 6mm), and this could be explained by understanding the anatomy and histology of macula, and the pathophysiology of CME, the macular region is predisposed to the collection of transudated fluids by virtue of its anatomic structure, the horizontal course of the outer plexiform layer extend transversally from cone nuclei to bipolar cells, and the resultant laxity of this layer predisposes to the formation of reservoir for the accumulation of transudate (Yamada [26]). Furthermore, the avascularity of the foveolar area restricts absorption of fluid (Jaffe [27]). As a result of this predilection for the accumulation of fluid, the macula has been said by some investigators to "act as a sponge" (Cogan et al [28]). In addition to these anatomic considerations, the foveal region has large concentrations of cells with a high metabolic activity, inflammatory, metabolic, or vascular disturbance can lead to increased concentrations of tissue metabolites with loss of biochemical activity (Ffyche and Blach [29]).

5. Conclusions:

1. Diabetic retinopathy is the most common causative factor of CME, (54.66%) of cases, followed by cataract surgery (13.34%)

2. The macular edema is more sever in diabetic retinopathy, CRVO and after cataract surgery.

3. Cystoid Macular Edema is more sever at the fovea centralis and the edema is reduced as peripheral as from the fovea.

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تأثير بعض الدقائق النانوية على بعض من سلالات النوع Pseudomonas aeruginosa المتعددة المقاومة للمضادات الحيوية

[1]بيمان علي كريم، [2]اسراء غانم السماك

[1]قسم صناعات الغذائية/كلية الزراعة/جامعة صلاح الدين,

[2]قسم علوم الحياة/كلية العلوم/جامعة الموصل

[1]Payman_ali2006@yahoo.com, [2]essra_alsammak@yahoo.com

الملخص

جمعت 179 عينة سرسرية شملت :التهاب المجاري البولية،مسحات الجروح، القيح، الحروق والتهاب اللوزتين من المرضى الوافدين الى مستشفى رزكاري التعليمي وروزئاوا في مدينة اربيل من اذار الى ايلول 2013، وتم تشخيص (24) سلالة للنوع *Pseudomonas aeruginosa* وبنسبة (13.40%) اعتماداًعلى الصفات الشكلية والزرعية والأختبارات الكيموحيوية و اختبار APi20E. اختبرت حساسية هذه السلالات تجاه 12 نوع من المضادات الحيوية. اعطت الانواع مقاومة عالية ضد الAmpicillin (AM/10µg) و Amoxicillin (AX/25µg) بنسبة (100%) وكانت اقل مقاومة تجاه Gentamicin (GM/10µg)، Cephalothin (KF/30µg) و Ciprofloxacin (CIP/5µg) بنسبة (25،33.3، 20.8%) على التوالي.اختيرت (10) سلالات ذات مقاومة عالية للمضادات وحدد التركيز المثبط الادنى (MIC) تجاه المضادات قيد الدراسة اضافة الى بعض من الدقائق النانوية باحجام مختلفة ZnO20,30,50~150, Ag20,90nm (nm,$TiO_2$10,50,100nm), اظهرت النتائج بأن MIC لل(Ag 20,90nm) كان (650-2600) مكغم/مل، اما ل (ZnO20nm) تراوحت قيم MIC بين (81.25-2600) مكغم/مل بينما MIC (ZnO30, 50~150nm) كان بين (325-2600) مكغم/مل وMIC لل($TiO_2$10 nm) كان بين (81.25-2600)) مكغم/مل وMIC لل($TiO_2$50 nm) بين (325-2600)) مكغم/مل بينما MICلل($TiO_2$100 nm) بين (162.5-2600)) مكغم/مل. كما تم التحري عن تاثير مزج المضادات الحيوية مع الدقائق النانوية، وأظهرت تأثيرا تأزريا بينهما وفعالية جيدة في تثبيط النمو البكتيري خاصة للسلالات المقاومة للمضادات الحيوية.

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The Effect of some nanoparticles on multiple antibiotics resistant *Pseudomonas aeruginosa* isolates

[1]Payman A. Kareem, [2]Essra Gh. Alsammak
[1]College of Agriculture/ Salahaddin University,
[2] Dept. of Biology/ College of Sciences/ Mosul University.
[1]Payman_ali2006@yahoo.com, [2]essra_alsammak@yahoo.com

ABSTRACT

One hundred seventy-nine clinical samples collected included: urine, wounds, pus, burns and tonsils from patients coming to Rizgary Teaching Hospital and Rozhawa Hospital in Erbil city from March to September 2013, (24) (13.40%) strain of Pseudomonas aeruginosa identified according to cultural characteristics, microscopically features and biochemical tests in addition to the API -20E.Antibiotics sensitivity done against 12 types of antibiotics. The results showed absolute resistance against Ampicillin (AM / 10µg)& Amoxicillin (AX / 25µg) by 100% whereas the lowest resistant appeared against Gentamicin(GM/10µg), Cephalothin(KF/30µg) & Ciprofloxacin(CIP/5µg) (33.3,25,20.8%) respectively .Ten isolates were selected according to their pattern of the highest resistance as these showing multi-drug resistances and tested to specify their minimum inhibitory concentration (MIC) for the antibiotics and some types of Nanoparticles include Silver in different sizes (20, 90)nm, Zinc oxide in different sizes (20,30, 50~150)nm and titanium dioxide in different sizes (10, 50, 100)nm. The results showed that the MIC for Ag 20,90nm was between (650 -2600) µg/ml and the MIC for ZnO20nm was between (81.25 -2600) µg/ml but the MIC for ZnO30, 50~150nm between (325-2600) µg/ml and the MIC for $TiO_2$10nm was between (81.25 -2600) µg/ml, MIC of $TiO_2$50nm between (325-2600) µg/ml but MIC of $TiO_2$100nm between (162.5-2600) µg/ml .Synergism effect between the antibiotics and the Nanoparticles showed high activity in inhibition of Pseudomonas aeruginosa growth.

Keywords: Pseudomonas aeruginosa, multi-resistant to antibiotics, silver nanoparticles, Zinc oxide and titanium dioxide nanoparticles.

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1. المقدمة

تعرف الدقائق النانوية Nanoparticles بأنها تلك الفئة المتميزة من المواد الدقيقة التي يمكن انتاجها بحيث تتراوح مقاييس أبعادها او ابعاد حبيباتها بين1− 100 نانومتر، وقد ادى صغر احجام ومقاييس تلك المواد الى ان تسلك سلوكا مغاير للمواد التقليدية كبيرة الحجم التي تزيد ابعادها على 100 نانومتر هذا يعني ان الجسيمات بالحجم النانوي تمتلك مواصفات كهربائية ومغناطيسية تختلف بدرجة مهمة عن الجسيمات كبيرة الحجم لنفس المركبات [1].

يمكن الحصول على الجسيمات النانوية المعدنية بالطرائق الحيوية والفيزيائية والكيميائية اذ أن هناك أنواع عدة من البكتيريا والفطريات لها القدرة على إنتاج الجسيمات النانوية المعدنية ذات خصائص مضادة للأحياء المجهرية [2].

عرف منذ القدم أن للفضة ومركباتها تأثيرات مختلفة ضد الاحياء المجهرية والفايروسات ويعود ذلك لصغر حجم دقائقها التي تقل عن 5 نانومتر والتي تعمل على زيادة المساحة السطحية وبه يؤدي الى توليد نزعة للهجرة الى السطح الخارجي للدقائق النانوية وزيادة النشاط الكيمياوي لها وزيادة انتاج الاوكسجين المتفاعل بضمنها تكوين الجذور الحرة free radicals [3,4] كما ان للدقائق الفضة النانوية قدرة على اجتياز الاغشية الحية كالجلد المصاب بالأكزيما او الحروق والوصول الى مجرى الدم مؤدية الى زيادة الجهد التأكسدي oxidative stress وانتاج السايتوكينات cytokines والالتهاب واخيراً موت الخلية [5,6].

ويعد أوكسيد الزنك النانوي من أشهر أكاسيد المعادن التي تمتلك العديد من الخصائص وأهمها الخصائص شبه الموصلة والنشاط المضاد للبكتيريا والذي حاز على اهتمام كبير كعلاج مضاد للجراثيم [7] ولديه نشاط مضاد للجراثيم اقوى من أكسيد الزنك، ويرجع ذلك إلى زيادة المساحة السطحية للجسيمات الى حد كبير.أوكسيد الزنك النانوي ينافس الأكاسيد المعدنية النانوية الأخرى من خلال النشاط المضاد لمجموعة واسعة من البكتريا الموجبة والسالبة لصبغة كرام [8].

اما ثاني أكسيد التيتانيوم (TiO_2) النانوي قد استخدم على نطاق واسع لقتل مجموعات مختلفة من الكائنات الحية الدقيقة بما في ذلك البكتيريا والفطريات والفيروسات، لأنه ذوتحفيز ضوئي عالي [9]

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،له خواص عازلة [10] ،ثابت كيميائياً، قليل التكلفة وغير سام [11]. بسبب فعاليته الضوئية photo activity واستخدامه في مجال الوقاية من الشمس فان عدداً من الدراسات قد تناولت تأثيرات التشعيع بالاشعة فوق البنفسجية على الخلايا بوجود التيتانيوم النانوي TiO_2 [12].

أصبحت الجراثيم الممرضة التي تتصف بصفة المقاومة المتعددة للمضادات الحيوية والتي تمتلك البلازميدات مشكلة أساسية خاصة بالإنسان اى تقاوم هذه الجراثيم عدداً من المضادات الحيوية ويمكن أن تواصل النمو في الجسم على الرغم من أخذ المضادات الحيوية [13]. إن إضافة مضادات حيوية إلى الجسيمات النانوية قد أظهر تأثيرات تآزرية ضد البكتيريا، حيث أظهر استخدام الجسيمات لوحدها كبح لنمو 40% منها، و قد ارتفعت النسبة كثيرا مع إضافة المضادات الحيوية[14] . وعليه استهدفت الدراسة التحري عن نسبة انتشار افراد النوع *Pseudomonas aeruginosa* المتعددة المقاومة للمضادات الحيوية والمسببة للعديد من الامراض,وتقدير مدى تاثير الدقائق النانوية عليهاواستخدامها كبدائل او كمساعد للعلاج بالمضادات الحيوية .

2. المواد وطرائق العمل: Materials and Methods

جمعت (179) عينة من المرضى الوافدين الى مستشفى رزكاري وروزئاوا في مدينة اربيل للفترة من آذار لغاية ايلول سنة 2013 اذ شملت العينات الادرار،مسحات الجروح ،القيح،الحروق والتهاب اللوزتين.تم عزل وشخصت افرادالنوع *Pseudomonas aeruginosa* من العينات المختلفة وفقا لما جاء في [15,16] اعتماداً على الصفات الشكلية والزرعية والكيموحيوية ونظام API-20E المجهز من شركة BioMerieux وحسب مواصفاتها [17] .

اجري فحص الحساسية باستخدام طريقة الانتشار بالاقراص للمضادات الحيوية أذ استخدم لذلك (12) نوعا من المضادات الحيوية Ampicillin (AM/10µg), Amoxicillin (AX/25µg), Gentamicin (GM/10µg), Erythromycin (E/15µg), Ciprofloxacin (CIP/5µg), Chloramphenicol (C/30µg), Cefotaxime(CTX/30µg), Nitrofurantoin (NF/300µg), Co-Trimoxazole (COT/25µg), Cephalothin (KF/30µg), Doxycycline

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(DO/30µg), Ceftriaxone (CRO/30µg) وباستخدام وسط مولر–هنتون الصلب اذ حضنت الآوساط في درجة 37 °م ولمدة 18 ساعة.قورنت النتائج مع ما ورد من قياسات عالمية حسب ما جاء [18].

استخدمت طريقة التخفيف بالمرق للتقدير الكمي لتوضيح تاثير فعالية المضادات الحيوية والدقائق النانوية.حيث استعملت طريقة microtiter plate وبأستخدام 96 حفرة ,واجريت اعتماداً على طريقة [19,20] كالاتي:-

- اضيف 100مايكروليتر من مرق مولر هنتون الى كل حفرة.
- اضيف 100 مايكروليتر من المضاد المحضر مسبقابتركيز 1024 مايكروغرام لكل مل الى الحفرة رقم 1 من الصف A. مزج المضاد من خلال حركته الى اعلى واسفل6–8 مرات وهذاجعل المخفف بتركيز ضعف اي يعادل 512 مايكرو غرام/ مل.
- نقل 100 مايكروليتر من الحفرة 1 الى الحفرة 2 ومزج بنفس الحركة وهكذا اصبح المخفف بتركيز 256 مايكروغرام/ مل.
- كررت العملية وصولا الى الحفرة رقم 10 وبعدها سحب منه 100 مايكروليتر واهمل وبهذا نحصل على تراكيز (512,256,128,64,32,16,8,4,2,1) مايكروغرام/ مل.
- اضيف 5 مايكروليتر من المعلق البكتيري وبعمر (24) ساعة الى كل الحفر.
- اضيف للحفرة رقم 11 المرق والمعلق البكتيري فقط واعد سيطرة موجبة.
- الحفرة 12 اصبح سيطرة سالبة حاوي فقط على المرق والمضاد.
- اضيف الى الصف B مضاد اخر وهكذابالنسبة للصفوف الاخرى.
- غطى الطبق وحضن في درجة(37)°م لمدة(18–24) ساعة.
- فحص وجود النمو مرئياوثم ملاحظة ال MIC تركيز المثبط الادنى للمضاد من خلال ملاحظة عكورة الوسط.

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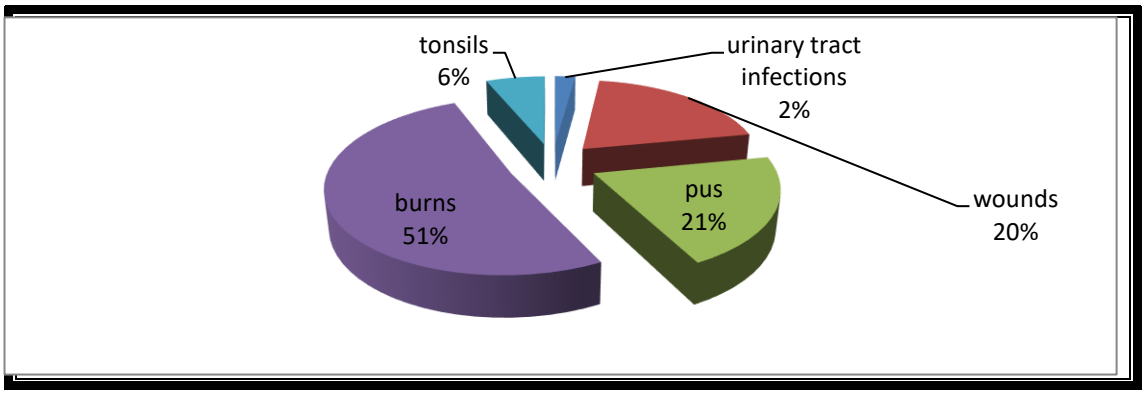
اما بالنسبة الى الدقائق النانوية استعملت نفس الطريقة السابقة باستخدام تركيز 5200 مايكروغرام / مل المحضر مسبقا الى الحفرة رقم 1 من الصف A وبهذا نحصل على التراكيز (2600, 1300, 650, 325, 162.5, 81.25, 40.6, 20.3, 10.15, 5.07) مايكروغرام/ مل.

كما قدر التأثير التآزري لكل من دقائق الفضة و اوكسيد الزنك وثاني اوكسيد التيتانيوم على حدى مع المضادات الحيوية وذلك بأضافة 50 مايكروليتر من الدقائق بتركيزهاالمثبط الادنى الخاص بها مع 50 مايكروليتر من المضادات بتركيز المثبط الخاص بها الى الحفر وبقطر 5 ملم بعد تلقيح سطح الاطباق بالانواع النقية قيد الدراسة وحضنت الاطباق في درجة 37° م لمدة 24 ساعة وقدر اقطار التثبيط حول الحفر مقاسة (بالملم) وكررت العملية مرتين واخذ المعدل [21].

3. النتائج والمناقشة: Results & Discussion

يبين الشكل(1) النسبة المئوية للنوع Pseudomonas aeruginosa المعزولة من مصادر سريرية مختلفة وسيادة 12 عزلة من الحروق بنسبة (51%).



الشكل1 يبين النسبة المئوية للنوع Pseudomonas aeruginosa المعزولة من المصادرالمختلفة

شخصت العزلات اعتماداً على بعض الصفات الشكلية والزرعية والأختبارات والمبين في الجدول (1) واكد التشخيص اعتماداً على API-20E كما موضحة في الصورة (1).

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الجدول1 إختبارات التحري الاولي عن افراد النوع Pseudomonas aeruginosa قيد الدراسة

Test	Result	%	Test	Result	%
Gram stain	-	100	Indole	-	93
Catalase	+	100	Methyl red	-	97.6
Oxidase	+	100	Citrate	+	100
Voges proskour	+	100	Urease	+	92.8
Growth at 42°C	+	100	Pigment Production	+	100

الشكل2 API-20E لبكتريا Pseud.aeruginosa

درست حساسية البكتريا المعزولة تجاه 12 مضاداً حيويا من خلال قياس منطقة قطر التثبيط ومقارنة النتائج مع ما ورد في [18]أظهرت النتائج في الشكل(2) ان هناك تبايناً في مقاومة العزلات قيد الدراسة تجاه المضادات الحيوية المستخدمة حيث أظهرت البكتريا مقاومة عالية لمضادي Ampicillin ، Amoxicillin بنسبة 100% وجاءت متوافقة مع العديد من الباحثين [22], تلتها مضادات Ceftriaxone،Co-Trimoxazole،Nitrofurantoin و Erythromycin وبنسبة (70.8،75،83.3،87.5)% على التوالي وبينت النتائج كذلك وجود مقاومة عالية لبعض المضادات ومنها Cefotaxime، Doxycycline بنسبة (62.5،66.7)%على التوالي وتعتبر هذه النسبة طبيعية بسبب الاستخدام العشوائي للمضادات الحيوية،وتتفق هذه النتيجة مع [23] حيث وجد نسبة مقاومة عالية للمضادات الحيوية السيفوتاكسيم بين عزلات *Pseud.aeruginosa* وبنسبة متوسطة لمضاد Chloramphenicol إذ بلغت 54.2% ،اما اقل مقاومة كانت لمضادات Gentamicin،Cephalothin،Ciprofloxacin اذ بلغت (33.3،25،20.8)% على التوالي.أظهر

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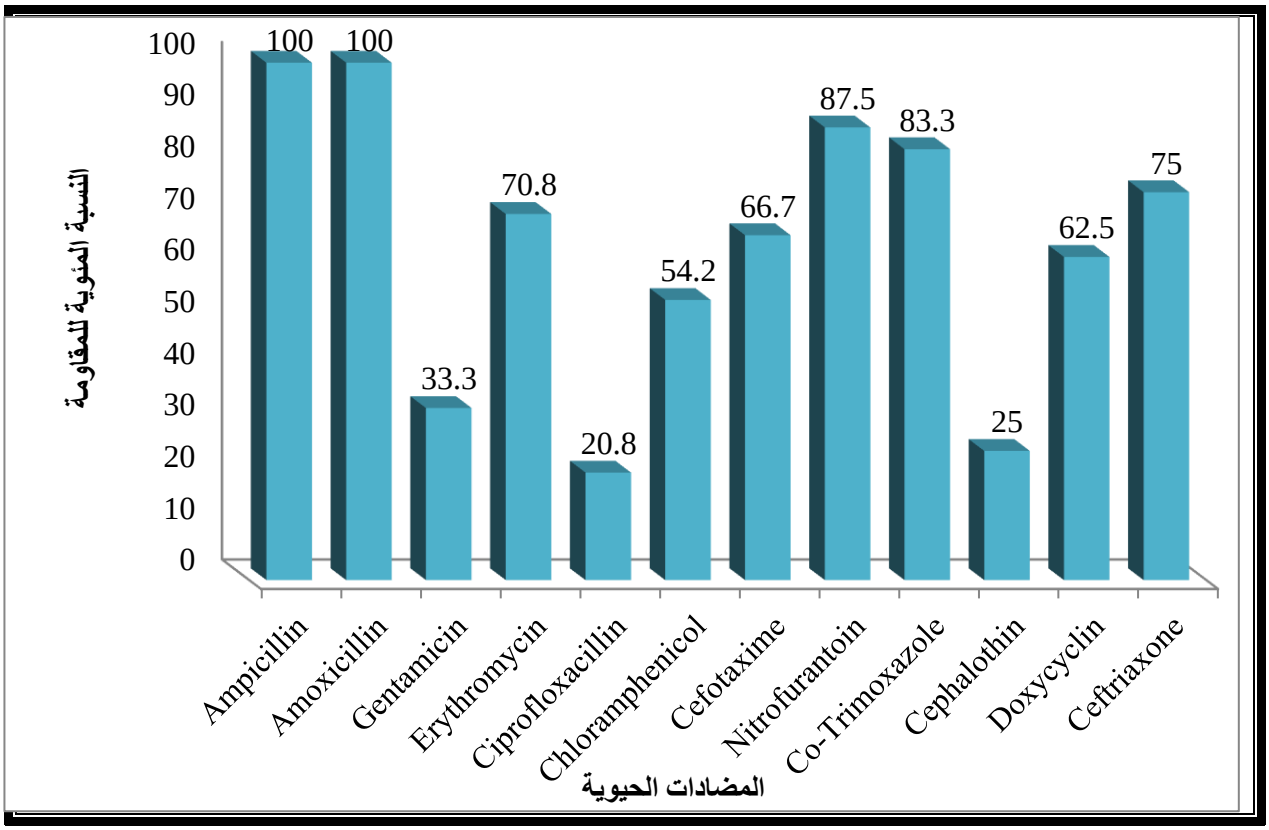
مضادCiprofloxacin تأثيراً واسعاً ضد البكتريا السالبة لصبغة كرام وهذا ما سجله [24]،اذ يثبط فعالية انزيم DNA gyrase [25].



الشكل3 نسب مقاومة عزلات النوع Pseud. Aeruginosa تجاه المضادات الحيوية قيد الدراسة

تم تحديد التركيز المثبط الادنى MIC للمضادات الحيوية المدروسةحيث و كما مبين في الجدول (2) تم اعتماد نقطة التوقف (Break point) الموصوفة من قبل [18] كاساس لحساب الاستجابةحيث أظهرت النتائج بان جميع العزلات ابدت مقاومة تامة لجميع المضادات واعطت قيماً عالية ل MIC بالمقارنة مع نقطة التوقف باستثناء حساسية جميع العزلات للمضادين Cefotaxime و Ceftriaxone و9 عزلات كانت حساسة لمضادNitrofurantoin حيث تراوحت قيم MIC مابين (2-64)مكغم/مل ماعدا عزلة واحدة كانت مقاومة اذ بلغت قيمة MIC لها (128) مكغم/مل بينما بالنسبة للمضاد Gentamicin اذ اعطت جميع العزلات مقاومة ماعدا عزلة واحدة كانت حساسة اذ بلغت قيمة MIC لها (2) مكغم/مل.

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الجدول2 التركيز المثبط الادنىMIC (مايكروغرام /مل) للمضادات الحيويةالمختلفة ضد عزلاتPseud. aeruginosa
*** نقاط التوقف معتمدة علىCLSI,2007 (26)**

رقم العزلة / المضادات الحيوية	نقاط التوقف مايكرو غرام/مل	PS1	PS2	PS3	PS4	PS5	PS6	PS7	PS8	PS9	PS10
		(مايكروغرام /مل)									
Ampicillin	8<	256	128	512	512	128	128	256	256	512	128
Amoxicillin	8<	128	256	256	64	128	512	128	512	128	256
Gentamicin	8≤	8	32	32	64	16	32	8	16	64	4
Erythromycin	1<	256	64	16	32	64	32	8	128	64	16
Ciprofloxacillin	4≤	16	16	4	4	32	4	16	8	32	4
Chloramphenicol	8<	16	4	32	4	32	16	8	32	16	8
Cefotaxime	64≤	2	8	4	16	64	32	16	4	8	2
Nitrofurantoin	64<	64	16	128	4	8	2	16	8	8	2
Co-Trimoxazole	4<	64	128	512	512	128	256	128	256	128	512
Cephalothin	32≤	64	16	4	2	8	32	32	64	16	2
Doxycycline	16≤	2	4	16	8	32	16	32	8	4	2
Ceftriaxone	64≤	64	16	16	8	4	32	4	2	2	8

أما التركيز المثبط الادنى MIC لدقائق الفضة النانوية (Ag–NP) ذات حجم 20& 90nm على عزلات بكتريا Pseud. Aeruginosa يوضحها الجدول (3) كانت بتراكيز بين (650–2600) مكغم/مل، حيث يبين أن عزلات بكتريا Pseud. aeruginosa مقاومة اكثر وتحتاج الى تركيز اعلى من دقائق الفضة النانوية لتؤثر في نمو البكتريا وهذه النتائج مقاربة مع ما ذكره [26].

اما التركيز المثبط الادنى MIC لدقائق اوكسيد الزنك النانوي (ZnO–NP) ذو الحجم 20nmعلى عزلات بكتريا Pseud.aeruginosaكانت بتراكيز بين (81.25–2600) مكغم/مل في حين تركيز المثبط الادنى MIC لدقائق اوكسيد الزنك النانوي (ZnO–NP) ذوالحجم 30 nm كانت بين (325–1300)مكغم/مل اما تركيز المثبط الادنى MIC لدقائق اوكسيد الزنك النانوي (ZnO–NP) ذوالحجم 50~150nm كانت بين (325–2600) مكغم/مل . حيث ان فعالية الضد أحيائية لاوكسيد الزنك النانوي ضد بكتريا Pseud.aeruginosa تزداد كلما قل حجم الجسيمات [27,28].

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الجدول3 التركيزالمثبط الادنى MIC للدقائق النانويةالمختلفة ضد عزلات النوع Pseud.aeruginosa

PS10	PS9	PS8	PS7	PS6	PS5	PS4	PS3	PS2	PS1	العزلات البكتيرية / الدقائق النانوية
MIC (µg/ml)										
2600	650	1300	2600	2600	1300	650	650	2600	1300	**Ag20nm**
2600	2600	1300	2600	1300	650	650	1300	2600	1300	**Ag90nm**
1300	325	81.25	1300	1300	650	2600	1300	325	1300	**ZnO20nm**
1300	650	325	650	1300	325	1300	650	325	650	**ZnO30nm**
1300	650	650	1300	325	1300	2600	1300	1300	1300	**ZnO50~150nm**
1300	650	325	81.25	2600	1300	1300	650	2600	2600	**TiO210nm**
1300	1300	650	325	1300	650	650	1300	2600	1300	**TiO250nm**
1300	162.5	650	1300	2600	650	1300	325	162.5	650	**TiO2100nm**

اما التركيز المثبط الادنى MIC لدقائق اوكسيد التيتانيوم النانوي (TiO_2–NP) ذوالحجم 10nm على عزلات بكتريا Pseud.aeruginosa كانت بتراكيز بين(81.25–2600) مكغم/مل في حين تركيز المثبط الادنى MIC لدقائق اوكسيد التيتانيوم النانوي (TiO_2–NP) ذو الحجم 50nm كانت بين (325–2600) مكغم/مل، اما التركيز المثبط الادنى MIC.

لدقائق اوكسيد التيتانيوم النانوي (TiO_2–NP) ذوالحجم 100nm كانت بتراكيز(162.5–2600)مكغم/مل. في حين ذكر الباحث (29) أن اوكسيد التيتانيوم النانوي له خصائص مضادة للميكروبات ومادة مؤكسدة قوية يعمل على تثبيط بكتريا *Pseudomonas aeruginosa* ATCC 27853 بشكل كبير بوجود الضوء عندالطول الموجي (365nm) لمدة 90 دقيقة بتركيز (0.5 –1) ملغم/لتر.

اما الجدول (4) فيبيّن تأثير العلاقة بين المضادات الحيوية والدقائق النانوية على بكتريا النوع *Pseudomonas aeruginosa* حيث ظهرت المضادات (CRO،DO،CTX،CIP،C،E،GM) زيادة في معدل قطر منطقة التثبيط عند المزج مع الدقائق النانوية المستخدمة قيد الدراسة وباحجامها المختلفة وقد أظهرت دراسة [30] ظهور التأثير التآزري عند

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المزج بين دقائق الفضة النانوية ومضاد الكلورامفينيكول ضد بكتريا Pseud.aeruginosa في حين لاتتفق مع ما ذكره [31]. بينما تتفق مع ما ذكره [32] بأن المضادات الحيوية أظهرت تأثيرا تازريا مع اوكسيد الزنك النانوي ضد البكتريا المنتجة لأنزيمات بيتا لاكتاميز الواسعة الطيف حيث أن الجمع بين اوكسيد الزنك النانوي والمضادات الحيوية يزيد من نفاذية الغشاءالخلوي وبالتالي يؤدي الى تسرب البروتين من غشاء البكتريا.

الجدول4 تأثير المزج بين المضادات الحيوية والدقائق النانوية على النوع Pseud.aeruginosa

المضادات الحيوية	تأثير المضاد لوحده	تأثير المضادات مع الدقائق النانوية(ملم)								تأثير الدقائق النانوية لوحدها(ملم)							
		الم ضاد + Ag 20	الم ضاد + Ag 90	الم ضاد + ZnO 20	الم ضاد + ZnO 30	الم ضاد + ZnO 50	الم ضاد + TiO2 10	الم ضاد + TiO2 50	الم ضاد + TiO2 100	Ag 20	Ag 90	ZnO 20	ZnO 30	ZnO 50	TiO2 10	TiO2 50	TiO2 100
Am	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
AX	0	0	0	0	0	0	0	0	0								
GM	0	0	0	0	7	0	0	0	0								
E	8	0	0	13	0	0	0	0	0								
CIP	15	18	17	17	16	14	14	13	12								
C	10	7	8	13	10	11	9	8	8								
CTX	9	11	11	9	11	10	10	9	11								
NF	0	0	0	0	0	0	0	0	0								
COT	0	0	0	0	0	0	0	0	0								
KF	0	0	0	0	0	0	0	0	0								
DO	8	0	0	8	7	0	0	8	9								
CRO	0	10	10	11	9	9	0	0	0								

4. الاستنتاجات: Conclusion

نستنتج من هذه الدراسة بان كفاءة اوكسيد الزنك النانوي في التاثيرعلى البكتريا المقاومة للمضادات الحيوية مقارنةً بدقائق الفضة النانوية وثاني اوكسيد التيتانيوم النانوي.كما ان مقاومة العزلات البكتيرية لمجاميع عديدة من المضادات الحيوية ومنها مجموعة البنسلينات والسيفالوسبورينات في حين أظهرت حساسيتها للمضادات (Ciprofloxacin ، Cephalothin و Gentamicin). كما تفاوت التأثير التآزري بين المضادات الحيوية والدقائق النانوية المستخدمة في الدراسة ضد العزلات

البكتيرية حيث أعطتْ المضادات (Ceftriaxone, Cefotaxime, ، Ciprofloxacin)عند مزجها مع الدقائق النانوية المستخدمة في الدراسة اعلى تأثيرضد العزلات البكتيرية.

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