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The progress and prosperity of the nations is a foundation that builds up the science and the continuity of a country that is more than 6,000 years old. The University College is struggling to fulfill its scientific responsibility, like other governmental and non-governmental academic institutions, scientific and scientific researchers in our academic and scientific premises, academic institutions and other academic scientific centers to be embedded in the broad knowledge.

Al-Kitab Journal for Pure Sciences welcomes the research and scientific studies of professors and researchers from universities, academic institutions, and research and scientific centers from inside and outside Iraq. Our Journal aims to evaluate and publish research by academics and researchers as well as graduate students' research. In view of the many disciplines in the disciplines of pure science, the editorial board has approved that this Journal should publish its products and scientific research in the specialties of the medical, engineering and biomedical sciences and all related fields.

The task of the editorial board is to receive the research from the researchers and check it in terms of conformity with the conditions of publication and registration of research and give it a special number and identify the reviewers in the field of competence and the editorial board to send research to the reviewers and follow-up. And the receipt of research returns from the evaluation and delivery to the researcher for the purpose of making amendments approved by the evaluators and then provide them with the acceptance of publication after making the required amendments and the publication of research in the preparation of the journal each according to the allocation and sequence.

Prof. Dr. Ayad Ghany Ismaeel
President of Al-Kitab University
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Bleeding Time in Different Blood Groups and Genders In Hawija Technical Institute Students

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ABSTRACT

In medicine, blood groups play an active role. A noticeable relationship is observed linking ABO with the Wilbrand factor and vWF deficiency which results in hemorrhagic disorders, while increased levels are a risk factor for blood clotting. Previous investigations found that individuals in group O have long hemorrhageand blood clotting time. The aim of the current study is to evaluate the bleeding time relationship with the different blood groups and sex also. This cross-sectional study includes 95 students aged between 18 and 20 years. Permission has been takenfrom the students participated in this study before the bleeding time (the method of filter paper for Duke) was determined.The obtained results showed a longer time of bleeding among the AB group. Moreover, the bleeding time is longer in women than men. For more results, it is necessary to involve a larger research group.

Keywords: Bleeding time, Blood groups, Factor of von Wilbrand**.**

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زمن النزف في مختلف فصائل الدم و كلا الجنسين لدى طلاب معهد الحويجة التقني

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الخلاصة

في مجال الطب, تلعب فصائل الدم دورا حيويا. وجد ان هناك علاقة واضحة ما بين مختلف فصائل الدم و عامل "فون ولبراند", حيث ان نقص هذا العامل يؤدي الى اضطرابات نزفية, بينما تؤدي زيادته عن المعدلات الطبيعية الى ظهور الجلطات الدموية. اثبتت دراسات سابقة ان الافراد ذوات فصيلة الدم "ج" يكون زمني النزف و التخثر لديهم اطول من باقي الفصائل. الهدف من هذه الدراسة هو احتساب العلاقة ما بين زمن النزف و بين مختلف فصائل الدم, و اذا ما كانت هنالك اي علاقة ما بين زمن النزف والجنس. ضمت هذه الدراسة المقطعية 95 طالبا و طالبة ضمن الفئة العمرية (18-20)عاما. تم احتساب زمن النزف لديهم بطريقة "ديوك باستعمال ورق الترشيح" بعد ان تم جمع المعلومات المطلوبة من المتطوعين. اوضحت هذه الدراسة ان زمن النزف كان اطول لدى ذوات فصيلة الدم "أب" , كذلك كان زمن النزف اطول لدى الطالبات مقارنة بالطلاب.

الكلمات الدالة: زمن النزف, فصائل الدم, عامل فوم ولبراند.

I. Introduction

The people are dividedinto four major blood groups based on Mendelian Determinants which state that the antigens of blood cell are inherited. Individuals of type A contain antigen A; type B contains antigen B; type AB contains both of antigen A and antigen B, and type O which doesn't contain any of the previously mentioned antigens. A and B antigensare complex Oligosaccharides, which have different covered sugar [1]. On the other hand,

antigens of ABO seem to be important during our development, as the different blood types frequency varies in different population groups [2].

Karl Landsteiner defined the ABO blood group system in 1900 and put the milestone for the beginning of blood transfusion and banking medicine. Complex carbohydrate molecules form ABO. The glycosyl A and B, encoding alleles A and B, convert the H-antigen parameters to A and B. This is the result of the transferase enzyme in the G-group, which remains to express the antigen H [3]. These antigens are carbohydrate fragments located at the end of the carbohydrate chain in the glycoprotein on the surface of red blood cells. The location of the gene that symbolizes these antigens is on the chromosomes 9 and 19 [4].

Latest studies suggested an association of ABO blood groups and various diseases, like periodontal disease, stomach cancer and venous thrombosis [5, 6].

Diabetes, duodenal ulcer, urinary tract infection, incompatibility of the mother-child species, etc. [7, 8, 9].

The time of bleeding is defined as the period between the skin puncture and automatic stop of bleeding [10].

The phenotype and ABO level are clearlycorrelated. In clotting, there are two important proteins, factor VIII and von Wilbrand vWF. These factors are lower in plasma in the peoplewithin group O by about 25% than in other groups, which increases blood clotting time and can cause excessive bleeding [11].

The factor of von Wilbrand is a large glycoprotein produced by the endothelial cells of the blood vessels as well as produced by master cells. The lack of the vWF causes hemorrhagic disorders, and high levels of it are a risk factor for coagulation [12,13,14].

According to a study conducted by Gill J. C. et al. [15], lowest plasma vWF levels found in individuals in group O, while, elevatedplasma vWF levels found in the other groups (A, B and AB). Claim that there is a potential risk of stroke among people outside the group O. This indicates an increase in the time of bleeding and the time of a blood clotting between the

group O individuals compared to members of non O group. On the other hand, Daniel M. and others were unable to find any relationship in their studies between ABO Group and the factor of von Wilbrand [16].

The aim of the current investigation is to evaluate the bleeding time relationship with the different blood groups among students of the Technical Institute of Hawija.

II. Materials and methods

This study was conducted on students of the first and second stages of the Department of Medical Laboratories Techniques at Hawija Technical Institute in Kirkuk city. The study included 95 students aged 18 to 20 years. The study excludes students with any history of bleeding disorders and non-use of (NSAIDs). Data collection was age-related after getting informedconsent.

Procedures: Collection of blood was performedby adding antisera A and B to the blood sampleand wasconfirmed by the clumping appearance between the erythrocytes. Bleeding time estimation was conducted using the filter paper method for Duke [17].

III. Results

In the current study, data collected from ahomogeneous study group of 95 students aged between 18 to 20 years old. Of the 95 students, 47 were women,and 48 were men. The bleeding time was found between 1-4 minutes in group AB (88.23%) compared to group A (84.61%), group B (75%) and group O (63.88%) as presented in Table 1. There was a clear difference between ABO groups with bleeding time less than 1 min and between 1-4 min but not statistically significant ($p > 0.05$).

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Table 1 Students distribution according to Bleeding time (BT) and Blood groups

Blood group	Bleeding time (BT)	
	<1	1-4
A (n=26)	4(15.38%)	22(84.61%)
B (n=16)	4(25%)	12(75%)
AB (n=17)	2(11.76%)	15(88.23%)
O (n=36)	13(36.11%)	23(63.88%)
Total	23	72

Furthermore, insignificant difference observed among blood groups in bleeding time ($p>0.5$) as listed in Table 2.

Table 2 BT Comparison in between blood groups

Comparison	Bleeding time (BT)		
	X2-value	p-value	Significance
A and B	0.594	0.441	NS
A and AB	0.112	0.738	NS
A and O	3.26	0.071	NS
B and AB	0.971	0.325	NS
B and O	0.621	0.43	NS
AB and O	3037	0.066	NS

The difference in genders regarding bleeding time showed that 8.51% of women had bleeding time longer than 4 minutes compared to 6.25% for men. The t-test of student's bleeding time revealsinsignificant statistical difference between men and women ($p>0.5$) as presented in Table 3.

Table 3 Comparison of bleeding time between males & females

GENDER	< 4 mins (%)	> 4 mins (%)
FEMALE	43(91.48%)	4(8.51%)
MALE	45(93.75%)	3(6.25%)

IV. Discussion

So far, much research has been done to establish a relationship between blood groups and bleeding time and blood clotting time. Massimo et al.surveyed the relevant literature and reported that, compared to O group; members of group O may not have a potential risk of coagulation due to the vWF low levels [18]. In addition, the ABO group variation can influence the vWF undermining, which indicates that the levels of plasma for the vWF may depend on the human blood type.Another study by Jenkins et al. [19], stated that, compared to O group, vWF is largest 25% in the other non O groups of individuals, means that the time of hemorrhage and blood coagulation time will increase between O group compared to other groups. Although according to a study conducted by Mahpatraet al. [20], bleeding time in group AB increased compared with other groups. This result was consistent with our results.

Furthermore, no significant difference in the bleeding time and the time of coagulation observed between men and women in the Mahapatra study [20] and other studies, which were also consistent with the results of our study. Another study found that 44.4% of women had more than 4 minutes bleeding time compared to 13 % of men, this result agreed with a study conducted by Roy et al.[21], who noted that bleeding time was longer in women compared to men. The fact that the females have longer bleeding and coagulation time is related withthe presence of estrogen hormone and a decrease in fibrinogen in plasma as reported by Ercan et al. [22].

V. Conclusions

O group was the most common type, and B was the less common group among the study students. Bleeding time was longer 1-4 minutes in AB individuals, followed by A members, B and O. As well as, there was no statistical association between the blood groups in regard bleeding time. Also in regard bleeding time and sex, we found longer bleeding time in females than males, although the difference is statistically insignificant. Values werestatistically unimportant; this may be because of the small size sample. Further studies with large size samples of study are needed to confirm the findings and correlate it with the level of von wilbrand factor and factor VIII to take prophylaxes before any troubles.

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Knowledge attitude and practice study of HIV/AIDS in Kirkuk

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Abstract

Introduction: patients with HIV/AIDS in developing countries have to face discrimination in the society and in health care system .The knowledge of people in such countries also not good enough as many of them don't know the main information about this disease and some of them get infected because of lack of information

Objective: To examine the knowledge of people about HIV/AIDS in Kirkuk city among different educational background.

Subjects and Methods: A structured questionnaire form related to HIV/AIDS was administrated on the 6000 person included (primary, secondary, high school, university student and employers as well as public people). The questionnaire form included demographic items including gender, age, setting, and educational level and questions on AIDS related knowledge covering main topics. The data was analysed and evaluated by chi-square and student t-test.

Result: The results of this study showed that the rate of knowledge about HIV/AIDS regarding the knowledge of people about the causative agent the highest knowledge was virus (80.86%) followed by bacteria (8.9%), parasite (3.38%), fungus (2.23%). the rate of knowledge about HIV/AIDS according to being zoonosis in females (32.1%) was higher than males (21.18%). The knowledge of university student (45.13%) was highest followed by high school (28%), secondary school (19.75%), and the primary school (8.68%). The knowledge of people about the prevention and control of the disease, the rate of correct answer (66.8%) was higher than incorrect one (28.9%).

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Conclusion: There is a gap in the existing knowledge of HIV/AIDS regarding route of transmission, causative agent, and general appearance of the disease.

Key words: HIV/AIDS, Knowledge, Kirkuk, people.

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الخلاصه

المقدمه : المرضى المصابين بمرض الايدز في الدول الناميه يواجهون التمييز في المجتمع وفي انظمة الصحة . معلومات الناس في هذه البلدان غير كافيه بحيث ان معظمهم لا يعرفون المعلومات الاساسيه حول المرض وبعضهم يصابون بهذا المرض بسبب النقص في معلوماتهم حول هذا المرض.

الهدف: معرفة معلومات الناس حول مرض الايدز في مدينه كركوك بين مختلف مستويات التعليم .

طرائق العمل : نظمت استماره الاستبيان المتعلقه بمرض الايدز والتي طبقت على 6000 شخص تشمل (طلاب المدارس الابتدائيه , طلاب المدارس المتوسطه , طلاب الاعداديه, طلاب الجامعات , موظفين و عامه الناس) . استماره الاستبيان كانت تشمل العناصر الديموغرافيه والتي تشمل (الجنس , العمر , المكان , مستوى التعليم و الاسئله المتعلقه بالمعلومات الرئيسيه عن مرض الايدز) . البيانات فحصت وقيمت احصائيا بواسطه اختبارين (chi -square, students t- test).

النتائج : نتائج هذا البحث تبين معدل معلومات الناس حول مرض الايدز تبعا اذا كان المرض مشترك (اي ينتقل من الحيوان الى الانسان وبالعكس) حيث تبين ان معدل اجابات الاناث (32.1%) كانت اعلى من الذكور (21.18%) . وان معلومات طلاب الجامعه (45.13%) كانت الاعلى تليها طلاب الاعداديه (28%) , طلاب المتوسطه (19.75%) و طلاب الابتدائيه (8.68%) . اما فيما يتعلق بمعلومات الناس حول مسبب المرض حيث اعلى معدل كان الفايروس بنسبه (80.86%) يليها البكتريا (8.9%) , طفيليات (3.38%) , فطريات (2.23%) . معلومات الناس حول منع والسيطره على المرض , حيث ان معدل الاجابات الصحيحه (66.8%) كانت اعلا من الاجابات الغير الصحيحه (28.9%) .

الاستنتاج : هنالك فجوه في المعلومات القائمه حول مرض الايدز. فيما يتعلق بطرق الانتقال, مسبب المرض ,الظهور العام للمرض . ان معلومات الناس في كركوك حول مرض الايدز تتحسن من خلال النشر الصحيح فيما يتعلق بحقائق حول عدوى مرض الايدز من خلال التلفاز , الراديو , الصحف , الانتريت , الاجتماع العام والتوصيه الصحيه خصوصا في المناطق الريفيه .

الكلمات المفتاحيه : مرض الايدز , كركوك, معلومات .

1.Introduction

HIV is a virus that attacks cells in the immune system, which is our body's natural defense against illness. The virus destroys a type of white blood cell in the immune system called a T-helper cells are also referred to as CD4 cell. As HIV destroys more CD4 cells and makes more copies of itself, it gradually weakens a person's immune system. This means that

someone who has HIV, and isn't taking antiretroviral treatment, will find it harder and harder to fight off infections and diseases. AIDS is a set of symptoms (or syndrome as opposed to a virus) caused by HIV. A person is said to have AIDS when their immune system is too weak to fight off infection, and they develop certain defining symptoms and illnesses. This is the last stage of HIV, when the infection is very advanced, and if left untreated will lead to death [1]. AIDS represent the final manifestation of HIV and the earlier stages of the infection are asymptomatic [2].

Human are not the natural hosts of either HIV-1 or HIV-2. Instead, these viruses have entered the human population as a result of a zoonotic, or cross-species transmission. Evidence of simian immunodeficiency virus (SIV) infection has been reported for 26 chimpanzees and SIVsm from sooty mangabeys, are the cause of the acquired immunodeficiency syndrome (AIDS) in human together they have been transmitted to human on at least seven occasions. The implications of human infection by a diverse set of SIVs and of exposure to a plethora of additional human immunodeficiency virus-related are discussed [3]. Transmission of HIV occurs through transmission of infected blood and its derivatives (semen, rectal fluid, vaginal fluid) sexual contact, from infected mother to babies injecting drug users and breast feeding [4].

The illness was first described in 1981 and the virus was isolated by the end of 1983[2]. Recent report on the global AIDS epidemic estimates that there were 35.3 million [32.2million- 38.8 million] people living with HIV [5]. Globally, it is known that there is a lack of HIV knowledge among youth between the ages of 15-24 [6]. Many factors put developing countries like Iraq at greater risk for developing HIV. Examples for these factors illiteracy, low per capita income, gender discrimination, poor knowledge about routes of transmission. Social stigma might disallow people with risky behaviours from seeking HIV testing or disclosing a positive status. Population growth, migration to urban areas, sociocultural barriers and poor prevention efforts might also contributing to the spread of HIV/AIDS [7]. Iraq is categorized as a low prevalence HIV epidemic, with a low number of officially reported cases (0.1%) of total population [8].

There are several studies performed in several Iraqi provinces i.e; knowledge of secondary school students on HIV/AIDS in Kirkuk province [9], knowledge about HIV/AIDS among high school students in Erbil city/Iraq [10], knowledge and attitude of health care workers in Baquba Teaching Hospitals toward HIV/AIDS infection [11], HIV and AIDS-related knowledge among women in Iraq [12].

This study aimed to know the awareness of people in Kirkuk city about HIV/AIDS and to compare their knowledge about the disease between different educational level educated and uneducated people.

2.Subjects and methods

A prospective study was conducted in Kirkuk city, which is the center of Kirkuk province located in the north of Iraq and its the fifth largest city of Iraq in terms of the population of about 1,200,000 inhabitants according to the department of statistic in Kirkuk for 2019. The study applied on the people inside Kirkuk as well as nearby towns including (Taza, Dakok, Hawihja, Riaz, Dibis and Altun-kopri) and the people from other province including (Baghdad, Salah-Aldien, Mosul, Erbil, Sulaimaniyah, Diyala, Anbar, Duhuk and Babel) from December 2018 to March 2019. The study was applied on 6000 person (3506 females, 2494 males) including high school students and university students, taken from 20 different schools and 9 colleges as well as employers and public people in different ages and different educational background. A special questionnaire form arranged to collect information about studied groups:-

The questionnaire form was consisted of two sections:-

1. Demographic items including gender, age, place, and educational level.
2. Questions on AIDS related knowledge covering three main topics: general information, transmission, and preventative measures. The response categories for the section on knowledge were Yes, No, don't know.

The data was analysed and evaluated by chi-square and t-test using the statistical package of social science (spss inc, chicago) for windows V.7. A p-value of ($P<0.05$) was considered statistically significant.

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A QUESTIONNAIR FORM

A-Personal information

Gender: Male ☐ Female ☐ Age ……. Address……..

B- Education level: Primary school ☐ Secondary school ☐ High school ☐ University ☐ Postgraduate studies ☐ Employers ☐

C-Do you breeding an animal? Yes ☐ No ☐

D- Do you raising an animal? Field ☐ Home ☐

E- Type of animal ……

F- Etiology of HIV/AIDS: Bacteria ☐ Virus ☐ Fungus ☐ Parasite ☐

G- IS it a zoonotic disease: Yes ☐ No ☐

H- Which type of animals that transmit the disease? Monkeys ☐ Dogs ☐ Cats ☐ Pigs ☐ Cows ☐ Sheep's ☐ Horses ☐ Rodents ☐ Other animals ☐

I- Mode of transmission: Blood ☐ Sex ☐ Kissing ☐ Insect bite ☐ Food and drink ☐ Shaking hands ☐ Contaminated syringes ☐ Wounds and abrasions ☐ Mother to fetus ☐ Use patient personal tools ☐ Organ transplantation ☐ Meat of infected animal ☐

J- Places that transmit the disease: Swimming pools ☐ Cosmetic centre ☐ Massage centre ☐ Tattoo centre ☐ Dental clinics ☐

K- Is the disease treatable? Yes ☐ No ☐ I don't know ☐

L- Dose the infected person show the clinical signs of disease? Yes ☐ No ☐ I don't know ☐

M- Dose the patient required isolation? Yes ☐ No ☐ I don't know ☐

N- Should the infected person tell others about his or her infection? Yes ☐ No ☐ I don't know ☐

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O- Do you support the marriage of infected person? Yes ☐ No ☐ I don't know ☐

P- Methods of control and prevention of disease? …….

……

3.Results

Table 1. Shows the number of people that participate according to the educational level. It was the highest among the university students (44.26%), followed by high school students (27.46%), secondary school students (19.36%) and the lowest was primary school students (1.45%). Statistically there was significant difference between different educational groups ($p<0.0001$).

Table 1 The number of the participant according to their educational level.

Educational level	Gender		Total
	Male	Female	
Primary school	56 0.93%	31 0.51%	87 1.45%
Secondary school	447 7.45%	715 11.91%	1162 19.36%
High school	537 8.95%	1111 18.51%	1648 27.46%
University	1143 19.05%	1513 25.21%	2656 44.26%

Sig= 0.000

Table 2. Shows the number of people that participate according to their settings which the people that participate inside Kirkuk (83.7%) was highest than outside Kirkuk (6%) and those from other governorate (4.36%). The difference between people of different residency was significant statistically ($p< 0.0001$).

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Table 2 The number of participants according to the setting.

Place	Gender		Total
	Male	Female	
Inside Kirkuk	1881 31.35%	3141 52.35%	5022 83.7%
Outside Kirkuk	248 4.13%	112 1.86%	360 6%
Other governorate	164 2.73%	98 1.63%	262 4.36%

Sig=0.000

Table3 The number of participant according to animal breeder and non animal bre

Animal breeder	Geneder		Total
	male	female	
Animal breeder	679 11%	575 10%	1254 21%
Non animal breeder	1674 27%	2931 48%	4605 76%
Total	2353 39%	3506 58%	5859 97%

Table 4. Shows the knowledge of people on the etiology of HIV/AIDS, it is shown that the knowledge of people regarding the causative agents being virus was (80.86%) bacteria (8.95%) parasite (3.38%) and fungus (2.23%) respectively.

Regarding the animal breeding it was found the rate of the affirmative answer among non - animal breeder was (63.43%) was greater than animal breeder (17.06%).

Regarding the educational level among all people the rate of the affirmative answer among the university students was highest (39.06%) followed by high school students (22.7%), secondary school students (13.28%) and the lowest primary school students (8.68%). Statistically there was significant difference between groups ($p< 0.0001$).

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Table 4 Knowledge of people about HIV/AIDS according to the causative agents.

		bacteria	Virus	fungus	Parasite
Gender	Male	218 3.63%	1957 32.61%	56 0.93%	75 1.25%
	Female	319 5.31%	2895 48.25%	78 1.3%	128 2.13%
Animal breeder	Animal breeder	122 2.03%	1024 17.06%	30 0.5%	46 0.76%
	Non-animal breeder	401 6.68%	3806 63.43%	103 1.71%	153 2.55%
Educational level	Primary school	13 0.21%	521 8.68%	5 0.08%	7 0.11%
	Secondary school	214 0.35%	797 13.28%	37 0.61%	58 0.96%
	High school	149 2.48%	1362 22.7%	36 0.6%	62 1.03%
	University	137 2.28%	2344 39.06%	44 0.73%	62 1.03%

Sig (gender) = 0.506 Sig (animal breeder) = 0.18

Sig (education level) = 0.01

Table 5. Shows the knowledge on HIV/AIDS among all people according to being zoonosis or not zoonosis. The rate of the affirmative answer among the female (32.1%) was higher than male (21.18%). The knowledge of non- animal breeder (41.3%) was higher than animal

breeder (11.7%). The rate of the affirmative answer among the educational level the answer among the university students was the highest (22%) followed by high school students (15.93%), secondary school students (11.76%) and the lowest was primary school students (0.88%).

Table 5. Knowledge of people about HIV/AIDS according to being zoonosis

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		Zoonosis	Non zoonosis
Gender	Male	1271 21.18%	928 15.4%
	Female	1926 32.1%	1349 22.48%
Animal breeder	Animal breeder	702 11.7%	486 8.1%
	Non animal breeder	2480 41.3%	1776 29.7%
Educational Level	Primary school	53 0.88%	28 0.46%
	Secondary school	706 11.76%	379 6.31%
	High school	956 15.93%	582 9.7%
	University	1320 22%	1138 18.96%

Sig(gender) = 0.431 Sig (animal breeder) = 0.765

Sig (educational level) = 0.000

Table 6. Shows The knowledge of people on HIV/AIDS according to the mode of transmission. It is shown that the percentage of people with the affirmative answer for sex was (58.18%), followed by the using of personal tools (40.66%), organ transplant (35.5%), mother to fetus (31.78%), contaminated syringe (31.53%), kissing (22.83%), meat of infected animals (21.01%), food and drink (19.01%), wound and abrasion (8.68%), shaking hand (14.58%), insect bite (12.5%) and the lowest was blood (3.7%).

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Table 6 The knowledge of people about HIV/AIDS according to the mode of transmission.

Rout of transmission	Gender		Total
	Male	Female	
Blood	68 1.13%	154 2.56%	222 3.7%
Sex	1406 23.43%	2085 43.75%	3491 58.18%
Kissing	596 9. 93%	774 12.9%	1370 22.83%
Insect bite	342 5. 7%	408 6.8%	750 12.5%
Food and drink	416 6.9%	725 12.08%	1141 19.01%
Shaking hands	258 4.3%	617 10.28%	875 14.58%
Contaminated syringes	872 14.53%	1020 17%	1892 31.53%
Wound and abrasions	477 7.95%	644 10.73%	1121 18.68%
Mother to fetus	753 12.5%	1154 19.23%	1907 31.78%
Personal tools	967 16.11%	1473 24.55%	2440 40.66%
Organ transplantation	850 14.16%	1281 21.35%	2131 35.51%
Meat of infected animal	576 9.6%	640 10.66%	1216 20.26%

Table 7. Concerning the prevention of HIV/AIDS show the rate of correct answer was (66.8%) higher than incorrect answer was (28.9%).

Table 7 The knowledge of people about HIV/AIDS according to the prevention of disease.

Answers	Male	Female	Total
Correct answers	2008 33.46%	2000 33.33%	4008 66.8%
Incorrect answers	738 12.3%	969 16.15%	1734 28.9%

Sig =0. 000

4.Discussion

This study explored HIV/AIDS knowledge, and sources of information among different groups of people in Kirkuk governorate Kirkuk-Iraq. HIV/AIDS has become a common problem in the world and its rate increased in many developing countries including Iraq, following the wars, in addition of having social implication, it is necessary to take immediate action to decrease the future spread of this problem.

In this study the knowledge about etiology of HIV/AIDS affirmative in females 58.43% higher than males 39.2%. The higher rate among females than males is in contrast with finding of Tahir *et al* [9] who found the affirmative answer in males was higher than females, among secondary school students in Kirkuk and also not in agreement with Othman in Erbil [10], and Abiona *et al* [13]. The higher level of knowledge of men than women might be due to that males desire to learn about the subject and this might encourage them to discuss HIV/AIDS with each other by Huda and Amanullah in Bangladesh [14].

The knowledge about etiology of HIV/AIDS was affirmative in 80.86%. This reflects that the most people know the etiological agent being virus. This is also reported by Sly *et al* [15] and Tahir *et al* [9]. As far as education concern, it seems from the results of this study, that the education level has significant effect on knowledge of people about the etiology of AIDS. As the result of this study showed that the highest positive knowledge was among those with university level (45.13%).

Regarding the knowledge of people about methods of transmission of HIV/AIDS, it was found that the highest rate believe that it is transmitted through sex followed by using patient articles, organ transplantation, vertical transmission (mother to fetus), and contaminated syringes and kissing. It seems from this study that the knowledge of people about mode of transmission is not sufficient as only (3.7%) of studied group believe that HIV/AIDS is transmitted via blood transfusion.

The poor knowledge about mode of transmission by blood is much lower than that in Pakistan [16]. Unsterilized syringes (10%), while in Qatar and Canada Students high rate of student believe that HIV/AIDS can be transmitted by contaminated blood transfusion 92% in Qatar and 95.9% in Canada [17].

In addition to that many people believe that this disease is transmitted through insect bite, meat of infected animal, food and drink, wound and abrasions, shaking hands. As the majority of students believe that it is transmitted by sex, this is identical to that reported by Oyo-ita *et al* in Nigeria [18]. It is identical to that reported by study performed among Diyala and Al-Nahrain university student who found the knowledge and awareness of males 32.6% and in females 67.4% with high level of knowledge about etiology, sexual transmission, blood and blood product. It is also compatible with those reported in Sudan [19] and china [20] and Taiwan [21] in contract to Tahir *et al* in Kirkuk [9].

Regarding the role of insect transmission of HIV/AIDS in this study (12.5%) believed that HIV/AIDS are transmitted by this way. This finding is lower than that reported by Zimbabwean secondary school Wilson *et al* [22] and in Kirkuk Tahir *et al* [9]. The knowledge of people about HIV/AIDS about prevention of disease, the rate of correct answer was

(93.8%), this reflects that the majority of them are aware about prevention of this dangerous disease in our community.

During the period of study, a question was arise about the possibility of HIV/AIDS being a zoonotic disease, it is believed that as this disease is not the natural host of HIV, but the virus entered the human population as a result of zoonotic or cross transmission Hahn *et al* [3]. The knowledge of people regarding residency it was found the information of people among people inside Kirkuk(85.9%) was highest than those residing outside Kirkuk and other governorates . This might be due to higher level of health education about infectious diseases inside Kirkuk than outside and other governorate.

5.Conclusions

There is a gap in the existing knowledge of HIV/AIDS regarding route of transmission, causative agent, and general appearance of the disease.

6.Recommendation

Its recommended to carry on further studies in other part of the country in order to improve their knowledge about this disease and its prevention. The knowledge of people in Kirkuk could be improved by proper dissemination about the fact related to the HIV infection via TV, radio, newspaper, internet and public meeting especially in rural areas.

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Effect of Silver Nanoparticles on Some Physical& Biological Properties of Fluid Denture Base Material

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Abstract

Poly methyl methacrylate (PMMA) is one of the most widely used materials in modern prosthodontics. It is widely known due to its simplicity in use and acceptable aesthetic. A new concept of polymerization fluid resin technique was instead of heat and gypsum material. Forty specimens were prepared from two brands of fluid acrylic resin. The samples were divided into two groups, the first one was the control while the other group was incorporated with silver nanoparticles(modified). The tests performed were impact strength, transverse strength, color stability and candida retention ability on the samples. 10 samples for each test were used. The results showed that modified group had significantly higher impact strength than the control group. There was non-significant difference between group of modified fluid acrylic and control group. Regarding color stability, there were highly significant color change after 10 days of immersion in the tea solution for the modified group the results of the biological test showed that the candida retention of the control group was significantly higher than modified group.

Within the limitation of this study it can be concluded that addition of silver nanoparticles has resulted in significant difference between control and modified group for impact strength test. While non-significant difference was seen for transverse strength test. In regard to color stability, showed enhancement in color stability for both before and after placement in tea solution. Addition of silver nanoparticles also caused reduction in candida albicans retention in the added samples.

Keywords: PMMA, fluid resin, Impact strength, Candida albicans.

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الخلاصة

ميثيل ميثاكريليت هي واحدة من أكثر المواد المستخدمة على نطاق واسع بسبب بساطته في الاستخدام والجمالية المقبولة . كان المفهوم الجديد لتقنية راتنج السوائل بلمرة بدلاً من الحرارة ومواد الجبس .تم تحضير أربعين عينة من نوعين من راتينج الأكريليك السائل .تم تقسيم العينات إلى مجموعتين ، الأولى كانت السيطرة بينما تم دمج المجموعة الأخرى مع الجسيمات النانوية الفضية) المعدلة .(كانت الاختبارات التي تم إجراؤها هي قوة التأثير ، والقوة العرضية ، واستقرار اللون ، وقدرة احتباس المبيضات على العينات .تم استخدام ١٠ عينات لكل اختبار .أظهرت النتائج أن المجموعة المعدلة لديها قوة تأثير أعلى بكثير من المجموعة الضابطة .لم يكن هناك فرق معنوي بين مجموعة أكريليك مائع معدل ومجموعة تحكم .فيما يتعلق بثبات اللون ، كان هناك تغير كبير في اللون بعد ١٠ أيام من الغمر في محلول الشاي للمجموعة المعدلة ، أظهرت نتائج الاختبار البيولوجي أن احتباس المبيضات من المجموعة الضابطة كان أعلى بكثير من المجموعة المعدلة.

في حدود هذه الدراسة ، يمكن استنتاج أن إضافة الجسيمات النانوية الفضية قد أدى إلى اختلاف كبير بين المجموعة الضابطة والمعدلة لاختبار قوة التأثير .بينما شوهد اختلاف غير معنوي لاختبار القوة العرضية .فيما يتعلق بثبات اللون ، أظهر تحسنًا في استقرار اللون قبل وبعد وضعه في محلول الشاي .تسبب إضافة الجسيمات النانوية الفضية أيضًا في انخفاض احتباس المبيضات البيض في العينات المضافة.

I. Introduction

Poly methyl methacrylate (PMMA) is one of the most widely used materials in modern prosthodontics. It is widely known due to its simplicity in use and acceptable esthetics [1] PMMA is a thermoplastic polymer, the original material was seen as replacement for glass in a variety of applications, and is currently used extensively in glassing applications, the material is one of the hardest polymer, rigid, glossy finish, and good resistance [2]. Many attempts have been made in dentistry for various purposes like making denture base, artificial teeth, provisional restoration, surgical splints, stents and orthodontic appliances. They are the material of choice for removable complete denture prosthesis [3, 4]. For dental applications PMMA are modified by cross - linking to improve hardness and stiffness (increases molecular weight), increase crazing resistance (small cracks originating at the teeth - denture margin), wear and solvent resistance, but this increases brittleness [5].

However, poly methyl methacrylate is the most commonly used material but it doesn't have optimal property, both denture base material have similar chemical composition except fluid type of denture resins have higher molecular weight powder particles that are much smaller and when mixed with monomer, the resulting mix is very fluid. Therefore, they are referred as fluid resins. They are used with significantly lower powder-liquid ratio [6].

The color change of a polymeric material may be caused by intrinsic and extrinsic factors. Intrinsic factors involve resin discoloration itself and matrix changes, occurring during the aging process of the material due to many physical and chemical conditions, furthermore, extrinsic factors such as thermal changes, stain accumulation, artificial dyes used in food, cleaning procedures, and handling by the patient can also cause discoloration [7].

Nanotechnology has opened up new avenues of research and offers many applications in human health [8, 9]. Nanotechnology can be defined as using materials and structures with nanoscale dimensions usually the range 1-100 nm [10]. The effect of silver nano particles (Ag-NPs) are one of the most commonly used antimicrobial nano materials in range of consumer products and for medical applications [11]. This study was conducted to assess some physical properties and the antifungal activity of silver nanoparticles against candida when they are added to fluid denture base material powder in 0.4% concentration by volume [11].

II. Materials and Methods

Forty specimens were prepared from two brands of fluid acrylic resin, the first controlled group 20 specimens were prepared from the fluid acrylic resin (Mega press NV+ JFT) and the second group was modified by adding silver nanoparticles to the fluid acrylic (0.4/100gm of fluid resin), These specimens were divided into four testing groups according to the type of the test to be done later on. Then each group was subdivided into two groups. For each test, five specimens for two control and the other five specimens for the modified resin as shown in Table 1 [12]. Table 2 shows the composition of each material.

Table 1: Verifying the specimen number and type of testes

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Table 2: Verifying the composition and properties of fluid resin and silver nanoparticles

Fluid acrylic resin	**Liquid**	**Powder**
	- Megadental GmbH - Mega press NV + JET X. - Cold cure and contain 500 ml	- Mega press NV. - Kaltpolymerisat - Cold cur and contain 1000g.
	- Seeweg 20.D 63654Budingen. - Made in Germany. - Normal working and verarbeitungsdauer time: 7-10 min	
Silver nanoparticles	- Part number: MKN- Ag- 020. - Silver nanopowder (Ag 99.95% pure, APS 20nm, SSA: ~m2/g. - Lot # SN0710. - Appearances: black nanopowder, Morphology: spherical - Synthesis process: wet chemistry. - True dentistry: 10.5 g/cm3 and expire date: 2017 – 2020.	

III. Specimen preparation

According to manufacturer instruction in a mixing ratio by volume / parts by weight were 1 ml liquid/ 1.5 g powder, the (polymer) powder of required quantity is poured into the liquid (monomer) in a clean dry jar and mixed manually thoroughly for 20 second the 0.4 g silvernano particles then added to the mixing as shown in Table 3.

Testes	Specimen No.	Control group	Modified group
		Polymer/monomer ratio 1ml/1.5gm	Polymer/monomer ratio1ml/1.5gm/0.4%g silver nanoparticles
Impact	10	5	5
Transvers strength	10	5	5
Color stability	10	5	5
Candida retention	10	5	5

Table 3: Shows the mixing ratio

Sample NO.	Type of tests		Study groups	
			Control	Modified
			Polymer - Monomer Ratio	Adding silver particles
10	Impact		1ml /1.5gm	0.4%g
10	Transvers strength		1ml/1.5gm	0.4%g
10	Color stability	B	1ml/1.5gm	0.4%g
		A	1ml/1.5gm	0.4%g
10	Candida retention		1ml/1.5gm	0.4%g

The dough stage is reached after 4 minutes and remains till 6 minute then after that the resin was poured in to a mould prepared by metal specimens invested by a silicone gel material in to a special flask (Casta fiask) which is a clear plastic, high resistance to the temperature and easy to control. This flask possess 3 openings, from one opening the fluid resin was poured and the air exuded through the other openings and when the fluid resin exudes through these opening means that the mould has been filled, it composed of two parts, can be opened and joined together by two metal clips. The three plastic reservoirs placed at the upper part of the flask to close the reservoirs after filling the flask then cured by pressure curing device, the mold placed in pressure curing device that was filled with water at room temperature, the mold is completely immersed in water then the temperature gradually raised up to 120 °C at 20psi pressure for 15-30 minute [13].

The temperature of the device was 0-95 °C that permitted to increase the water temperature to 120 °C. The higher temperatures of water above boiled point could only be reached under pressure. In order to avoid that hot water vapor of 120 °C escapes from the pressure pot and in order to reduce the risk of scalding when opening the lid, this device was equipped with a safety lock which only allows the lid to open when the operated pressure in the unit [13]. When using a pressure pot, it is not necessary to pressurize it with air to more than 20 psi

(pounds per square inch), the cooling last from 5–8 minutes from time expiration to the opening of the lid. When the flask completely cooled removed from the chamber and opened for removing the specimens [13].

1. Impact strength test

The specimens used for impact strength test was prepared according to the ISO no. 179-1 [14]. with dimensions (80mm X 10mm X 4mm) length, width and thickness respectively, the specimens was tested after being conditioned in distilled water at 37°C for 48 hours using an incubator and the testing procedure done by a Charpy type digital impact tester (Electric Charpy impact tester, LY-XJJD-5, China), according to the procedure given by ISO 179 [14]. The speed of fall of the striker will be 2.9 m/s, and the striker has an energy range of 0.5,1,2, 4, and 5 joules, a striker of one joule testing capacity was used.

Impact strength = (E / b.d) X 103 (ISO 179-1, 2000) where

E : is energy absorbed to break the specimen

b: is width of the specimen in millimeter.

d: is thickness of the specimens in millimeter

The test specimen, supports near its ends as a horizontal beam, is impacted by a single blow of a striker, with the line of impact midway between the supports and strikes at a high, nominally constant, velocity [14].

2. Transverse strength test

Ten specimens five as a control and the other five are the modified, that prepared from fluid acrylic resin denture bas material measuring (65 x 10 x 3) mm ± 0.03mm in length x width x depth, respectively. The transverse deflection and transverse strength of the specimens were measured in air by three points bending on a computerized universal testing machine. The device was supplied with a central loading plunger and two supports with polished cylindrical and projection in the center of the cylindrical, the two support are apart from each by the 100mm. The supports were parallel to each other and perpendicular to the longitudinal central

line, the force and deflection were sensed by a sensor which was linked directly to the computed program that gave directly force-elongation table and record it in sequence from the starting of the test till the end.

The test specimens were held at each end of the two supports which away from each other by 50mm, and the loading plunger placed midway between supports, the tests were carried out with a constant crosshead speed of 0.5mm/ minute. The specimens were deflected till the fracture is occurring, then the transverse strength was calculated using the following formula:

Transverse strength = (3PL) / (2B.H2) MPa

Where:

P: is the peak load

L: is the span length (50mm)

B: is the width of the specimen (10mm)

H: is the thickness of the specimen (3mm).

3. Color stability

For the color stability test, rectangular metal specimens were constructed with the dimensions (25 X 4 X 0.5) mm length, width and thickness respectively to fit into the specimen carrying chamber of the spectrophotometer, and the color stability is the property of a material that allows color to be maintained over a period of time in a given environment, it is considered an important physical property of dental materials [15].

All spectrophotometer instruments designed to measure the absorption of radiant energy have the basic components [15].

1. A stable source of radiant energy (Light).

2. A wavelength selector to isolate a desired wavelength from the source (filter or monochromator).

3. Transparent container (cuvette) for the sample.

4. A radiation detector (phototube) to convert the radiant energy received to a measurable signal and a readout device that displays the signal from the detector.

The energy source is to provide a stable source of light radiation, whereas the wavelength selector permits separation of radiation of the desired wavelength from other radiation, the light radiation passes through a glass container with specimen and the detector measures the energy after it has passed through the species, the readout device calculates the amount of light absorbed by the specimen displays the signal from the detector as absorbance or transmission. [16].

The light absorption for each specimen was measured before immersion of the specimens in the solutions, the standard solution of tea prepared from 4 grams of dry tea boiled in 500 ml of distilled water for 4 minutes, and allowed to cool at room temperature, and the solution would decanted from tea leaves, this solution was used for staining the test specimens and the specimens measured by spectrophotometer, then immersion of it in the fresh tea solutions (that prepared prior to use) for 10 days [17].

4. Candia test specimens

Polymethyl methacrylate squares (10 × 10 × 0.5 mm) length, width and thickness. were fabricated, fluid resin acrylic samples processes according to manufacturers, specimens were equivalent in size and surface finish. No surface modification were making to the processed squares following recovery and then placed in distilled water for 24 h and stored dry until used [18].

The acrylic specimens containing silver nanoparticles was eluted with culture medium for 1, 2, and 5 days, the samples were then fixed with glutaraldehyde and Gram stained and adhered Candidial cells were examined by light microscope [19].

Preparation of C. albicans.

After preparing the agar medium, broth medium, yeast nitrogen base(YNB) then we prepared the *Cahyndida albicans* were grown on Brain Heart Infusion (BHI)agar over night at 37 °C. One colony of candida strain was inoculated in 5 mL of 30 % BHI and 70 % YNB and

incubated at 37 °C for 24 h. The concentration of the yeast culture 3 × 107 cells/ mL in BHI/YNB. Then, acrylic samples were placed in each well of a 12-well plate. Inoculate the wells with 2 mL of suspension in BHI/YNB media and incubate for 3hr at 37 °C under aerobic condition. After 3hrs incubation, the samples were washed with sterile phosphate buffer saline and then move the samples to a new sterile well plate filled with 2 mL fresh BHI/YNB. The biofilm will be allowed to grow for 24 h at 37 °C under aerobic conditions [20].

Colony forming unit CFU

Microscope observation epithelial cells and coupons with adherent yeasts were treated as described above, but without acetic acid. A duplicate of each plate was performed. Candida attached to crystal violet was quantified using an inverted light microscope. Ten fields were randomly observed in each well. As the samples were set up in triplicate for each experiment, the mean number of yeasts per 10 fields was expressed as number of cells per unit area of the well [21].

Results

Table 4 shows t-test results for assessing the effect of nanosilver on the impact, transverse strength, color stability and Candida retention of fluid acrylic resin denture base material. The results showed that comparison of controlled group and modified group of fluid acrylic resin, reveals that the modified group had significantly higher impact strength than the control group ($P < 0.01$).

The results of bending test for the 10 specimens of fluid acrylic resin denture base showed that the 5 modified fluid acrylic resin was the highest mean value for bending test (148.4N/mm2), followed by the control fluid acrylic resin (129.0 N/mm2) statistically there was non-significant difference between the two groups.

Regarding Color stability, t- test was done for the two groups control and modified also before tea immersion in tea and revealed that there was non statistically significant difference ($P>0.05$) between all the two groups of fluid acrylic resin denture base as shown in Table 4

but there were highly significant color change after 10 day immersion in the tea solution for the modified group (P< 0.01).

Regarding Candida retention, t-test was revealed that the mean of control group was significantly higher than modified group (P<0.01).

Table 4: Effect of different tests, impact, transvers strength, color stability and candida retention on both control and modified study groups.

Sample NO.	Type of tests		Study groups		Probability T- test
			Control	Modified	
			Mean ± SE NO. 5	Mean ± SE NO.5	
10	Impact		4.90±0.69	10.23±0.62	P<0.01
10	Transvers strength		129.0±4.56	148.4±11.68	p>0.05
10	Color stability	B	1.70±0.03	1.79±0.02	p>0.05
		A	4.90±0.69	10.23±0.62	P<0.01
10	Candida retention		30.0±4.64	10.80±2.24	(
B:before;	**A:After**				

Discussion

There were high significant differences between means of impact strength among control and modified groups that disagree with results of [22], when they found that the highest impact stress for the conventional fluid acrylic resin without silver nanoparticles, this may be due to the sample size, or the amount of the additives, also the type of the used resin.

Transverse strength that widely used for evaluation of quality of acrylic denture base material was non significantly increased in modified group this agree with result of [23] when they found the mean compressive strength of acrylic reinforced with nanosilver were higher than the unmodified one, reverse result was found by [22] who reported that the addition of silver nanoparticles had no effect on flexural strength and elastic modulus of acrylic resin.

The means of color stability in before(B) and after(A) groups were increased in modified compared with control (P>0.05), (P<0,01) respectively, that agree with [24] they reported that acrylic resin exhibited the least color alteration, and the addition of pigments to the resin enhanced its color stability, in addition of nanoparticle materials partially blocks the passage of ultraviolet rays because of its size and gray color, reducing color degradation of other pigments and overall color change of the denture. Indeed, the color of the specimens was changed by adding the silver nanoparticles to dark gray and increased by the specimen's thickness.

The silver nanoparticle cause reduction of the Candida retention and that agree with [25] who observed that the bioactivity and biomass of *C. albicans* biofilm successively decreased with increasing nano-silver solution concentration also the thickness and live/dead cell ratio were successively reduced with increasing nano-silver concentrations [25].

Conclusion

Within the limitation of this study the authors can conclude that addition of silver nanoparticles has resulted in significant difference between control and modified group for impact strength test. While non-significant difference was seen for transverse strength test. In regard to color stability, showed enhancement in color stability for both before and after placement in tea solution. Lastly the addition of silver nanoparticles caused reduction in candida albicans retention in the added samples.

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Relation of the 25 (OH) D Levels and Preterm Labour

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ABSTRACT

Pregnant women are a risk group vitamin D insufficiency found among greater than 50% of pregnant females. Actually, there few researches and knowledge which associate the Maternal 25(OH) D level and premature labour, and no one carried in Iraq. The aim of this research is to find out any relation between the maternal plasma 25(OH) D levels of females who have gave birth to premature (< 36 weeks) in comparison to females with full-term neonates in both groups . The current study is a case control research was carried out between January-August 2020, at the department of gynecology and obstetrics at Azadi Teaching Hospital in Kirkuk Governorate. A convenient sample was randomly selected consist of 30 Mothers with premature delivery, compared with 30 mothers term pregnancy delivery, the newborns were weighing >2500g and appropriate for gestational age. Revision of maternal ANC cards were carried out for investigations, ultrasonography, date of LMP of mothers', as well as fetal anthropocentric measurements through the conception period. The mean Vitamin D level was (18.6±6.7) among preterm deliveries, which is lower significantly from those with full term delivery (27.5±6.2), P value < 0.0001, as represented in figure 1. Deficient vitamin D level was reported among 15(50%) of preterm delivered mothers versus 6(20%) of full term mothers. insufficient vitamin D level was reported among 12(40%) of preterm delivered mothers versus 9(30%) of full term mothers. sufficient vitamin D level was reported among 3(10%) of preterm delivered mothers versus 15(50%) of full term mothers. The low levels Vitamin D level is significantly associated with premature deliveries.

Keywords: Vitamin D deficiency, Preterm Labor prematurity, vitamin D level

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علاقة مستويات 25 D (OH) والولادة المبكرة

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الملخص

تعتبر النساء الحوامل من الفئات المعرضة لنقص فيتامين (د) الموجود بين أكثر من 50٪ من النساء الحوامل. هناك القليل من الأبحاث والمعرفة التي تربط بين مستوى 25 D (OH) للأم والولادة المبكرة ، ولم يتم إجراء أي بحث في العراق. الهدف من هذا البحث هو معرفة أي علاقة بين مستوى بلازما الأم 25 D (OH) للإناث اللائي ولدن ولادة مبكرة (أقل من 36 أسبوعًا) مقارنة بالإناث ذوات الولاده التامه. الدراسة الحالية عبارة عن بحث حالة شواهد أجريت في الفترة ما بين كانون الثاني وآب 2020 ، في قسم أمراض النساء والتوليد في مستشفى آزادي التعليمي في محافظة كركوك. تم اختيار عينة ملائمة بشكل عشوائي تتكون من 30 أم مع ولادة مبكرة (أقل من 36 أسبوعًا) ، و 30 أمًا ولادات حمل كاملة المدة (37-41 أسبوعًا) ، والذين كانوا مناسبين لعمر الحمل ووزن الولادة> 2500 جم . تم إجراء مراجعة لبطاقات ما قبل الولادة من أجل الفحوصات المخبرية ، والتصوير بالموجات فوق الصوتية ، وتاريخ آخر دورة شهرية للأم ، والقياسات البشرية للجنين من خلال المراقبة التوليدية للحمل. كان متوسط مستوى فيتامين د (18.6 ± 6.7) بين الولادات المبكرة ، وهو أقل بكثير من أولئك الذين لديهم ولادة كاملة المدة (27.5 ± 6.2) ، قيمة P <0.0001 ، كما هو موضح في الشكل 1. تم الإبلاغ عن مستوى نقص فيتامين د بين 15 (50٪) من الأمهات المولودين قبل الأوان مقابل 6 (20٪) من الأمهات الناضجات. تم الإبلاغ عن عدم كفاية مستوى فيتامين (د) بين 12 (40٪) من الأمهات المولودات قبل الأوان مقابل 9 (30٪) الأمهات الناضجات. تم الإبلاغ عن مستوى كاف من فيتامين د بين 3 (10٪) من الأمهات المولودات قبل الأوان مقابل 15 (50٪) من الأمهات الناضجات. ترتبط المستويات المنخفضة من فيتامين د بشكل كبير بالولادات المبكرة.

الكلمات الدالة: نقص فيتامين د والولادة المبكرة ، ومستوى فيتامين د.

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Introduction

A secosteroid hormone that its main role is calcium and phosphorus homeostasis regulation called Vitamin D (25 (OH. Actually, vitamin D body's requirement is taken through its synthesis in the skin during sun light exposure and then transformed to active form in liver & kidney. [1] Vitamin D deficiency prevalence is globally wide spread, Asian and the Middle East females have elevated risks of 25(OH) D deficiency: in Turkey 50%, in Pakistan45%, and in India60%. [2] Severe vitamin D deficiency in Iraq was documented among reproductive aged females at (76%) and 25 (OH) D insufficiencies (18%), and only 7% had sufficient serum level. [3] Pregnant women are a risk group vitamin D insufficiency found among greater than 50% of pregnant females [4]

Vitamin D concentration level of the mother has an impact on its concentration in fetus, 25(OH) D, the calcium and phosphorus placental transfer, also had a role in as well as equilibrium of hormones & well-functioning immune system, the later were important in skeletal system development and feto-placental solidity.[5] Several researches associate reduced Maternal concentration of 25(OH) D and preeclampsia, gestational diabetes, [6, 7], and intrauterine growth restriction [8]. Actually, there few researches and knowledge which associate the Maternal 25(OH) D level and premature labour, and no one carried in Iraq. The aim of this research is to find out any relation between the Maternal plasma 25(OH)D level of females who have gave birth to premature (< 36 weeks) in comparison to females with full-term neonates in both groups.

Patients & Methods

The current study is a case control research was carried out between January-August 2020, at the department of gynecology and obstetrics at Azadi Teaching Hospital in Kirkuk Governorate. A convenient sample was randomly selected consist of 30 Mothers with premature delivery (< 36 weeks), and 30 mothers full term pregnancy deliveries and their neonates (37- 41 weeks), who were appropriate for gestational age and with a birth weight > 2500 g. Exclusion criteria encompass the following: Mothers with type 1 DM, rheumatic disease, kidney disease, and those using immunosuppressant were excluded. The mothers included in the study answered questions in a standardized questionnaires, that encompass questions about their socioeconomic situations, medications, education, pre-existing problems

and/or obstetric disease, mineral supplements or vitamin utilization (iron, folic acid, and vitamin D), sunlight exposure, and the regular sunscreen utilization .

Revision of the maternal cards of antenatal care carried out for lab investigations, ultrasonography, dating of LMP of mothers', and recorded measurement's of fetus thorough the conception. Mother baseline height and weight in Pre-pregnancy, along with weight gain per week during conception. BMI (kg/m2) were based on the height and weight measurements. Blood samples of 10 mL from mother's blood on delivery in the obstetrics center. At once blood placed in EDTA and dry then send for lab for measure the level of 25(OH) D. The vitamin 25(OH) D cutoff points were as follows: sufficient > 30 ng/mL, insufficient 20-30 ng/mL and deficiency < 20 ng/dL [9]. Advised levels for pregnant females were > 30 ng/mL. enroled mothers were informed about the study and their acceptance for participation in the research that showed the agreement to undergo the procedures of the research..

Results

The greatest frequency of full term &premature delivered mothers has primary education 12 (40%), 14 (46.7%), respectively. Most of the premature and full term delivered mothers were multigravida 16 (53.3%), 19 (63.3%) respectively in a statistically no one significant relation. Higher percentages of Full term mothers had folic acid supplementation 26 (86.7%) than those with premature pregnancy 17 (56.7%), this variation was statistically significant. There were equal percentage regarding iron supplementation among premature and full term delivered mothers 23(76.7%), 26(86.7%), respectively this relation was statistically not significant. None significant difference was shown in table 1 between premature and full term delivered mothers regarding vitamin D supplementation 3 (10%), 2 (6.7%) respectively. Conception complications of gestational hypertension UTI, was significantly higher among those with preterm delivery 12(40%), 13(43.3%)) than those with full term delivery 5(16.7%), 6(20%) respectively. Antenatal care visits was irregular among 24(80%) of those with preterm delivery group while only 7(23.3%) of those with full term pregnancy had irregular visits.

The mean Vitamin D level was (18.6±6.7) among preterm deliveries, which is lower significantly from those with full term delivery (27.5±6.2), P value < 0.0001, as represented

in figure 1. Deficient vitamin D level was reported among 15(50%) of preterm delivered mothers versus 6(20%) of full term mothers. insufficient vitamin D level was reported among 12(40%) of preterm delivered mothers versus 9(30%) of full term mothers. sufficient vitamin D level was reported among 3(10%) of preterm delivered mothers versus 15(50%) of full term mothers. This relation was statically significant as shown in table 2.

Table 1. The distribution of study sample according to multiple risk factors and type of delivery

Variable		preterm delivery		full term delivery		P value
		F	%	F	%	
Age		25.8±5.4		26.4±6.3		
Education	Illiterate	7	23.3	6	20.0	>0.05^{NS}
	1ry	12	40.0	14	46.7	
	2ndry	7	23.3	5	16.7	
	high education	4	13.3	5	16.7	
Parity	Primigravida	14	46.7	11	36.7	>0.05^{NS}
	Multigravida	16	53.3	19	63.3	
supplementation during pregnancy	folic acid	17	56.7	26	86.7	<0.05 S
	Iron	23	76.7	26	86.7	>0.05^{NS}
	Calicum	4	13.3	3	10.0	>0.05^{NS}
	Vit D	3	10.0	2	6.7	>0.05^{NS}
pregnancy complication	gestational HT	12	40.0	5	16.7	<0.05 S
	UTI	13	43.3	6	20.0	<0.05 S
ANC	Regular	6	20.0	23	76.7	<0.05 S
	Irregular	24	80.0	7	23.3	

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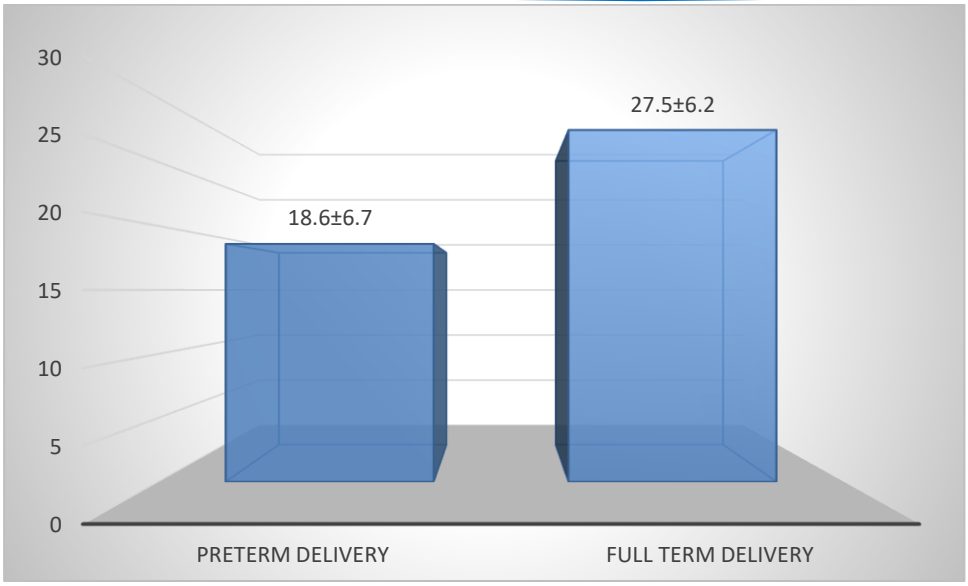

Figure 1. The mean vitamin D level among preterm and full term delivered mothers.

Table 2. Frequency distribution of vitamin D level among both study groups

Vitamin D level	preterm delivery		full term delivery	
	F	%	F	%
Deficiency	15	50.0	6	20.0
insufficiency	12	40.0	9	30.0
sufficiency	3	10.0	15	50.0
Total	30	100.0	30	

P value <0.005 significant Discussion

Discussion

Throughout conception, the only source of fetal vitamin D is the maternal vitamin D which spreads across the placenta. Elevated production of hepatic vitamin D binding protein (DBP) in relation with decreased in levels of albumin, through conception alter the metabolism of maternal vitamin D. resulting from this is decreased free vitamin D level, and elevated placental 1, 25(AH) 2 D3 production. [10] In the current research, there was a significant

elevated percentages of Full term mothers had folic acid supplementation (86.7%) than those with premature conception (56.7%), this goes with a study carried out Papadopoulou, E et al (2013) that the folic acid daily intake of a dose of 5 mg supplemental was related with a 31% reduction in the risk of premature delivery (RR, 0.69; 95 % CI, 0.44, 0.99), [11] A research of a meta-analysis type carried out by Li Bingbing et al, revealed that the higher is the folate levels and the supplementation of the folic acid is significantly correlated with a reduced general risk of whole PTB. [12]

While a research achieved by Rolschau et al. have shown a reduced risk for premature deliveries and SGA neonates in females receiving folic acid pre-pregnancy or in the first half of conception in affluent Northern worlds. [13] No relation was found by Timmermans et al. between the impacts of folic acid supplementation on gestational age. [14]

The gestational hypertension was considerably higher among those with premature delivery 12 (40%), than those with full term delivery 5 (16.7%) UTI, was considerably higher among those with preterm delivery (43.3%) than those with full term delivery (20%) the mean Vitamin D level was (18.6±6.7) among preterm deliveries In this study, this goes Letícia VD et al who found vitamin D level among preterm mothers 20.8 ± 11.8, full term mothers was 26.5 ± 9.7. [15] But was higher than reported in Egypt by Tahoun AM et al 2018 that PTB (16.15 ± 8.63), PTB (10.93 ± 4.40) [16]. In the current, it was found a considerable reduced mean vitamin D level among premature deliveries than full term deliveries this was in line of other researches carried out by Letícia VD et al (2020), Tahoun AM et al (2018), Burris HH et al (2012), Kim MS et al (2007) [16, 17, 18].On the other hand Lixia Yang et al found a non-significant effect of vitamin D deficiency on PTB for OR was 0.78 [19].
In the current research the Deficient vitamin D level was documented among 15 (50%) of premature delivered mothers versus 6 (20%) of full term mothers, insufficient vitamin D level was documented among 12 (40%) of preterm delivered mothers versus 9 (30%) of full term mothers, sufficient vitamin D level was documented among 3(10%) of premature delivered mothers versus 15(50%) of full term mothers.

This finding goes with Tahoun AM et al found that 93% of cases having preterm labor had abnormally low 25 (OH) D levels. Where 60% of patients showed deficient 25 (OH) D (<12

ng/ml), 33% of patients showed insufficient 25 (OH) D (>20 and <30 ng/ml), while 7% of cases showed normal vitamin D level. [16] In another study done by Burris HH et al 2012 found, 98.9% of preterm infants had vitamin D insufficiency or deficiency, and 51.1% of preterm infants were severely vitamin D deficient. [17] Chen Yuan-Hua et al 2018 China followed large number of mothers found that 8.23% of those mothers with sever vitamin D deficiency, (RR: 3.28) and 3.81% of those mothers with insufficient vitamin D level (RR: 1.45) had preterm delivery [20] Levels of vitamin D concentration in premature delivered females was considerably reduced in association to its concentration in the full-term delivered females, and vitamin deficiency was documented in around 50% of the females affected by PTN. [15]

Flood-Nichols SK et al 2015 found in a retrospective study 235 patient studied the relation of vit d level and pregnancy complications found that 10% of preterm deliveries had deficient, 60% insufficient level and 30% had sufficient level, the study concluded that there is no relation between 1st trimester vit d level and pregnancy complication. The mean vit D was 28.4 rang (19.9-72.3) [21]

An early report showed that the active hormone circulating 25(OH)D is transformed to 1,25(OH)2D3 to 40 ng/ml [22] in an optimal way. Several researches of vitamin D supplementation showed that preterm delivery rates for women with vitamin D ≤20 ng/ml are substantially higher compared to those with serums vitamin D ≥40 ng/ml, concluding a decreased PTD with increasing maternal vitamin D level .[23]

The low level of vitamin D among both groups preterm and full term could be explained by the finding in previous results in Karbala in Iraq about the prevalence of vitamin D among women in reproductive age found that (87%) of the females had low level of vitamin D in front of only 13% of them had sufficient vitamin D females conducted in the study and economic status of them, amount of milk taking per week, parity and with the duration of sun exposure. [24] The etiology of women's decreases in vitamin D is likely to be multi-stakeholders, but partially due to the increased BMI and protection of the sun combined with a reduced consumption of vitamin D, such as milk or other dairy products. Sadly, an increase in the use in younger and older adults of multivitamins and dietary supplements appears not to be associated with a related increase in the serum 25-OH vitamin D levels. [25, 26] In recent randomized controlled studies, loading doses as high as 1000–4000 IU/day were needed

before adequate vitamin D plasma concentrations were measured [23,26] In most of geographical regions, where sunshine enough for the proper photo-cutaneous synthesis of vitamin D; however, the greater number of Middle East women who spend most of their time indoors cannot benefit from this source through cultural practices, such as clothing and veiling among Muslim women.[27]

Conclusions

The low levels Vitamin D level is significantly associated with premature deliveries. More researches needed to explore the benefit of vitamin D supplementation in preventing preterm labors.

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Design and Analysis of Phased Array System by MATLAB Toolbox

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ABSTRACT

An array of antennas mounted on vehicles, ships, aircraft, satellites, and base stations is expected to play an important role in fulfilling the increased demand of channel requirement for these services.

In this paper toolboxes of MATLAB will use for the phased array system for different purposes of extraction of information about a validate results for antenna array and a comparison is made between different antenna array geometries, also this paper provides the background of the newly developed MATLAB Phased Array Toolbox. So, some effective parameters like the changing element spacing and the number of elements and the geometrical shape of the array on the antenna array radiation pattern along with the gain have been studied. The Phased Array Toolbox of MATLAB has also been used to validate the results.

Keywords: antenna array, phased array system toolbox, wireless mobile communication.

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تطبيق خوارزميات مختلفة في تشكيل الحزمة التكيفية في نظام اللاسلكي

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الملخص

من المتوقع أن تلعب مجموعة الهوائيات المركبة على المركبات والسفن والطائرات والأقمار الصناعية والمحطات القاعدية دورًا مهمًا في تلبية الطلب المتزايد لهذه الخدمات.

في هذا البحث، ستستخدم MATLAB Toolbox لنظام الصفيف الهوائي لأغراض مختلفة لاستخراج المعلومات حول التحقق من صحة نتائج مصفوفة الهوائي ويتم إجراء مقارنة بين الأشكال الهندسية المختلفة لمصفوفة الهوائي ، كما يوفر هذا البحث خلفية MATLAB Phased Array المطورة حديثًا لمجموعة أدوات المصفوفة. لذلك ، تمت دراسة بعض الخصائص المهمه مثل تباعد العناصر المتغير وعدد العناصر والشكل الهندسي للصفيف على مخطط إشعاع صفيف الهوائي إلى جانب ال (gain). كما تم استخدام مجموعة أدوات المصفوفة الهوائيه من MATLAB Toolbox للتحقق من صحة النتائج.

الكلمات الدالة: الصفيف الهوائبي، صندوق أدوات الصفيف الهوائي, الاتصالات المتنقلة اللاسلكيه.

1. Introduction

The smart antenna works on the concept of spatial processing which is the central idea of adaptive antennas systems [1]. The use of an antenna array adds an extra dimension and makes the utilization of spatial diversity possible. This is since the interferences rarely have the same geographical location as the user and therefore they are spatially separated.

Using antennas with very directive characteristics to meet the demands of high capacity can be achieved by forming an assembly of two or more radiating elements in electrical and geometrical configuration, which is referred to as an array. In a linear antenna array, antenna elements are placed along one axis. The antenna array produces a beam that is affected by changing the array geometry and by some other parameters such as inter-element

spacing, and excitation of the individual element [2]. The non-uniform linear array was also investigated by considering the average element spacing such that a relationship between the array length, side lobe, and directivity was established [3].

Arrays may produce the desired radiation characteristics by properly exciting each element with certain amplitudes and phases to maximize the signal from the desired users [4]. This paper analyzed various array geometries such as uniform and non-uniform linear, uniform planner arrays, and three-dimensional arrays with the help of MATLAB program. The linear array has excellent directivity and narrowest main lobe in a given direction, but in all azimuthal directions it does not work equally well, a major drawback of the planner array is the question of presence on the opposite side of an additional large lobe of the same strength [5] an obvious advantage comes from the symmetry of the circular array structure since, it has no edge components, directional patterns synthesized with a circular array can be rotated electronically in the array plane without a significant change in the beamform [6].

In this paper, the phase array toolbox manages to create a beam pattern with the main lobe pointing in a specific direction, to produce development for an efficient array with enhanced direction of arrival (DOA) estimation and other array requirements like the lower sidelobe level and high directivity, narrower beamwidth …etc.

2. Phased Array Toolbox

MATLAB comes with an additional tool specially built for phased arrays, i.e. the Phased Array Toolbox, this tool would be discussed in this thesis.

Antenna array performance is discussed by which phased array toolbox of MATLAB or also can be called it the basic array factor method. Insight into MATLAB has been given to better explain the entire design process, so, the effect of element spacing on the performance of an antenna array has been widely studied with the help of MATLAB. Programs and tools for designing phased array signal processing systems are provided by the phased array system toolbox. It also provides simulation and analysis capabilities which can be accomplished by MATLAB functions and MATLAB objects. This toolbox includes many algorithms that are mainly used for beamforming, target detection, space-time adaptive processing, and waveform generation. Also, array visualization applications assist in evaluating spatial or

temporal performance. This toolbox can be a great help in modeling an end-to-end phased array system or using simple/complex algorithms to process gathered data [7].

3. Phased Array Design and Analysis

This toolbox contains examples that give a starting point for designing user-defined phased array systems. It helps to model, simulate, and analyze the common array geometries and user-defined array geometries. To define the desired array geometry, the following parameters are required: the number of elements, the element spacing, and the position of each element and its 3D space orientation. Each element can have a cosine shaped, isotropic, or user-defined 3D pattern as the response and radiation pattern. There is also an option of shading (tapering) over the entire array. Inhomogeneous arrays can also be designed by deploying multiple-element patterns.

Analysis of the toolbox provides ways to visualize and analyze the radiation pattern of the array as well as individual elements. Visualization may be rectangular, spherical, or u/v format. There are several helpful tools available where the following parameters can be visualized/analyzed: array geometry, array gain, array response, delay between elements, steering vector, element response,

4. Different Array Factor for Different Array Geometry

4.1 Linear Array

The array factor for the linear array with simply an equally spaced elements and equal amplitudes, and can easily implement by shifting the phase of the antennas current for each element axis and the phase shift δ is equal to zero. The AF for N elements can be considered as[8]

$$AF = [1 + e^{j(kd\sin\theta+\delta)} + e^{j2(kd\sin\theta+\delta)} \ldots . e^{j(N-1)(kd\sin\theta+\delta)}]^T \quad (1)$$

And,$k = 2 * \frac{pi}{\lambda}$ is the phase constant, d is element spacing, θ is arrival angle. Equation (1) can be expressed by:

$$AF = \sum_{n=1}^{N} W_n \, e^{j(n-1)\psi} \quad (2)$$

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Where, $\psi = kd\,sin\theta + \delta$ and $\delta = -(kd + sin\theta)$ which is the progressive phase, k is the wavenumber and, $Wn = a_n * e^{jb}$

4.2 Non-Uniform Linear Array

The symmetrical radiation pattern can be generated by the unsymmetrical placement of the antenna array. The array factor is specified by [9]

$$AF = \sum_{n=1}^{N} e^{j(n-1)(kd_n \sin\theta + \delta)} \quad (3)$$

From the schematic diagram, it is clear that the AF's amplitude and phase can be controlled in uniform arrays by carefully choosing the relative phase between the elements; in non-uniform arrays, the distance, amplitude, and phase could be utilized to monitor the composition and distribution of the total array element.

4.3 Circular Array

The array factor or circular array in the x-y plane, with uniform angular distribution between elements of value $\emptyset_n = \frac{2\pi(n-1)}{N}$. The nth array element is located at the radius (a) with the phase angleφ_n. The AF can be found in a similar procedure as was calculated with the LA as [10]

$$AF = \sum_{n=1}^{N} w_n e^{-j(ka\hat{\rho}.\hat{r}+\delta_n)} = \sum_{n=1}^{N} w_n e^{-j(kasin\theta\cos(\varphi-\varphi_n)+\delta_n)} \quad (4)$$

4.4 Planar Array

This type is used to perform 2D beamforming (in both azimuth and elevation angles) with horizontal element spacing of ΔX and vertical element spacing of ΔY is shown in Fig.1. The AF for PA can be expressed as combining the AF of two LAs [11]. Pattern multiplication can be used to find the pattern of the entire M×N element array. Using pattern multiplication would have

$$AF = AF_x . AF_y = \sum_{m=1}^{M} a_m e^{j(m-1)(kd_x sin\theta\cos\varphi+\beta_x)} \sum_{n=1}^{N} b_n e^{j(n-1)(kd_y sin\theta\sin\varphi+\beta_y)} \quad (5)$$

$$AF_{xy} = \sum_{m=1}^{M}\sum_{n=1}^{N} w_{mn} e^{j[(m-1)(kd_x sin\theta\cos\varphi+\beta_x)+(n-1)(kd_y sin\theta\sin\varphi+\beta_y)]} \quad (6)$$

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The AF for cube array can be expressed as combining the AF of three LAs, Pattern multiplication can be used to find the pattern of the entire M×N×Z elements array as follow

$$AF_{xyz} = \sum_{m=1}^{M}\sum_{n=1}^{N}\sum_{o=1}^{O} w_{mno} e^{j[(m-1)(kd_x sin\theta cos\varphi+\beta_x)+(n-1)(kd_y sin\theta sin\varphi+\beta_y)+(o-1)(kd_z sin\theta+\beta_z)]}$$

Using pattern multiplication would have a few array geometries are shown in Fig.1 [7]. A sample 3D pattern plot for a rectangular array is shown in Fig.2 [7].

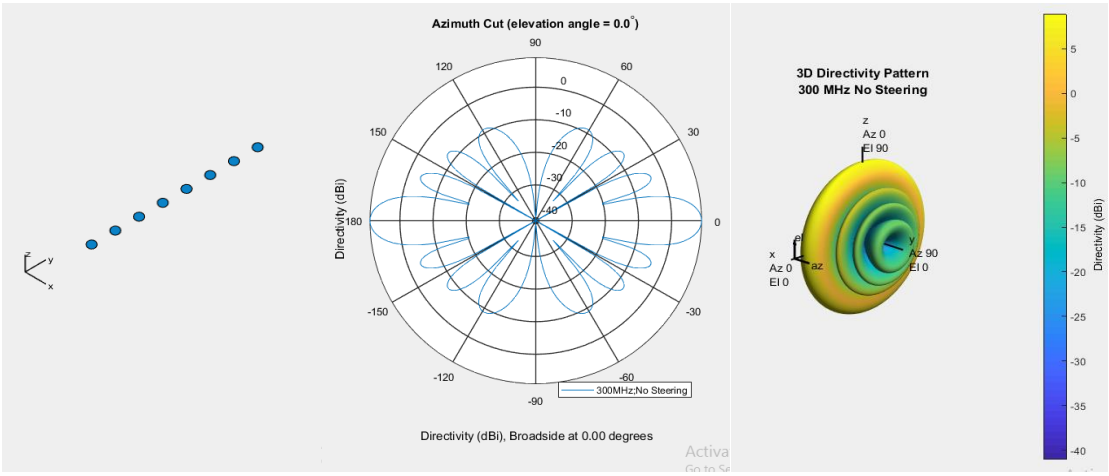

Fig.1 Linear array with 8 elements and DOA at 0°.

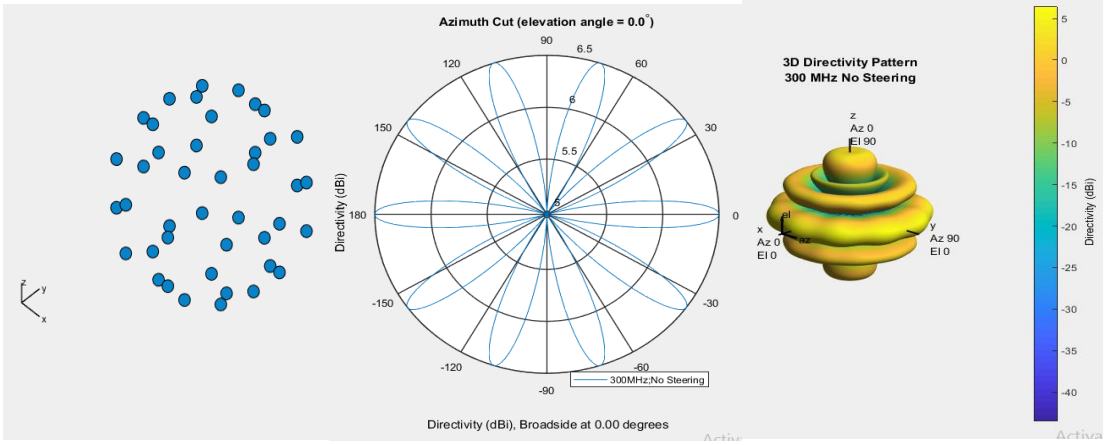

Fig.2 Spherical array with 10 elements at the center and DOA at 0°.

The isotropic antenna has quite a gain of 0 dB in the sphere around it and a 100 % efficiency. Which is used as a guideline for presenting the actual antennas' directive properties [12], but for more guideline, the MATLAB phase array toolbox could exam with different antenna types like cosine antenna, omnidirectional microphone, and cardioid microphone,

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because the definition of an isotropic is ideal and yet physically realizable. Fig.3 presents the linear array pattern for different antenna types with 12 elements and 45°. The directivity found equal to 16.78 dBi, 10.79 dBi and 13.69 dBi for cosine, omnidirectional and cardioid, respectively.

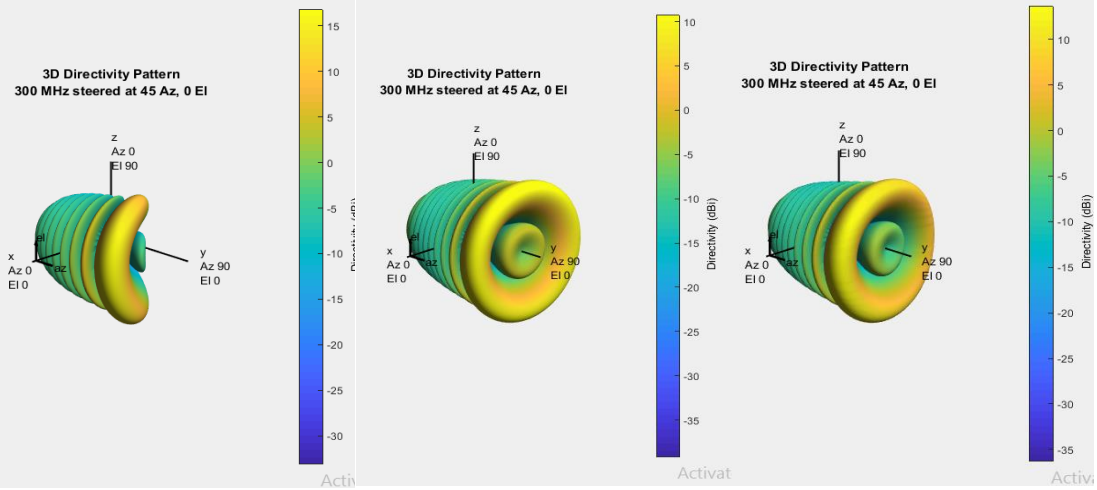

Fig.3 3D array pattern for cosine antenna, omnidirectional microphone, and cardioid microphone.

5. Simulation and Analysis

The phased array toolbox in MATLAB is used here to get results of different arrays that have been considered in the different algorithms of the smart antenna system. Phased array analysis in MATLAB only computes array factors of various built-in sources and does not include any mutual interactions. It is useful to visualize the effects of different element spacing on the array pattern for the side lobes level, grating lobes, and the directivity, however, it is not an exhaustive analysis, such as that from an analysis algorithm. It has limited usefulness if it is the only tool available.

In this paper the simulation will be done by comparison between designs from the toolbox and other how will built-in with toolbox by the author, the comparison will be in different array dimension as follow.

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i. one dimension array

Fig.5 represents 4 elements of linear array results for uniform linear array and non-uniform linear array and linear array with 45° angle, Table.1 shows the numerical comparison result with respect to the uniform liner array.

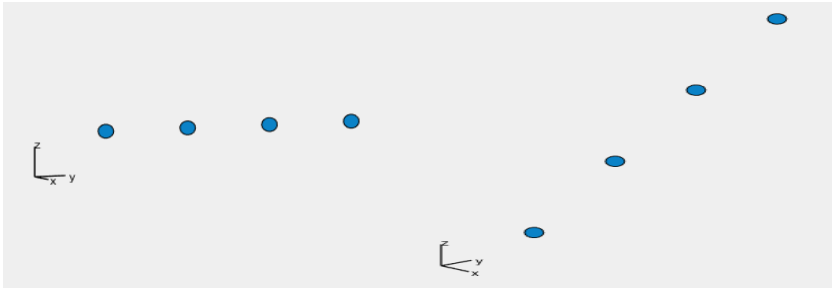
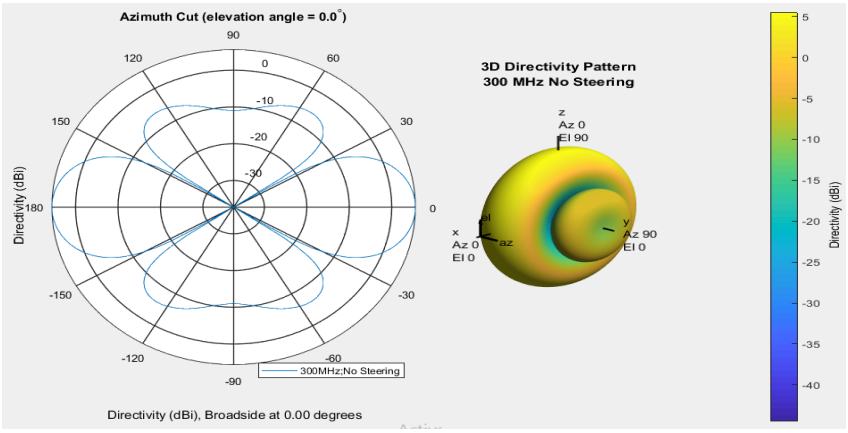
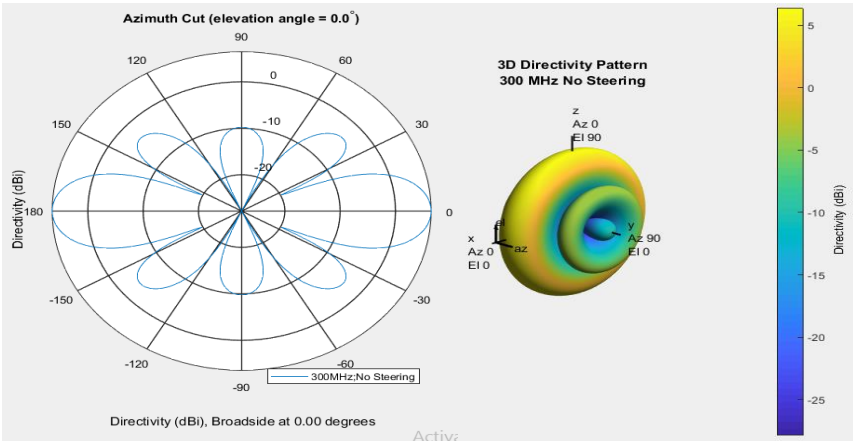


Fig.4 non-uniform linear and 45° angle array



(a)



(b)

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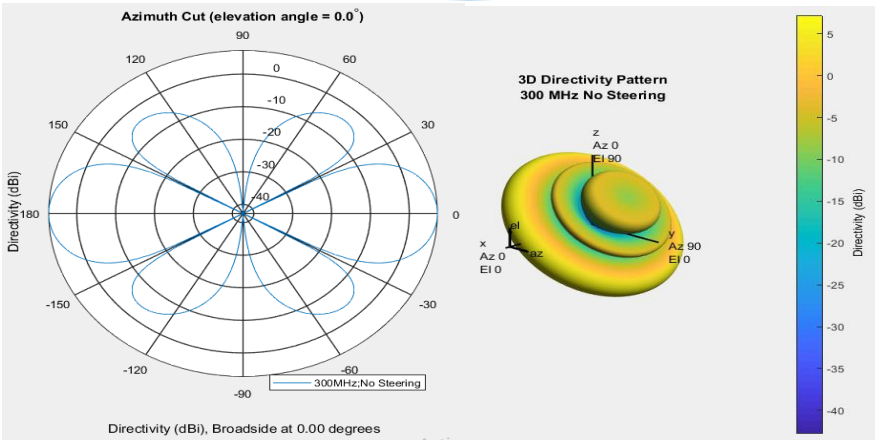

(c)

Figure.5 2D&3D antenna array pattern for (a) linear (b) non-uniform linear (c) linear with 45° angle

Table.1 numerical result

Array type	Uniform	Non-uniform	With 45° angle
Directivity(**dBi**)	5.58	6.45	7.22
BW	42.3	35.8	43.6
Spacing distance	[0.45 0.45 0.45 0.45;0 0 0 0;0 0 0 0]	[0.3 0.8 1.4 2;0 0 0 0;0 0 0 0]	[0 0.5 1 1.5;0 0.5 1 1.5;0 0 0 0]

It can show that by changing the distance between each element the directivity would be increased by about 1 dBi also it can conclude that the length of array decreases from 1.8 λ to 1.5 λ, and by elevating the element with 45° angle the directivity increase about 1.6 dBi with reducing in the number and the level of the side lobe.

i. two-dimension array

In this section two geometry will be discussed, the circular and hexagonal array as illustrated in Fig.6 Each array consist of 6 elements, and the comparison would done with respect to the circular array which exist by the MATLAB toolbox.

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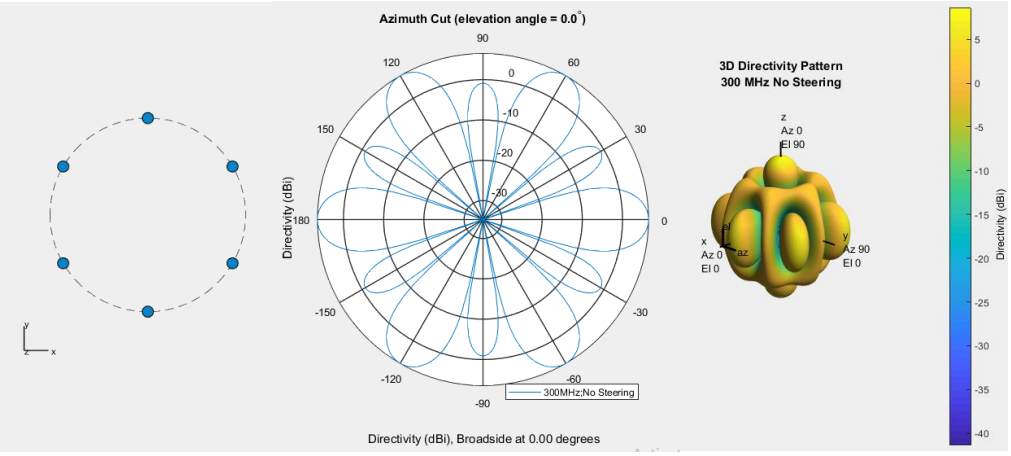
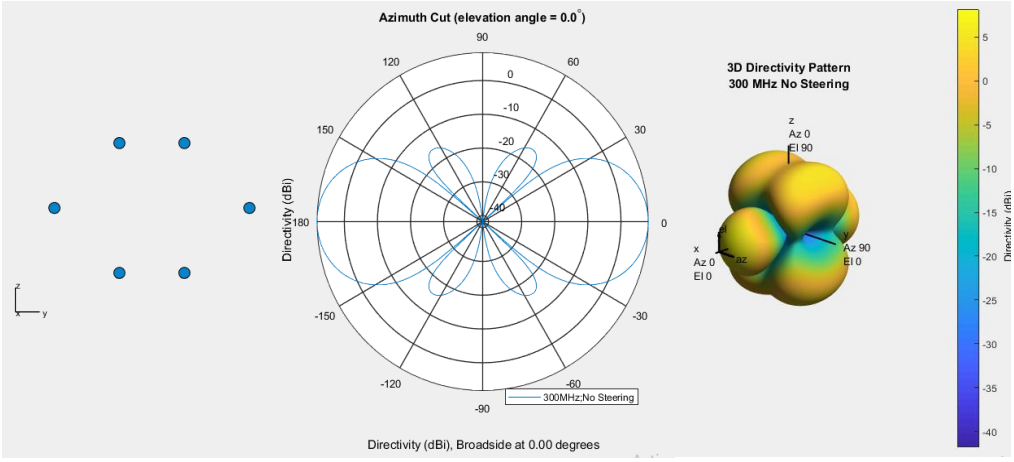


(a)



(b)

Figure.6 2D&3D antenna array pattern for (a) circular (b) hexagonal

Table.2 numerical result

Type of array	Circular	Hexagonal
Directivity(***dBi***)	6.47	8.22
SLL	-7	-24
Spacing distance	1λ radius	[0.5 1 0 1.5 0.5 1;0 0 0.5 0.5 1 1;0 0 0 0 0 0]

The result shows that with designed shape (hexagonal array) the directivity increase 1.75 dBi, besides the clear reducing in the number and the level of the side lobe.

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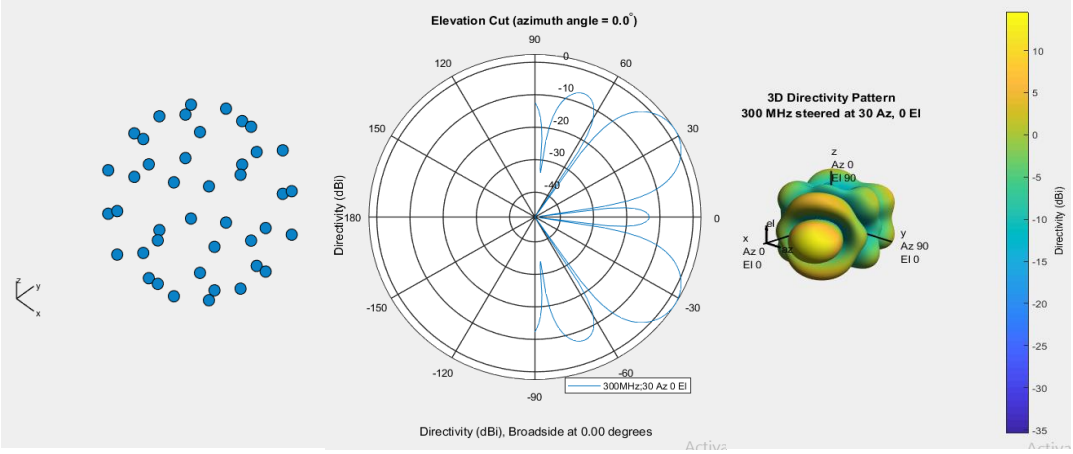
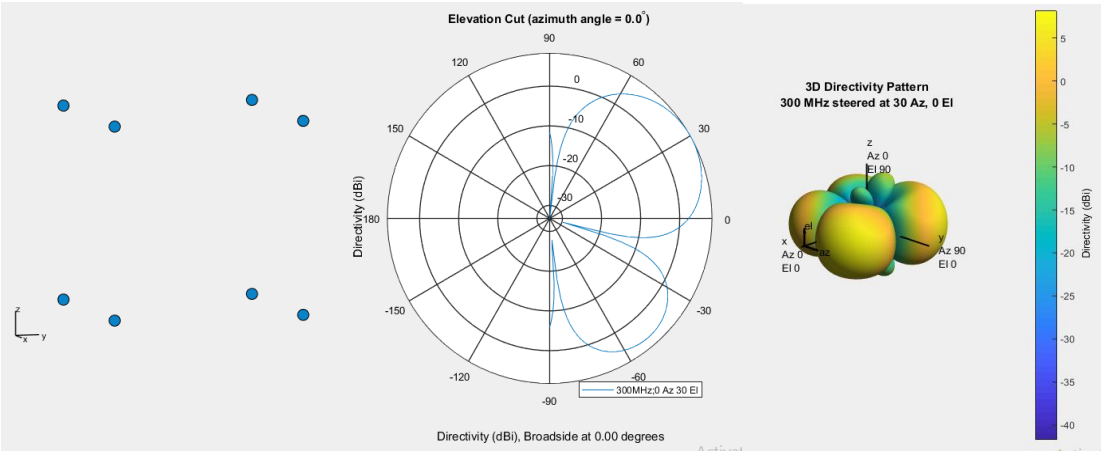
ii. three direction array

Three designs will be present in this part which can illustrate in Fig.7 with DOA equal to 30 for each; Table.3 gives the numerical result for comparison with respct to spherical geometry.



(a)



(b)

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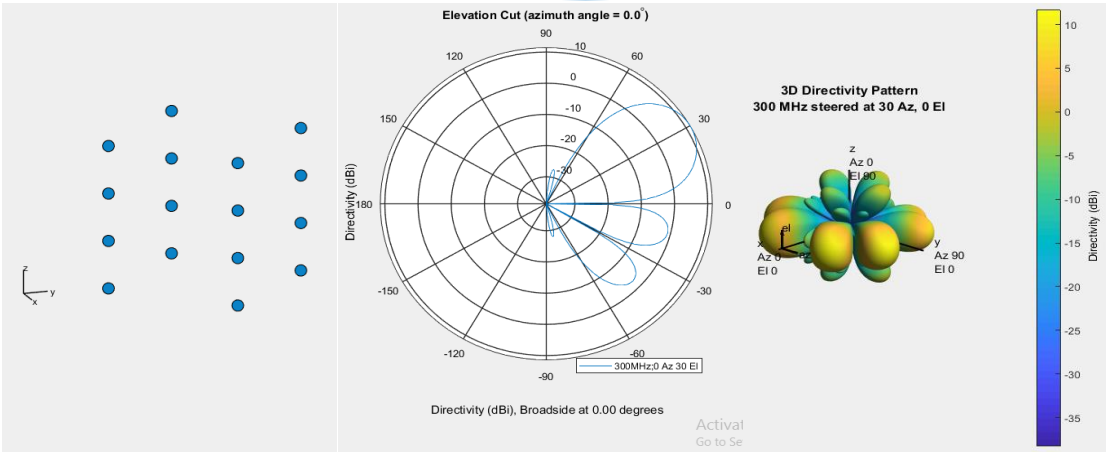
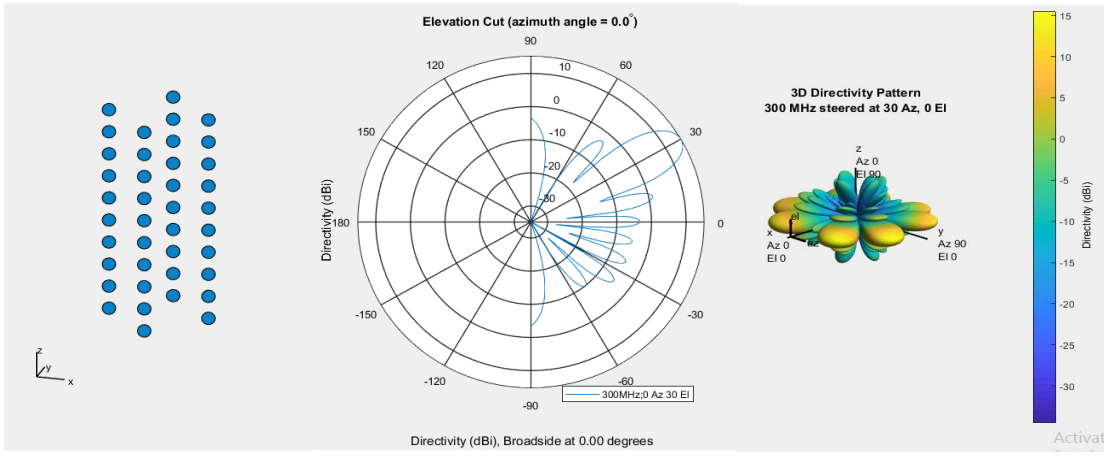


(c)



(d)

Figure.7 2D&3D antenna array pattern for (a) spherical (b) 2*2*2 cube (c) 2*4*2 cube (d) 2*10*2 cube.

Table.3 numerical result

Array type	Spherical	2*2*2 cube	2*4*2 cube	2*10*2 cube
Directivity(dBi)	14.1	8.25	11.72	15.82
No. elements	42	8	16	40
SLL	-8	-3	-11	-13.3
Spacing distance	1λ radius	[0 0.65 0 0.65 0 0 0.65 0.65;0 0 0.65 0.65 0 0.65 0 0.65;0 0 0 0 0.65 0.65 0.65 0.65]	0.5λ between each elements	0.5λ between each elements

As present in Table.3 above that the cube array most useful than the spherical array in the side of directivity with respect to the number of elements, and also from the side of SLL comparing with the number of antenna elements.

6. Conclusion

This thesis aimed to develop a novel design for a phased array antenna with different dimensions, varieties of antenna arrays is designed such as a non-uniform linear array, hexagonal planar array, and cubic arrays to meet the higher demands of present communication systems. Generally, this paper gives information about the MATLAB Phased Array Toolbox and presents array results generated by this toolbox.

It can conclude that the MATLAB toolbox would be the most effeteness tool to design and checking the suitable antenna geometry with good characteristics before applying to simulate with different sorts of an adaptive algorithm for smart antenna or adaptive system.

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Post coital bleeding is a risk for cervical cell abnormality

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ABSTRACT

Postcoital bleeding is a worrying, for both women and health care provider. This study aimed to evaluate the prevalence of abnormal cervical cytology among patient with PCB in the private outpatient care setting, and to identify risk-factors for cervical pathology among these patients. A cross sectional study of 90 patients presented to the privet clinic, during the period 1st feb-1st Des. 2019. Inclusion criteria include married women presented with post coital bleeding, non-pregnant, all patients undergo Pap Smear Cytology.

The commonest age presented with PCB was 40-44 years old 22(24.4%), followed by (45-49) years and (25-29) years 18(20%). Those aged ≥40 years 44(48.9%), and those aged ≤34 34(37.8%). The mean parity was 4.7±2.8, hormonal contraception was commonly used by those with PCB followed by intra uterine contraceptive device (IUCD), 30(33.3%), 18(20) respectively. Most of the patient were House wives 78(86.7%), The physical examination show that most patient had cervical erosion 68(75.5%), followed by healthy cervix in 12(13.3%), while suspicious features was found among 6(6.7%), Moderate and sever dysplasia was found more among those aged ≥40 years 10(22.7%), while it was 4(8.7%) among those aged < 40 years.

there is higher prevalence of High-grade squamous intraepithelial lesions among females with PCB, and non- significant difference among those aged less or more than 40 years. Therefore it's important to examine any patient complaining of PCB with PAP smear cytology and colposcopy examination.

Keywords: postcoital bleeding, irregular vaginal bleeding, Pap smear.

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نزيف ما بعد الجماع هو خطر تشوه خلايا عنق الرحم

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الملخص

يعد نزيف ما بعد الجماع مصدر قلق لكل من النساء ومقدمي الرعاية الصحية. هدفت هذه الدراسة إلى تقييم مدى انتشار خلل عنق الرحم غير الطبيعي بين المرضى الذين يعانون من ثنائي الفينيل متعدد الكلور في بيئة رعاية المرضى الخارجيين الخاصة ، وتحديد عوامل الخطر لأمراض عنق الرحم بين هؤلاء المرضى. دراسة مقطعية لـ 90 مريضاً قدمت للعيادة الخاصة خلال الفترة 1 فبراير – 1 ديسمبر. 2019. تشمل معايير الإدماج النساء المتزوجات اللائي تعرضن لنزيف بعد الجماع ، وغير الحوامل ، وجميع المريضات يخضعن لفحص عنق الرحم. كان العمر الأكثر شيوعًا للمصابين نزيف ما بعد الجماع هو 40–44 سنة 22 (24.4٪) ، يليه (45–49) سنة و (25–29) سنة 18 (20٪). أولئك الذين تقل أعمارهم عن 40 سنة 44 (48.9٪) ، وأولئك الذين تقل أعمارهم عن 34 سنة (37.8٪). كان متوسط الولاده 4.7 ± 2.8 ، وكانت موانع الحمل الهرمونية شائعة الاستخدام من قبل أولئك الذين لديهم نزيف ما بعد الجماع متبوعًا بجهاز منع الحمل داخل الرحم (IUCD)، 33.3) 30٪ (، 18 (20) على التوالي. كانت معظم المريضات من ربات المنزل 78 (86.7٪) ، وأظهر الفحص البدني أن معظم المريضات تعرضن لتآكل عنق الرحم 68 (75.5٪) ، يليه عنق الرحم السليم في 12 (13.3٪) ، في حين تم العثور على سمات مشبوهة بين 6 (6.7٪).) ، تم العثور على خلل التنسجي بدرجه معتدله والشديده بين أولئك الذين تتراوح أعمارهم بين 40 سنة 10 (22.7٪) ، بينما كان 4 (8.7٪) بين أولئك الذين تقل أعمارهم عن 40 سنة. هناك انتشار أعلى للآفات الحرشفية داخل الظهارة عالية الدرجة بين الإناث المصابات بنزف بعد الجماع، وهناك فرق غير مهم بين أولئك الذين تقل أعمارهم عن 40 عامًا أو أكثر. لذلك من المهم فحص أي مريضه تشكو من نزف بعد الجماع باستخدام فحص الخلايا PAP وفحص التنظير المهبلي.

الكلمات الدالة: نزيف ما بعد الجماع ، نزيف مهبلي غير منتظم ، مسحة عنق الرحم.

Introduction

Postcoital bleeding is bleeding or spotting unrelated to menstrual cycle and its related to sexual intercourse. The prevalence ranges from 0.7- 9.0% with annual cumulative incidence 6% among menstruating women [1]. For premenopausal women who are naturally menstruating, spontaneous resolution has been documented in 51% at two years with no further signs of recurrence [2]. About 30% of patients with post-coital bleeding also experience abnormal uterine bleeding and 15% have dyspareunia [3,4]. Postcoital bleeding mainly results from surface lesions of the cervix, it may be caused by: cervical polyps, cervicitis, ectropion, cervical intra-epithelial lesion (CIN), or carcinoma [5]. The prevalence of cervical cancer in women with postcoital bleeding is 3.0 to 5.5% and prevalence of CIN is 6.8% to 17.8% [4, 6, 7], abnormal epithelial cytology among post coital bleeding women 86% in a study done in Iraq[8] positive HPV found among 16.5% of Iraqi female[9], abnormal intraepithelial cytology found among 23% of cervical clinic attendance in Baghdad[10] .

There is currently no assent regarding when PCB requires further investigation and when women can precede with routine gynecological follow-up. One of the main reasons for the lack of assent is the rarity of data involving the prevalence of PCB in the population and the incidence of cervical cancer among these patients [11]. Other reasons include variations in study design, statistical analysis, and study location [12,7]. Therefore, management of PCB varies among countries.[13]

The objectives of the current study was to evaluate the prevalence of abnormal cervical cytology among patient with PCB in the private outpatient care setting, and to identify risk-factors for cervical pathology among these patients.

Patients & Methods

Cross sectional study of 90 patient presented to the privet clinic, during the period 1st feb-1st Des. 2019. Inclusion criteria include married women presented with post coital bleeding, non-pregnant, age ≥ 21 years, or married for at least 3 years, presented with signs and symptoms of PCB .

Exclusion criteria: women with active vaginal bleeding, hysterectomy, and women with frank growth and/or who had never been sexually active or had undergone prior treatment for CIN or cancer cervix, or had unsatisfactory Pap smear were excluded from the study. Pap smear was done for all the patient .Information regarding age, job parity, marital

status symptoms and patient complain and clinical examination of the patient was obtained via a structured questionnaire .Cytological study done by cytopathology specialist. Conventional pap smear were used. Cytology was reported using Bethesda system .

a single combined smear, was done for each patient by sampling the End cervix, first to obtain the cell sample. Ectocervix scraped with the spatula and materials rapidly was spread on the upper end of the slide. Spreading the End cervical material through the Ectocervical material to the end of the slide. This procedure Performed quickly to prevent drying artifacts. Fixation of the slide done using spray fix by thoroughly soaking the cellular sample while holding the spray fixative container about 15-20 inches from the slide. Then allowing spray fixative to evaporate.

Statistical analysis and data management: The Statistical Package for Social Sciences (SPSS, version 18) was used for data entry and analysis. Chi ($\chi 2$) square test, and t- test was used to compare means and proportions of different factors among different groups of study sample. Statistically significant relations regarded if P value of ≤ 0.05. Bar charts and tables used to present the data.

Results

The commonest age presented with PCB was 40-44 years old 22(24.4%), followed by (45-49) years and (25-29) years 18(20%). Those aged ≥40 years 44(48.9%), and those aged ≤34 34(37.8%) as shown in figure 1 and table 2.

The mean parity was 4.7±2.8, hormonal contraception was commonly used by those with PCB followed by intra uterine contraceptive device (IUCD), 30(33.3%), 18(20) respectively. Most of the patient were House wives 78(86.7%), as shown in table 1.

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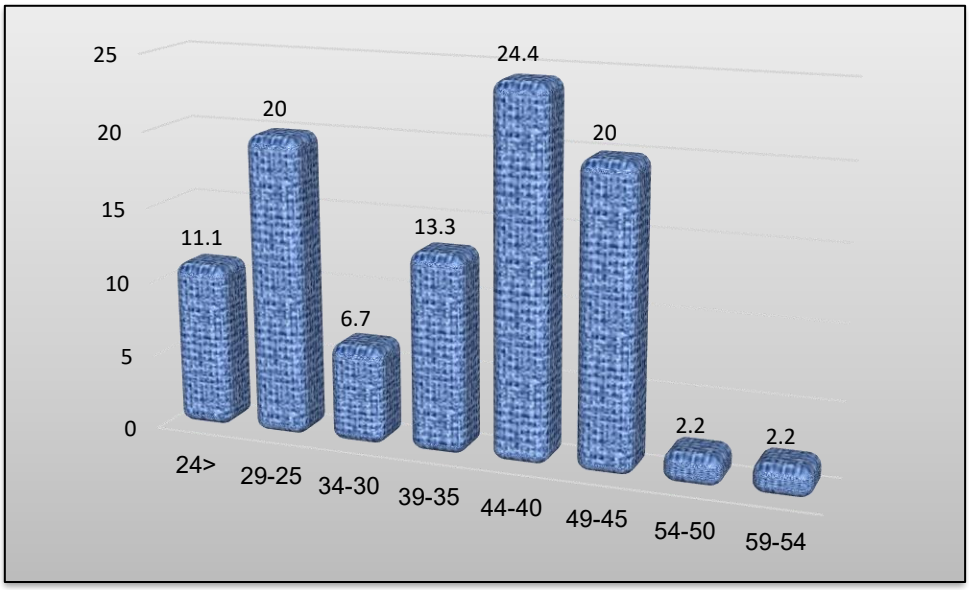

Figure 1 Age distribution of patients with PCB

Table 1 the general characteristics of patient with PCB

		Frequency	Percent
Age	≤34	34	37.8
	35-39	12	13.3
	≥40	44	48.9
Parity		4.7±2.8	
contraception	Non	42	46.7
	Hormonal	30	33.3
	IUCD	18	20
Job	House wife	78	86.7
	employer	12	13.3
	Total	90	100

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The physical examination show that most patient had cervical erosion 68(75.5%), followed by healthy cervix in 12(13.3%), while suspicious features was found among 6(6.7%), as shown in table 2.

Table 2 Physical examination features

	Frequency	Percent
Healthy	12	13.3
Erosion	68	75.6
suspicious features	6	6.7
polyp	4	4.4
Total	90	100

CIN2, and CIN3 was found among 10(11.1%), and 4(4.4%) respectively, as shown in table 3

Table 3 the cytology result of patient with PCB

Pap Cytology results	Frequency	Percent
NILM	4	4.4
ASCUS	42	46.7
CIN1	30	33.3
CIN2	10	11.1
CIN3	4	4.4
Total	90	100

Moderate and sever dysplasia was found more among those aged ≥40 years 10(22.7%), while it was 4(8.7%) among those aged < 40 years, this relation was statistically not significant, as shown in table 4.

Table 4 the association of cytology results of patient with PCB according to age

Age	≤CIN1	≥CIN2	Total
<40 Years	42	4	46
	91.30%	8.70%	100.00%
≥40 Years	34	10	44
	77.30%	22.70%	100.00%
Total	76	14	90
	84.40%	15.60%	100.00%

P value =0.066 not significant

Discussion

Abnormal vaginal bleeding caused by variety of gynecological causes, is a common presentation seen by health care provider, it cause adversity for both women and clinician, as this is an indication of possible underlying tumor. [1]

In this study we tried to answer the question of is patient with PCB need to direct referral for colposcopy clinic. From the 90 patient we studies non had invasive cervical cancer. This finding go in agreement with previous studies done by Abu J.et al [14] And Selo-Ojeme et al.[4], both studied women with PCB and found non of them had invasive cervical cancer. Cohen O et al found that 0.5% of women with PCB had invasive cervical cancer [15] the difference is not so high and the cause may be is that the later study done on 411 patient

treated in specialized center for colposcopy. Another studies found higher percentages of invasive cancer among PCB, such as Liu HL et al in Taiwan, 2.3% of patients with PCB had cervical cancer[16], and by Rosenthal AN et al in UK [6], who found that 4% of women with PCB had invasive cervical cancer. The prevalence of invasive cervical cancer in the studies done in Tian and UK may be related to cultural difference s and differences in HIV and HPV prevalence. Some studies found higher prevalence of PCB among women with HIV (5-32%) [17-19].

Moderate and sever Cervical dysplasia was 14(14.5%) [CIN2 (11.1%), and CIN3(4.4%)], this finding supported by Gulumser C et al (2015) [20] found that 13.1% of the PCB patient had CIN2/3. And Abu J et al [14] (10.5%), they found that if women with PCB have previous abnormal cervical cytology had more than double risk of CIN than those with a negative smear (odds of 0.47 and 0.19, respectively, with a relative risk (RR) of 2.37. This may be explained by the fact that bleeding or spotting occurs from the fragile mucosal layer of the cervix with CIN2/3.

Studies in Iraq found that 32.4% of women with PCB had abnormal Pap smear cytology without definite illustration of the type or grade of Pap smear abnormality[21], the High-grade squamous intraepithelial lesions was 1.5% among total population not only PCB [10] Gulumser C et al (2015) I TUrkey [20] found that 13.1% of the PCB women had CIN2/3, but he related this increase to the Smoking, HPV (+), previous history of abnormal cytology, [OR 1.6 , 4, 5.7 respectively] indicating that these factors are important if combined with PCB presentation [20]. Other studies found lower percentage of CIN2/3 among PCB : Cohen O et al 1% [15]. Shapley M et al 3.5% of the patient were CIN 2/3. [2]

The large difference in prevalence is due to cultural and variations in study design and methodology, but the important factor is study location. Studies performed in developed countries have a lower prevalence of cervical cancer and CIN due to access to screening programs [6, 7, 22].

This study was supportive of much greater risk of cervical dysplasia than in the general population.

In this study we analyzed the age distribution of moderate and sever dysplasia and found that even the association was not significant but the moderate and sever dysplasia was found more among those aged ≥40 years (22.7%), while it was (8.7%) among those aged < 40 years. This supported by previous studies in Iraq on general population that found increasing age is predisposing factor for abnormal cytology. Abdul Hasan M Y et al in study done 2019 in Iraq on general population found that (39.3%) of those aged more than 40 years had abnormal cytology at different stages, while only (25.1%) of those aged < 40 years had abnormal cytology.[21]

Another study done by Al Niyazee A.A [10] found that the mean age of those with High-grade squamous intraepithelial lesions (HISL) include cell changes having higher likelihood of progressing to cancer, including presence of moderate to severe dysplasia, carcinoma in situ (CIS), CIN 2 and CIN 3, or changes suspicious for invasive cancer, was 44.9±12.95, while those with LSIL (Low-grade squamous intraepithelial lesions): cells show definite minor changes unlikely to progress into cancer, including human papilloma virus (HPV) infection, mild dysplasia, and cervical intraepithelial neoplasia (CIN 1), was 38.4±11.3 years. Abu J.,et al [14] found that postcoital bleeding remains a cardinal warning sign of lower genital tract cancer, but it could be occure in the absence of cytological abnormality.

National Health Service Cervical Screening Program of the UK, recommended referral of women aged > 40 years presented with PCB to colposcopy clinic [23]. Some studies like Khattab et al. (2005) [24], and F. Alfhaily & A. A. A. Ewies (2010) [5] found that there is no significant difference among women aged < 35 and > 35 years regarding invasive cervical cancer and CIN among women presented with PCB. Therefore it's important to refer any women with persistent PCB for further investigation regardless of her age.

Conclusion and recommendations:

This study results indicate higher prevalence of HISL among females with PCB, and non-significant difference among those aged less or more than 40 years. We recommend referral of any patient with persistent PCB for PAP smear cytology and colposcopy examination.

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Energy Saving in Batteries Using the Photovoltaic System

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ABSTRACT

Photovoltaic panels are used to generate electricity directly or indirectly. in the case of indirect, the energy should be saved in batteries and then it can be used and in this case, the inverter is required to change the direct current of the batteries(DC) to operate alternating current(AC) loads. This paper concentrates on saving energy in batteries and investigating the process of charging and discharging the batteries to operate selective loads in the paper. Using the photovoltaic panels to store energy in batteries, the results reveal that one photovoltaic panel of(80 W) is placed towards south at a tilt angle of 36^{o}; it could generate (224 W.hr) of energy that was obtained by charging a(65 A.hr) lead-acid battery for 13 hours in April. Using two solar panels each of(80 W)is connecting parallel,(915.6 W.hr) of energy generated in May while using three units in parallel connection the electricity generated was near to that of two panels as the battery reaches nearly the full charge. Ambient temperature rise harms solar panels and leads to a decrease in the efficiency of the solar panel.

Keywords: Battery charging; Photovoltaic panels; Inverter; Energy saving.

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حفظ الطاقة في البطاريات باستعمال اللوحات الضوئية

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ملخص البحث

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تستخدم الألواح الضوئية لتوليد الكهرباء بشكل مباشر أو غير مباشر. في حالة غير مباشر ، يجب حفظ الطاقة في البطاريات ومن ثم يمكن استخدامها وفي هذه الحالة ، فإن العاكس مطلوب لتغيير التيار المباشر(تيار مستمر) للبطاريات الى (التيار المتردد) حتى نستطيع تشغيل احمال.

تركز هذه البحث على توفير الطاقة في البطاريات والتحقيق من عملية شحن البطاريات وتفريغها لتشغيل أحمال انتقائية في البحث. ، النتائج بينت أن لوحًا ضوئيًا واحدًا بقوة (80 واط) يوضع باتجاه الجنوب بزاوية ميل تبلغ 36 درجة ؛ يمكن أن ينتج طاقة (224 واط.ساعة) وقد تم الحصول في شهر نيسان عليها عن طريق شحن بطارية رصاص حامضية (65 أمبير.ساعة) لمدة 13 ساعة. وعند باستخدام اثنين من الألواح الشمسية كل واحد(80 واط) يربط بالتوازي في شهر ايار ، تم الحصول على طاقة مقدارها(915.6 واط .ساعة)، في حين عنداستخدام ثلاث وحدات تربط بالتوازي كانت الطاقة المتولدة قريبه من حالة استخدام وحدتين من اللوحات الضوئية والسبب يعود الى سعة البطارية المحدودة والتي تشحن بالكامل تقريبا . درجات الحرارة المحيطة المرتفعة لها تأثير سلبي على الألواح الشمسية.

الكلمات الدالة: شحن البطاريات، لوحات الضوئية، العاكس، حفظ الحرارة

1. Introduction

Environment pollution day by day increase via raised industrial sector and population growth, to dwindle risks emission gases in the world renewable energy used as a source of electricity production, solar energy is the source of energy which is free from carbon emission. Converting solar energy to electricity due to a device called the photovoltaic cell. Souvik and Jasvir [1] Measured the amount of incident solar radiation and concluded that it significantly determines the electricity produced by photovoltaic (PV) systems in Patiala; Hand calculations were available for May and June which offers the highest solar radiation. Possible plant capacity is estimated for an arbitrarily chosen area. Alaa M. Abdullah. [2] Proposed to shed light on alternative energy to the era of beyond oil for a rich oil country like Iraq, showing the opportunities and reasons that make solar energy the best alternative source after oil, she claimed to use the high solar energy intensity in Iraq especially as the maximum sunshine hours is approximately more than 3000 hours/year. Iraq is a global source of clean

energy due to the natural sources of solar and wind. V.K.Sethi et al [3] used nanotechnology in solar PV cells to get cheaper solar cells and with higher efficiency. As the absorption effectiveness would increase. Utilizing nanotechnology in the inexpensive solar cell would help to maintain the environment and reduced the manufacturing cost. Jignesh kumr et al. [4] used solar photovoltaic systems for energy saving in green buildings. Green building has to save water 36-40%, save energy 30-40%, and save material 25-40% compared to a conventional structure. Sandeep and Vijay. [5] Studied on a hybrid model of a solar / wind in Simulink, which used the battery as its storage system. Two renewable power sources are connected to a power grid with complex electrical interactions. The study showed that a standalone solar photovoltaic energy system could not supply reliable power during non-sunny days. The independent wind system cannot get the constant load demands due to significant fluctuations in the magnitude of wind speeds during the year. Due to this concept, energy storage will be essential to compensate for the change in wind speeds. Solar PV units minimize energy storage demand. Ionel Laurentiu Al Boteanu et al. [6] reviewed the main methods to increase the efficiency of photovoltaic systems by applying the maximum power point tracking method, the orientation of photovoltaic panel, reducing the temperature of photovoltaic cells are detailed. These methods are verified by numerical simulation, using dedicated software and experimental. Ashish S. Ignore and Bhushan S. Rakhonde. [7] investigated a hybrid power generation system to include wind energy and solar energy. They showed that it has higher efficiency. It can provide electricity to remote places where the government is unable to reach, reducing the cost and transmission losses. Also that it is a cost-effective solution for a generation. It only needs an initial investment. It also has a long life span. Overall it is a right, reliable, and affordable solution for electricity generation. Bhalchandra V Chikate, Y. A. Sadawarte [8] studied factors affecting the performance of solar cells, and they confirmed that the high voltage produced at low temperatures in other hands the cell loses voltage in high temperatures. Furkn Dincer and Mehmet Emin Meral [9] studied critical factors that affect the efficiency of solar cells, they concluded that the most important factors are temperature, energy conversion effectiveness, and peak power point tracking. reducing the reflection of the incident light will lead to better energy efficiency. C. Marimutho and V. Kirubakaran [10] investigated the factors affecting solar PV cell through

Matlab/Simulink model, they emphasized that the two main factors are of most importance which is the solar radiation and temperature.

2. Theory

2-1- Electricity production using photovoltaic panels(PV):-

Power output can be calculated at each load from the following equations:

$$P = V * I \quad (1)$$

Where; I current in Amperes, V voltage in Volts and P is the instantaneous power (in Watts) which are generated and the total energy production for the whole hour is determined by multiplying power by the number of hours at which PV produces energy. Or the total energy production for the entire day is determined by multiplying power by day length. The theoretical day length (td) can be calculated from the following equation:

$$td = \frac{2}{15}.cos^{-1}(-tan\emptyset.tan\delta) \quad (2)$$

Figure(1) shows the declination δ that shows the sun altitude in the sky. the angles north of the equator are taken as positive, and angle south of the equator is taken negative, then at any given day of the year, n, the declination can be found from:

$$\delta = 23.45.sin\left[\frac{360(n-80)}{365}\right] \quad (3)$$

Where n is day number and equal to one on the first January, 46 on 15th of February, 74 on the 15th of March, and so on for other days of the year [11]. Equation (3), is only a good approximation since the year is not exactly 365 days long, and the first day of spring is not always the 80th day of the year. In any case, to determine the location of the Sun in the sky at any time of day the following angles should be defined with aid of Figure (1).

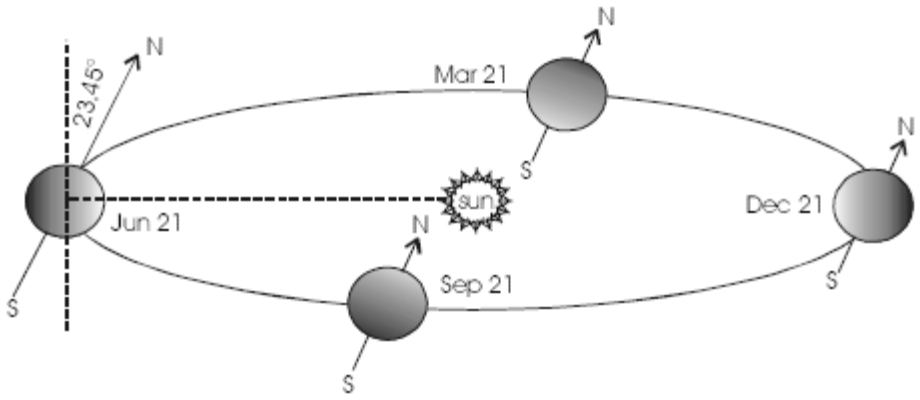

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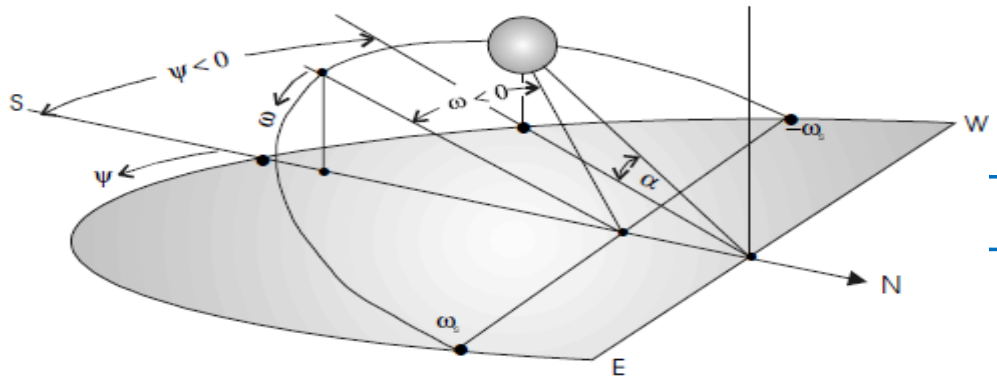
Fig. 1 The orbit of the earth and the declination at different times of the year[12].

The line perpendicular to the earth surface represents the Zenith and the Zenith angle, θz is characterized by the angle created between the zenith and the sun. the declination can be related to the zenith angle at solar noon by noting that the sun is directly at its top point in the sky at solar noon.

$$\theta_z = \emptyset - \delta \qquad 4$$

Where Ø is the latitude, or angular distance from the equator since when the declination and latitude are the same, the zenith angle is zero? Note that this Relationship only holds at given latitude at solar noon, since both Ø and δ are constant for any given day in any given location. However, as the time differs from solar noon, it is evident that the sun will no longer be overhead, and, hence, the zenith angle is no longer zero. Equation (4), however, is useful for determining the highest point in the sky reached by the sun on any particular day of the year at any specific latitude. It is also helpful in determining that the highest point of the sun in the sky will be at θz=Ø-23.45^o and the lowest point of the solar noon sun in the sky will be at θz=Ø + 23.45^o, provided that Ø> 23.45^o. It is particularly interesting to note that if Ø> 90^o – 23.45^o= 66.55^o, then the nadir point of the sun in the sky is below the horizon, meaning that the sun does not rise or set that day. The situation in Polar Regions, which are subject to periods of 24 hours of darkness. These same regions, of course, are also subject to equal periods of 24 hours of sun six months later. If Ø< 23.45^o, will at some time during the summer be negative.

Where Ø is the latitude, or angular distance from the equator since when the declination and latitude are the same, the zenith angle is zero? Note that this Relationship only holds at given latitude at solar noon, since both Ø and δ are constant for any given day in any given location. However, as the time differs from solar noon, it is evident that the sun will no longer be overhead, and, hence, the zenith angle is no longer zero. Equation (5), however, is useful for determining the highest point in the sky reached by the sun on any particular day of the year at any specific latitude. It is also helpful in determining that the highest point of the sun in the sky will be at θz=Ø-23.45^o and the lowest point of the solar noon sun in the sky will be at θz=Ø + 23.45^o, provided that Ø> 23.45^o. It is particularly interesting to note that if Ø> 90^o – 23.45^o= 66.55^o, then the nadir point of the sun in the sky is below the horizon, meaning that the sun does not rise or set that day. The situation in Polar Regions, which are subject to periods of 24 hours of darkness. These same regions, of course, are also subject to equal



periods of 24 hours of sun six months later. If ∅< 23.45°, will at some time during the summer be negative.

Fig. 2 Sun angles, showing altitude, azimuth, and hour angle [12].

In many publications, the azimuth angle is referenced to the north, such that solar noon appears at ψ = 180°. Another useful, albeit redundant, angle in describing the location of the sun due to the solar noon is called the hour angle that represents the angular deviation of the sun from the solar noon based on 360 degrees of rotation.

$$\omega = \left(\frac{(12 - T)}{24}\right) * 360 = 15 * (12 - T) \quad (5)$$

Where T is the day time expressed concerning solar midnight, on a 24-Hour clock. As example, for T = 0 or 24 (midnight), ω = ± 180° and for T = 10 A.M., ω = 60°. By relating ω to the other angles previously discussed, it is possible to show that the sunrise angle is given by.

$$\omega_s = cos^{-1}(-tan\emptyset . tan\delta) \quad (6)$$

This equation applies to both sunset and sunrise so that the day length should be found by multiplying ωs by 2.

2-2 Energy generation

Energy is a measurement that represents the multiplication of power by time, and the unit is (W.hr) or (kW.hr). The PV panel of 80 Watts produces 80 W.hr if subjected to solar insolation for one hour, and this value is not constant for all days due to the variation of weather conditions [13]. The total energy production in the day is given:

$$E = P * td \quad (7)$$

Where E can be represented as the monthly average daily energy production per module area and the total energy production in W.h /m^2 [11].

3. Experiments and Calculations

The main components of the system are as follows:

1- Three solar models (panels) of 80W with the following specifications see table 1.

Table 1 specification of the solar panels.

Cod	50166
Type	FVG 36-125

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Model	FVG 80M-MC
Model efficiency	12.49%
Cell efficiency	15%
Power peak (W)	80W
Vm (voltage at maximum p.)	18.2 V
Im (maximum current)	4.40 A
Voc (open circuit voltage)	22.1 V
Isc (short circuit current)	4.87 A
Power tolerance	+/- 5%
Maximum system voltage	700 V
Electrical specification at AM 1.5 1000W/m^2	25^{o}C

2- To batteries of 65 Ampere. hour, lead-acid type.

3- An inverter of 1000 volt.Ampere

3-1 Energy generation using one solar panel, 80W, and one battery.

The first arrangement of the system is as follows:

1- One solar panel of 809W capable to give 19-volt output.

2- One battery of 65Ampere-hour to store energy to be used later at night.

The inverter to convert the DC from the battery of 12 Volts to AC Current with 220 Volts. The solar module is placed with, an inclination angle β of 36^o with horizontal oriented towards the south, and this tilt angle is found by another researcher in this field [14]. One solar panel is used to store energy in the battery for different durations; from one to thirteen hours. And then the inverter is used to take the energy stored in the battery to operate loads of 28 W or 128 W which are of two bulbs of (18 and 10) Watts and one bulb of 100 W. The schematic diagram of the system is shown in Figures (3) and Figure (4).

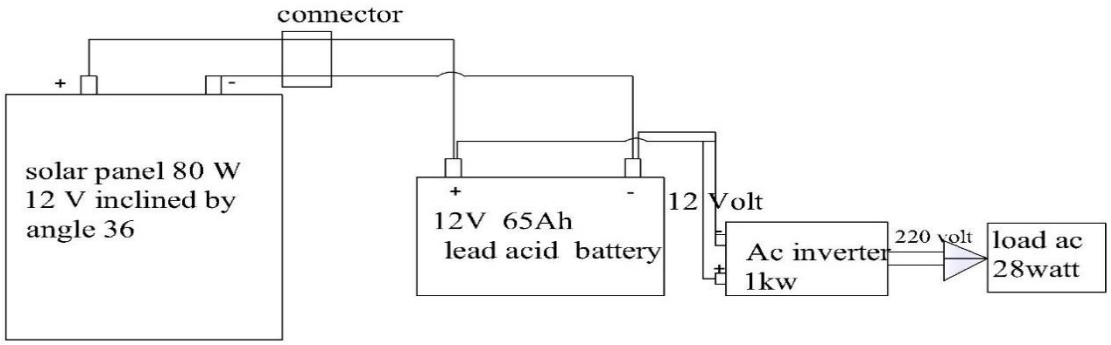

Figure 3 block diagram of the PV system.

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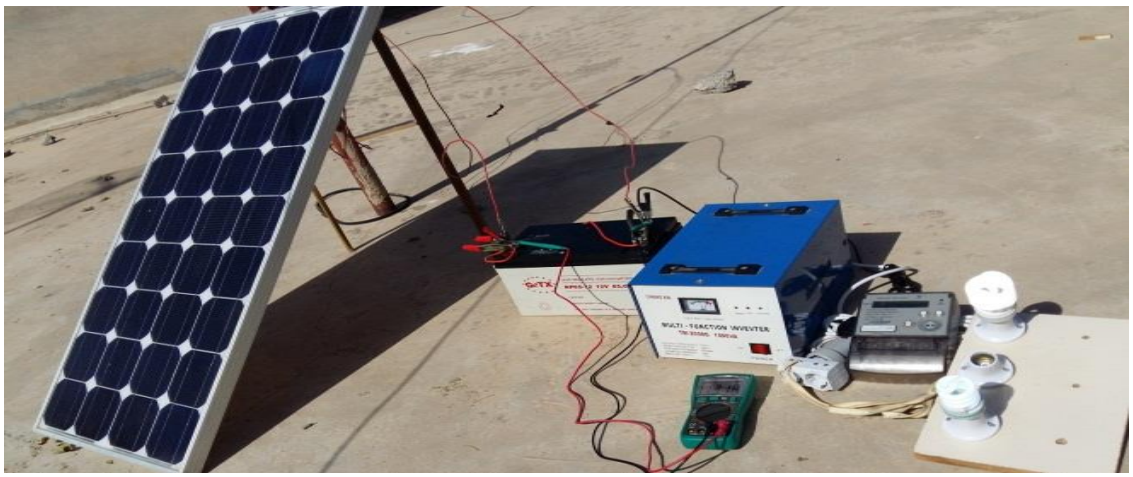

Figure 4 the photography of the one-panel solar panel system connections and components.

The recorded and measured data with the calculated terms are tabulated in table 2.

Table (2) Energy stored in the one Battery 65Ah by one Solar panel of 80 W in April.

Test No.	Battery Charging time, hour(s)	Charging period of one battery	AC Load, Watts	The working period of the load, hours	Saving energy, W.h	Date of test
1	1	7:20-8:20	28	0.33	9.24	April 4th 2016
2	2	8:40-10:40	28	1	28	April 4th 2016
3	3	10:40-1:40PM	28	2	56	April 4th 2016
4	4	9:30-1:40PM	28	2.8	78.4	April 5th 2016
5	5	7:55-12:55PM	28	3.4	95.2	April 6th 2016
6	6	8:45-2:45PM	28	3.9	109.2	April 7th 2016
7	7	6:55-1:35PM	28	4.3	120.4	April 9th 2016
8	8	8:40-4:40PM	28	4.7	131.6	April 10th 2016
9	9	9:30am-6:30pm	28	5.2	145.6	April 11th 2016
10	10	8:00am -6:00pm	128	1.3	166.4	April 13th 2016
11	11	7:00am-6:00pm	128	1.4	179.2	April 15th 2016
12	12	6:00am-6:00pm	128	1.5	192	April 16th 2016
13	13	5:00am-7:00pm	128	1.75	224	April 17th 2016

Base on the maximum current output in the PV panel is 4.4 Ampere and multiplying this by a total of 13 hours of charging, the result is 57.2 A.h, which means the battery capacity of 65 A.h will not be charged fully. Table 3 shows the results obtained for the same configuration of table 1 in the month of June.

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Table 3 Energy stored in the one Battery 65Ah by one Solar panel of 80 W in June.

Test No.	Battery Charging time, hour(s)	Charging period of one battery	AC Load, Watts	The working period of the load, hours	Saving energy, W.h	Date of test
1	1	900:am-10:00am	28	0.6	16.8	June 1st 2016
2	2	8:40am-10:40am	28	1.3	36.4	June 2nd 2016
3	3	9:00am-12:00pm	28	2.4	67.2	June 3rd 2016
4	4	8:00am-12:00pm	28	2.9	81.2	June 4th 2016
5	5	8:00am-1:00pm	28	3.6	100.8	June 5th 2016
6	6	8:45-am-2:45pm	28	4	112	June 6th 2016
7	7	7:35am-1:35pm	28	4.5	126	June 7th 2016
8	8	8:40am-4:40pm	28	4.9	137.2	June 8th 2016
9	9	9:00am-6:00pm	28	5.7	159.6	June 9th 2016
10	10	8:00am-6:00pm	128	1.5	192	June 10th 2016
11	11	7:00am-6:00pm	128	1.7	217.6	June 11th 2016
12	12	6:00am-6:00pm	128	2	256	June 12st 2016
13	13	5:00am-7:00pm	128	2.5	320	June 13th 2016

In the second test, two solar panels are used to store energy in the battery of the configuration of the rig as shown in Figure 5.

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Figure 5 Energy generation by two solar panels of 80

Similar to the first system, the solar panels are used to store energy in the battery for the different duration from one to thirteen hours and then using this energy for an AC load of 28 W to determine the optimum time for charging the battery by two solar panels. Different loads are used such as (28W) AC and (218 W). The system is shown in Figure 5. The data related to charged and consumed energy are shown in table 4 and table 5.

Table 4 Energy stored in the two Batteries 65Ah by two Solar panels of 80 W in May.

Test No.	Battery Charging time, hour(s)	Charging period of one battery	AC Load, Watts	The working period of the load, hours	Saving energy, W.h	Date of test
1	1	8:20am-9:20am	28	0.83	23.24	May 4th 2016
2	2	10:15am-12:15pm	28	2	56	May 7th 2016
3	3	7:00am-10:00am	28	4.42	123.76	May 8th 2016
4	4	9:30am-1:30pm	28	5.6	156.8	May 9th 2016
5	5	7:50am-12:50pm	28	7	196	May 10th 2016
6	6	6:55am-1:55pm	28	10	280	May 11th 2016
7	7	6:00am-1:00pm	28	12	336	May12th 2016
8	8	6:00am-2:00pm	218	2	436	May13th 2016
9	9	8:20am-5:20pm	218	2.5	545	May14th 2016

10	10	6:00am-4:00pm	218	3	654	May15th 2016
11	11	7:00am-6:00pm	218	3.5	763	May16th 2016
12	12	6:00am-6:00pm	218	3.8	828.4	May17th 2016
13	13	6:00am-7:00pm	218	4.2	915.6	May18th 2016

Table 5 Energy stored in the two Batteries 65Ah by two Solar panels of 80 W in June

Test No.	Battery Charging time, hour(s)	Charging period of one battery	AC Load, Watts	The working period of the load, hours	Saving energy, W.h	Date of test
1	1	8:00am-9:00am	28	0.89	24.92	June14th 2016
2	2	10:00am-12:00pm	28	2.1	58.8	June15th 2016
3	3	7:00am-10:00am	28	4.7	131.6	June 16th 2016
4	4	9:30am-1:30pm	28	5.8	162.4	June 17th 2016
5	5	7:50am-12:50pm	28	7.2	201.6	June 18th 2016
6	6	6:55am-1:55pm	28	10.5	294	June 19th 2016
7	7	6:00am-1:00pm	28	12.7	355.6	June 20th 2016
8	8	6:00am-2:00pm	218	2.3	501.4	June 21st 2016
9	9	8:20am-5:20pm	218	2.8	610.4	June 22nd 2016
10	10	6:00am-4:00pm	218	3.2	697.6	June 23rd 2016
11	11	7:00am-6:00pm	218	3.6	784.8	June 24th 2016
12	12	6:00am-6:00pm	218	3.9	850.2	June 25th 2016
13	13	6:00am-7:00pm	218	4.5	981	June 26th 2016

3-3 Energy Generation using three Solar panels of (80W) and two batteries with different load.

The third group of tests is done similar to the previous section by using three solar panels and the system is shown in Figure 6.

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Figure 6 Energy Generation by three Solar panels of 80 W.

Similar procedures of tests are repeated as in the two previous cases to determine the optimum time of charging to serve the AC loads of (18W) and (200W) the results are shown in table 6 and table 7.

Table 6 Energy saving by three Solar panels 80w and two Batteries 65A in May.

Test No.	Battery Charging time, hour(s)	Charging period of two batteries	AC Load, Watts	The working period of the load, hours	Saving energy, W.h	Date of test
1	1	8:30am-9:30am	28	3	84	May19th 2016
2	2	7:40am-9:40am	28	5.1	142.8	May 20th 2016
3	3	7:50am-10:50am	28	7.58	212.24	May 21st 2016
4	4	9:40am-1:40pm	28	10	280	May 22nd 2016
5	5	7:50am-12:50pm	28	11	308	May 23rd 2016
6	6	6:55am-1:55pm	218	1.9	414.2	May 24th 2016
7	7	6:00am-1:00pm	218	2.2	479.6	May 25th 2016
8	8	6:00am-2:00pm	218	2.8	610.4	May 26th 2016
9	9	8:20am-5:20pm	218	3.5	763	May 27th 2016
10	10	6:00am-4:00pm	218	4	872	May 28th 2016
11	11	7:00am-6:00pm	218	4.4	959.2	May 29th 2016
12	12	6:00am-6:00pm	218	4.8	1046.4	May 30th /2016
13	13	6:00am-7:00pm	218	4.5	981	May 31st 2016

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Table 7 Energy saving by three Solar panels 80W and two Batteries 65A.h in July 2016.

Test No.	Battery Charging time, hour(s)	Charging period of two batteries	AC Load, Watts	The working period of the load, hours	Saving energy, W.h	Date of test
1	1	8:30am-9:30am	218	0.3	65.4	July 1st 2016
2	2	7:00am-9:00am	218	0.5	109	July 2nd 2016
3	3	7:50am-10:50am	218	0.7	152.6	July 3rd 2016
4	4	9:40am-1:40pm	218	1	218	July 4th 2016
5	5	7:50am-12:50pm	218	1.2	261.6	July 5th 2016
6	6	6:55am-1:55pm	218	1.5	327	July 6th 2016
7	7	6:00am-1:00pm	218	1.9	414.2	July 7th 2016
8	8	6:00am-2:00pm	218	2.4	523.2	July 8th 2016
9	9	8:20am-5:20pm	218	2.85	621.3	July 9th 2016
10	10	6:00am-4:00pm	218	3.3	719.4	July 10th 2016
11	11	7:00am-6:00pm	218	3.7	806.6	July 11th /2016
12	12	6:00am-6:00pm	218	4.2	915.6	July 12th /2016
13	13	6:00am-7:00pm	218	4.6	1002.8	July 13th 2016

4- Results

One solar panel of 80 W is placed towards south at a tilt angle of 36^{o} as this angle was proven to be for annual operation [14]. The energy is stored by a charging lead-acid battery 65 Ah. An AC load was used to operate on the energy stored in the battery, but the battery gave DC, so the inverter was used to convert from DC to AC. Different loads were used 28 W, 128 W, and 218 W, and the results were tabulated in the tables above. Figure (7) shows the amount of energy stored when using one solar panel 80 W and one lead-acid battery 65 Ah in April of 2016; The battery was charged for a different number of hours duration from one to thirteen hours and the number of hours for charging depended on day length (i.e., the day of the year from January till December). The amount of energy saved at each hour was shown in Figure (7) that the number of charging hours increased, the amount of energy stored was also increased. The maximum energy stored from one solar panel for thirteen hours of charging in a day in April was 224 W.h.

The second set of tests were carried out using two solar panels of 80W parallel, to charge the battery for a different number of hours and the energy was extracted from the battery to operate the AC loads as mentioned in the previous procedure. Table (4) represented the data from two solar panels parallel to charge the battery. Figure (7) shows that the amount of energy stored by two solar panels of 80 W in the lead-acid battery 65 Ah in May 2016. It was clear that an amount of energy of 915.6 W. h should be extracted from the battery to energize the AC load.

The third set of tests were carried out using three solar panels of 80 W parallel to charge the two batteries which are connected in parallel for a different number of hours and the energy was extracted from the battery to operate the AC loads as mentioned in test one. Table (6) represented the data from three parallel solar panels to charge the battery. Figure (7) shows that the amount of energy stored by three solar panels of 80 W in the lead-acid battery 65 Ah in May 2016. It was clear that an amount of energy of 1090 W.hr should be extracted from the battery to energize the AC load; the stored energy is obtained in the process of charging the battery by three solar panels for 13 hours in a day in May 2016.

Figure 7 also displays the difference between the three tests. It was clear that as the number of panels increases the amount of energy-storing would increase, and that is due to the high potential of the higher number of panels over one panel for charging. A person could find the difference between the energy stored in the cases of two and three panels was small and that could be returned to the fact that the battery reached the full charging condition.

Figure 7 shows the amount of energy stored in the battery in April and May for three cases: using one solar panel, two solar panels, and three solar panels. The Figure shows that an increasing number of solar panels will lead to more energy storage.

Figure 8 shows the amount of energy stored in the battery in June and July for three cases: using one solar panel, two solar panels, and three solar panels for charging the battery. The difference for a case of two solar panels or three solar panels is small and this could be returned to the full charging of the batteries due to the high rate of solar intensity in these two months.

Figure (9) shows the amount of energy stored by three solar panels of 80 W in July and May. The amount of energy saved by three solar panels of 80 W in July is less than the energy stored in May due to the decrease in efficiency of solar panels in July due to the increase of ambient temperature.

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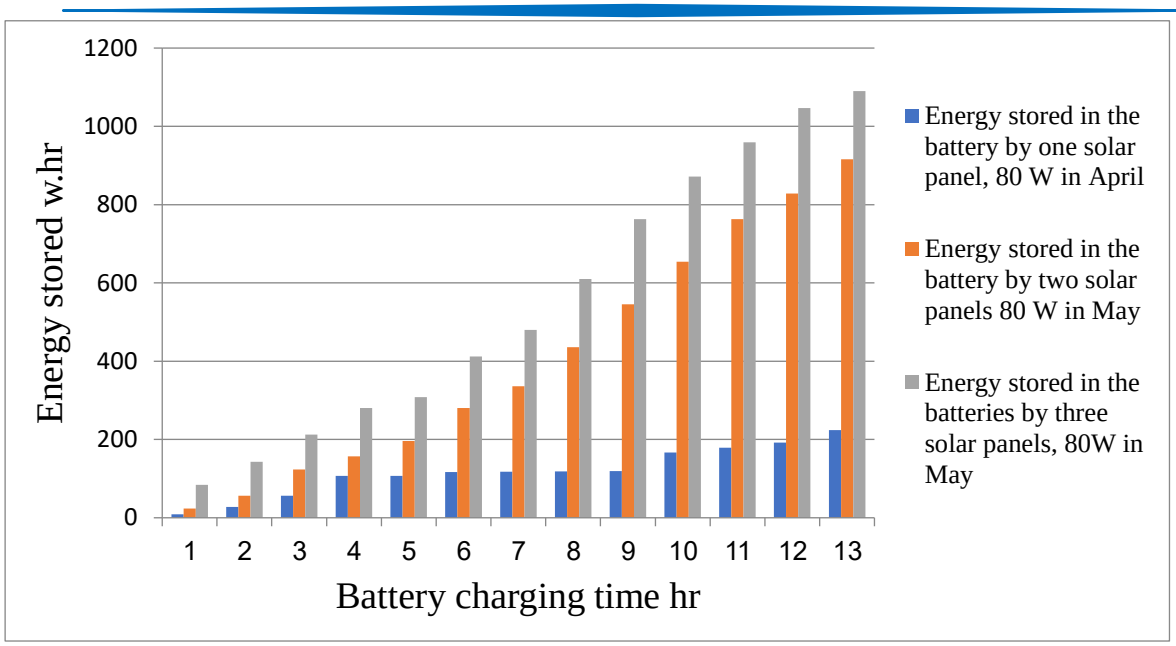

Figure 7 Energy stored in the Batteries by one, two, and three Solar panels of 80 W.

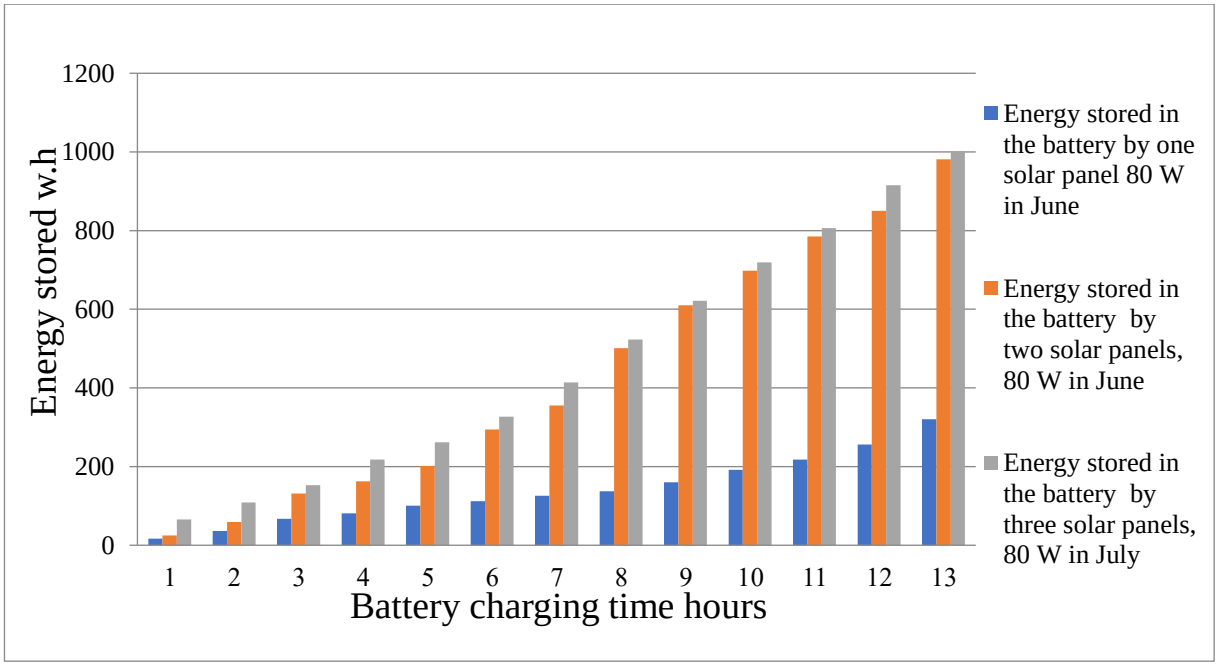

Figure 8 Energy Stored in the Battery by one, two and three Solar panels, of 80 W in June and July.

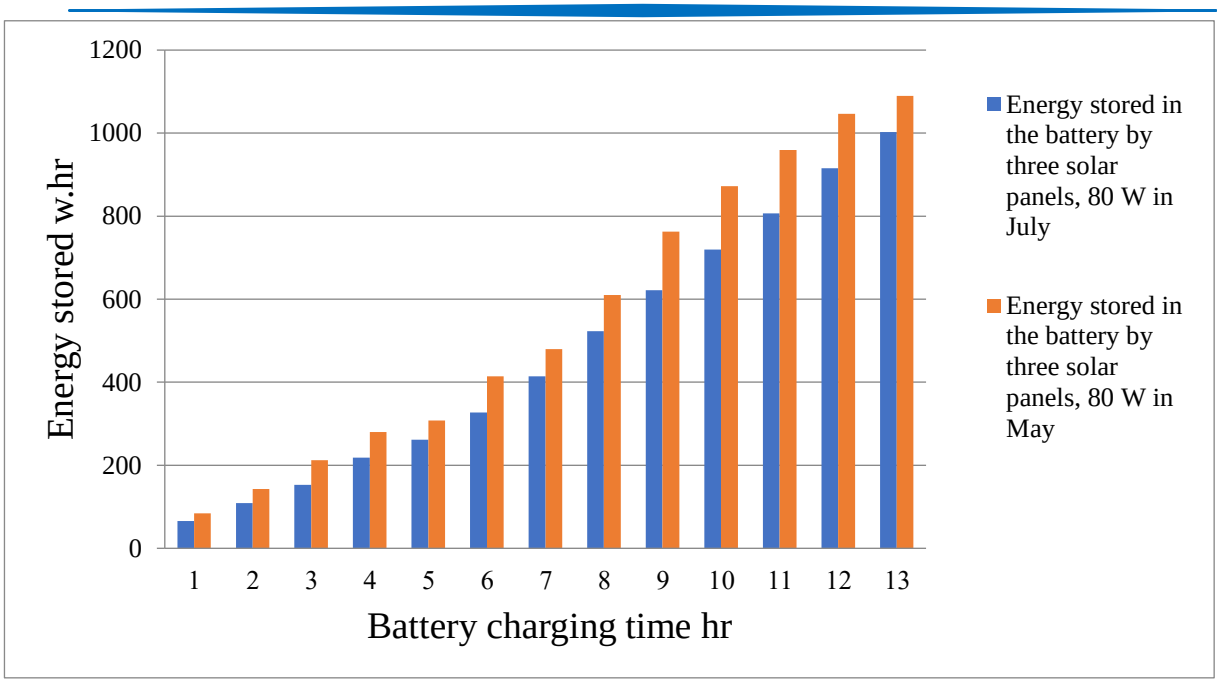

Figure 9 Energy Stored in the Batteries by three Solar panels 80 W in May and July.

5-Conclusions:

1- Using more than one panel gives better results than that of one panel.

2- The difference between charging the battery with two solar panels and three panels is not too big, so using two solar panels is preferable to reduce system cost.

3- High ambient temperature will lead to lower efficiency of the solar panels as noticed in the results for months May and July.

4- Higher storage capacities are needed when a higher power output is required.

5- Recommendations to future work

- Using data loggers to save the data on the hard disk.
- Using more than three panels in series and in parallel to get different array combinations and charging batteries of 12-volt or 24-volt design.
- Using the gel battery which is preferable for deep discharging without affecting the age of the battery.

- using of charge controller for saving the battery from overcharging

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