Effects of Progesterone Hormone on the Urinary Tract Infection in Pregnant Women

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Abstract

Infection is the highest ratio between hospitals and visiting patients are nosocomial infection registered in hospital is the urinary tract infection (UTI). The information about the UTI causative agents and the effect of the Progesterone hormones at possibly will help to choose the right remedy. The current study aimed to discover the effect of the progesterone in pregnant women on the incidence of the UTI during pregnancy. The current study was carried out at Hilla General Teaching Hospital, Babylon, Iraq during January- October, 2019. Out of 100 urine testers poised from the outpatient women, the culture showed 15 isolates identified as Gram positive bacteria (15%), 82 isolates of Gram negative bacteria (82%) and 3 isolates of yeast (3%). The record collective pathogen isolated was *Escherichia coli* (48.%), *Klebsiella* species (10%), *Streptococcus feacalis* (8%), *Proteus merabilis* (8%), *Enterobacter cloacae* (6%), *Pseudomonus* (5%), *Acinetobacter* (5%), *Candida albicans* (3%), *Enterococcus faecium* (2%), *Staphylococcus aureus* (2%), *Streptococcus agalctiae* (2%) and *Staphylococcus epidermidis* (1%). The progesterone hormone levels were estimated for all samples.

Keywords: *Progesterone during pregnancy, UTI infection during pregnancy, urinary tract infection and age.*

Introduction

Progesterone hormone produces that are synthesize and store in the brain in the different glands and during gravidity in the placenta. Throughout the latter two spans, femininity hormones[1], have a direct effect on the immune mediators levels such as (TNF-α), xanthine oxidase through periods of the multiplicative rotation[2]. The imbalance of femininity hormones could affect the immune status of the animals[3].

The main function of the progesterone is in the reproductive system, it has multiple other functions such as spasm and smooth muscle relaxation, expanding bronchi and regulates mucus[4]. It has been demonstrated that progesterone is responsible of the increase in the bladder aptitude and increase the frequency of genuine tension simultaneously through pregnancy[5].

The urinary tract and the genital tract origin from the same embryonic tissues and distinguish during the development of the human, because of that, both systems are affected by the steroids sexual hormones through the development cycle, in the female, there are two main hormones affecting both tracts, estrogen and progesterone [6] .

(UTI) is occur when invades by microorganism one or more organizations in thes tract, which combat the strong natural defenses of human body. Although, the immune emplacements, the furthermost public contaminations and container happen at whichever period of the individual life, it is responsible of approximately 8–35%of all the nosocomial contaminations[7].

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Contagions are produced by the bacteria that colonization Urinary tract as the urethra. The most predominant agent of the Uropathogenic *E coli* UPEC, which reasons over 90% of the UTI contagions in adults [8] .

Patients suffered from recurrent infections, organizational irregularities in the urinary tract, had urethral arrangement, acquired contaminations from hospital are exposed to increased incidence of infection caused by pathogenic bacteria and other organisms[9].

Complex and uncomplicated Urinary tract infection is always difficult to distinguish and this distinction helps in the clinical diagnosis that helps in adopting a patient's treatment protocol. The uncomplicated type occurs Generally in pre-menopausal healthy Women[10] .

Multiple strains of bacteria are opportunistic and have a role in causing disease. Infections in people with weak immunity often acquire infection when visiting the hospital[11].

Material and Method

1. **Sample Collection:** Samples were the urine mid-stream clean fastener samples were collected from hospitalized patients in Al-Hilla General Teaching hospital. The samples(100) were by the relevant biochemical tests according to [12].

   Results blood and MacConkey agar Culture were take to mean conferring to the typical benchmarks and a progression of colony forming units/ml was reflected as substantial bacterial infections [13].

2. **Blood Samples:** 5ml of blood were collected bin anticoagulant free tubes was disjointed. The serum by at about 3000 (R.P.M) for 5 minby centrifuge within 2-3 hours after collection.

3. **Microscopic Investigation (Colony morphology):** The affirmative culture and identified according to their morphological properties to identify the microorganism. (Analytical profile index API-20E) was secondhand to recognize Enterobacteriaceae household and connected organisms rendering to producer's guidelines**.**

4. **Progesterone ELISA Assay:** The Progesterone ELISA Assay tackle is a reasonable insusceptible enzymatic technique for quantifiable purpose of Progesterone meditation in anthropological serum or plasma. According to the ICN guide for Endocrine analysis., ICN Biomedical, Inc.pp.2:20-27[14].

Result

1. **Identification of bacteria:** Identification of bacteria carried out by bacteriological approaches the cultivated tasters remained positive culture, only (82) nations were characterized as (18) cultures were identified as gram negative bacteria and yeast.

Among (100) cultures which showed a significant bacterial growth the distribution of the strains were *Escherichia coli* (48.0%), *Klebsiella* species (10%), *Streptococcus feacalis* (8%), *Proteus merabilis* (8%), *Enterobacter cloacae* (6%), *Pseudomonus* (5%), *Acinetobacter* (5%), *Candida albicans* (3%), *Enterococcus faecium* (2%), *Staphylococcus aureus* (2%), *Streptococcus agalctiae* (2%) and *Staphylococcus epidermidis* (1%).as in table (1)

Table (1): The highest microbes quarantined from of pregnant women patients.

Type of Microorganisms		Number	Percentage %
Gram positive bacteria	Enterococcus faecalis	8	15%
	Enterococcus faecium	2	
	Streptococcus agalctiae	2	
	Staphylococcus aureus	2	
	Staphylococcus epidermidis	1	

Type of Microorganisms		**Number**	**Percentage %**
Gram negative bacteria	Escherichia coli	48	82%
	Klebsiella pneumonia	10	
	Enterobacter cloacae	6	
	Proteus merabilis	8	
	Pseudomonas aeroginosa	5	
	Acinetobacter	5	
Yeast	Candida albicans	3	3%
Total		**100**	**100%**

2. **Correlations between months of pregnancy, hormone level,type of bacteria and age:** The data was analyzed by using IBM SPSS software version 2.0. The p value of <0.05 stayed painstaking as substantial. The confident and destructive predictive value were calculated and the result showed no significant differences between months of pregnancy, hormone level, type of bacteria and age as showed in Table (2).

Table (2): Correlation frequencies between months of pregnancy, hormone level, type of bacteria, age.

Correlation		**Month of pregnancy**	**Hormone level**	**Type of bacteria**	**Age**
Month of pregnancy	Pearson Correlation	1	.107	-.042	-.011
	Sig. (2-tailed)		.292	.682	.915
	N	100	100	100	100
Hormone level	Pearson Correlation	.107	1	-.080	-.048
	Sig. (2-tailed)	.292		.428	.634
	N	100	100	100	100
Type of bacteria	Pearson Correlation	-.042	-.080	1	.024
	Sig. (2-tailed)	.682	.428		.810
	N	100	100	100	100
Age	Pearson Correlation	-.011	-.048	.024	1
	Sig. (2-tailed)	.915	.634	.810	
	N	100	100	100	100

3. **Frequency distribution of the progesterone hormone level:** The progesterone concentration in the serum of pregnant women was determined according to the method for quantitative determination of hormone level. The result showed that the lowest concentration of the progesterone was 7.1 ng/mL, (0-20) ng/mL showed the lowest frequency,the high incidence in (21-42) ng/mL and (61-83) ng/mL and the lowest incidence was (80-100) ng/mL,with Mean=45.86 and standard division =22.145 as in figure (1).

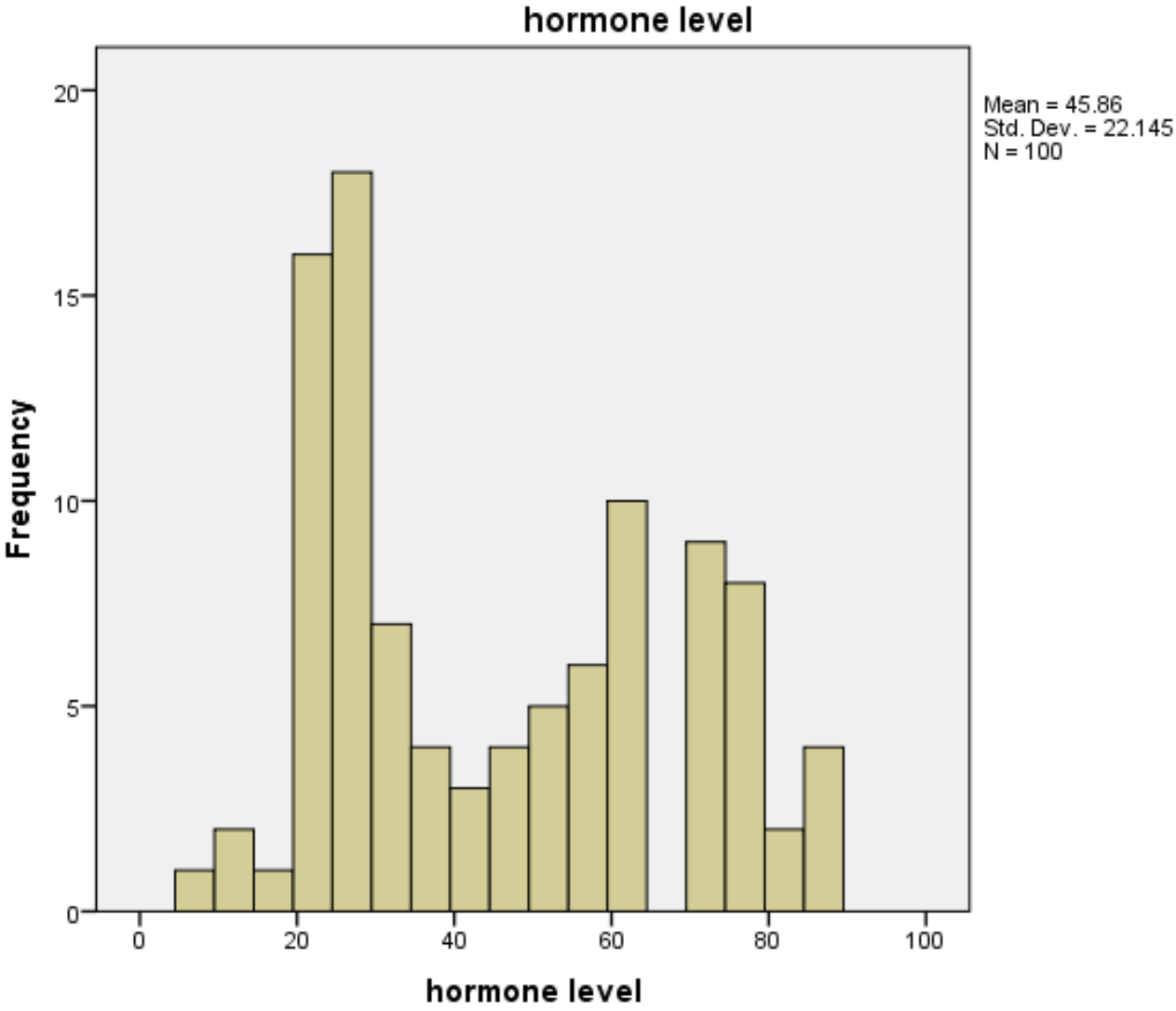

Figure (1) Histogram show frequencies of the UTI and hormone levels with Mean=45.86 and standard Division =22.145 .

4. **Frequency distribution of UTI infection according to the month of the pregnancy:** The result showed that the highest frequency of the UTI infections per month of pregnancy was among the group (1-3) months, (3-6) months and (6-9) months with mean=4.83 and standard division =2.23 with Cumulative Percent as revealed in Figure (2).

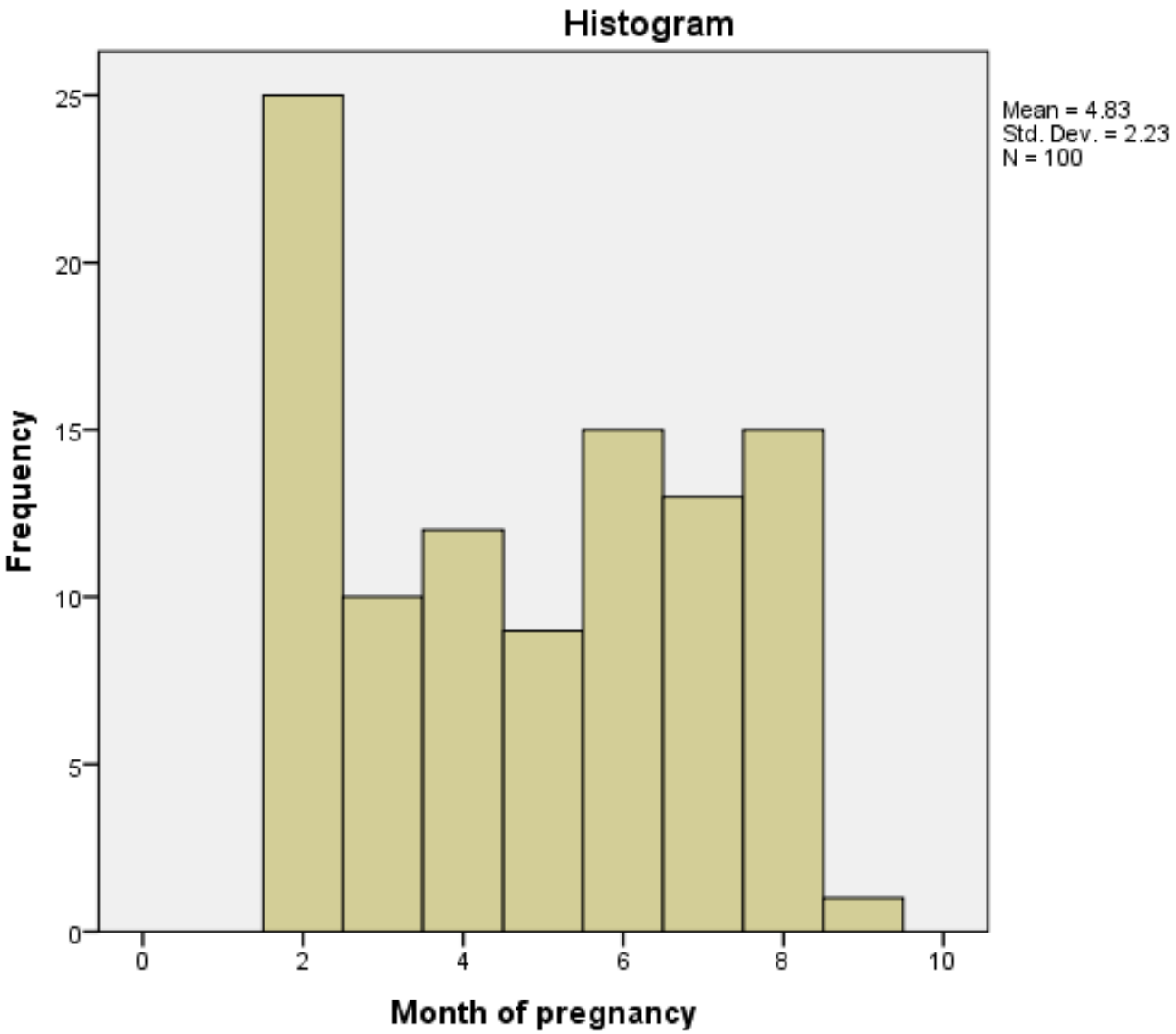

Figure (2) Histogram show frequencies of the UTI infections per month of pregnancy with Mean=4.83 and standard Division =2.23.

5. **Frequency distribution of UTI infection according to the type of microorganisms:** The bacterial growing were characterized as as Gram + and Gram negative, *Escherichia coli* recorded the uppermost percentage among all the isolates which was (48%) followed by the *Klebsiella* species (10%), *Streptococcus feacalis* (8%), *Proteus merabilis* (8%), *Enterobacter cloacae* (6%), *Pseudomonus* (5%), *Acinetobacter* (5%), *Candida albicans* (3%), *Enterococcus faecium* (2%), *Staphylococcus aureus* (2%), *Streptococcus agalctiae* (2%) and *Staphylococcus epidermidis* (1%), with Mean=4.75 and standard division =2.973 as shown Figure (3) .

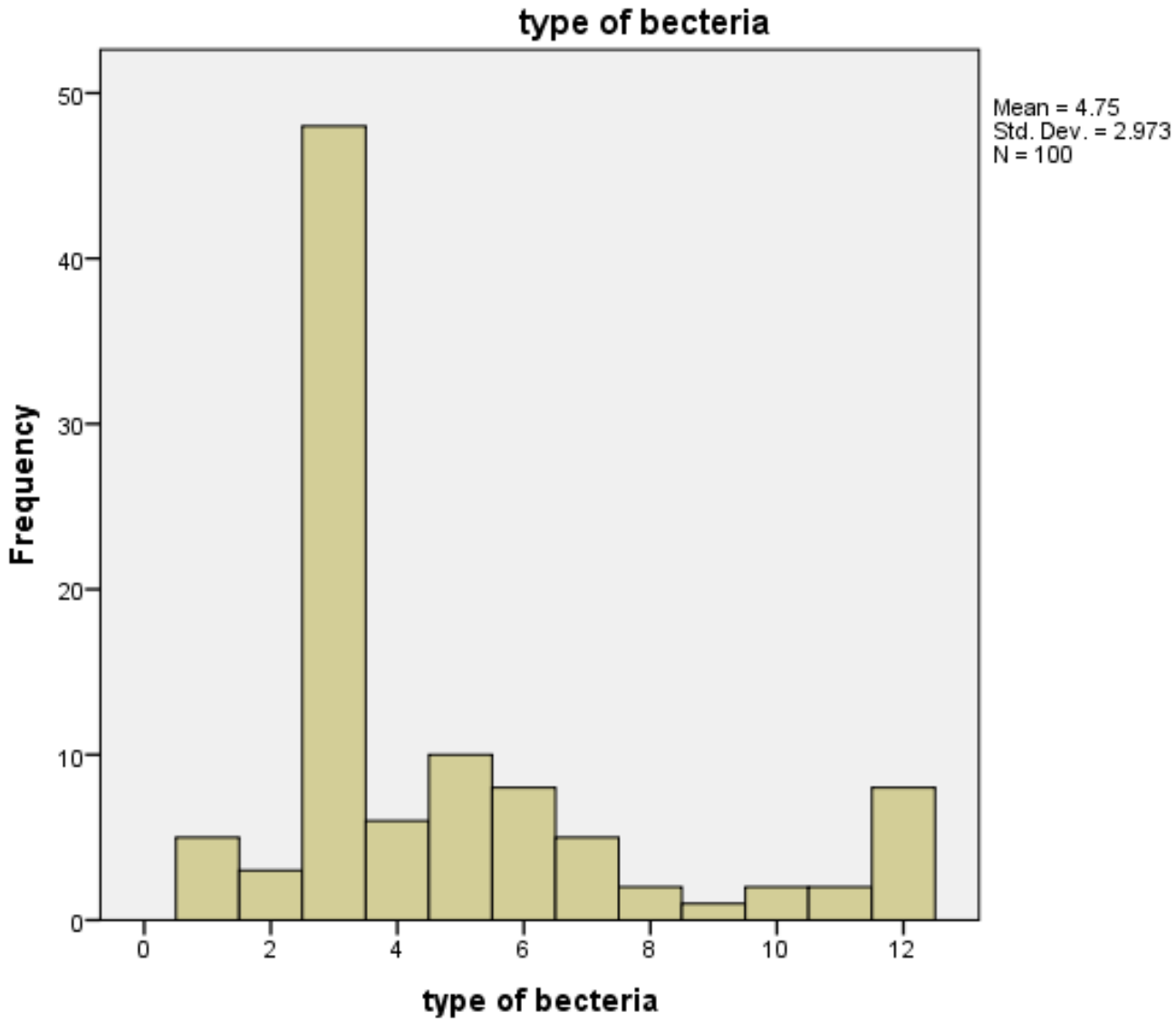

Figure (3): Histogram shows frequencies between types of bacteria with Mean = 4.75 and standard Division = 2.973 . 1 = *Acinetobacter*, 2 = *Candida albicans*, 3 = *Escherichia coli*, 4 = *Enterobacter cloacae*, 5 = *Klebsiella pneumonia*, 6 = *Proteus merabilis,* 7 = *Pseudomonas aeroginosa*, 8 = *Staphylococcus aureus*, 9 = *Staph. epidermidis,* 10 = *Streptococcus agalctiae*, 11 = *Strept. faecium*, 12 = *strept. fecalis*

6. **Distribution of UTI infection according to the age:** The result in the contemporary revision showed that the highest occurrence of the UTI infection was among the age 20-25 years (40 %), followed by 25-30 years (30%), whereas the lowest infections were in age group 15-20 and 30-35 years which was (15%)with Mean=24.75 and standard Division =5.13 9 as shown Figure (4).

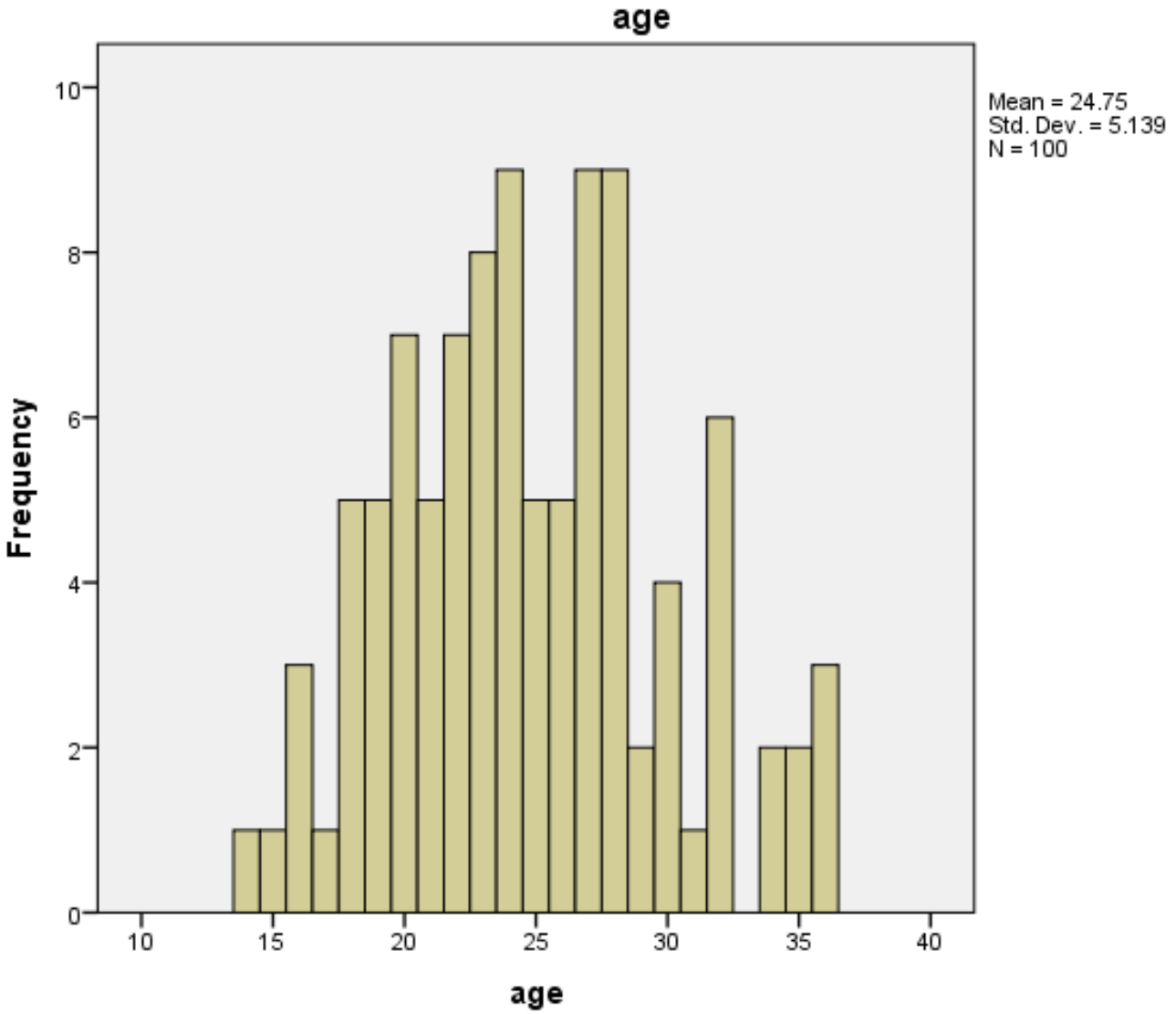

Figure (4): Histogram shows frequencies of the UTI according to theage per years withMean= 24.75 and standard Division = 5.139

Discussion

Sexes hormones have an impact on the UTI in different organisms, demonstrated that during the follicular stage the progesterone is the prevalent hormone in the adult females, which make it cause an increase in bladder oscillation in contrast to the luteal stage which is distinguished by the decrease in the bladder expand [15].

During pregnancy awake to 60% of prenatal women are suffer from anxiety incontinence indications, they suggested that the progesterone high level might be the reason for that the progesterone cause a reduction in the muscle manner of the ureters, which leads to the dilation in the ureters accompanied by a reduce and restriction in the flow of the urine the consequences of the increase in progesterone will be the urinary incontinence and urinary tract infections[16].

A pregnant and non-pregnant female share the same organisms that is *Escherichia coli* has been recorded in many studies as the most common pathogen in the UTI in highly rate of cases of pyelonephritis in pregnant patients Other bacteria-which may be isolated[17].

The results of present study agreed with[18] exceptsome diversion in the patients registered in the urological operation regions, anywhere the nosocomial contagions were mainly produced by *K. pneumniae* and *P.aeruginosa*[19]. *P.aeruginosa* is inhabit and

arrangement a biofilm that interferes with the action of the antimicrobial managers and congregation protection mechanism [20].

This product reach a decision with alternative schoolwork on urinary tract contaminations in patients with renal stones [21]. in which, the maximum ratio of the UTI bacteria was according to the *E. coli*, followed by *Proteus spp., Klebsiella pneumoniae, Pseudomonas aeruginosa*, correspondingly and this outcomes drives marginally with at raining on public developed UTI which presented that *E.coli* was responsible of 73% of the total UTI infections, whereas *K. pneumoniae* 6.5%; *P.aeruginosa* 2.3%, *Proteus spp*. 2.1%[22]. and, agreed with [23]. that reported the record collective bacteria isolate was *Escherichia coli with* (57%), shadowed by *Strep. feacalis*(16%), *Klebsiella* & *Pseudomonous* classes (8%), *Staphylococcus epidermidis* (6%), *Proteus* classes (1.6%), *Acenatobacter & Citrobacter* (1.3%), *Staphylococcus saprophyticus* (0.4%). The sequestration percentage of urinary bacteria of the current study is dependable with the results reported in NNIS, (1997)[24], which demonstrated that *Enterobacter* cloacae remained triggered (9.5%), the evidence that the bacterial endotoxins and exotoxins have a direct effect on the reproductive organs and related hormones [25].

Distribution of UTI infection According to Age: UTI infection among the patients according to age group 15-20 years was (15 %), 20-25 years (40 %) and 25-30 years (30%), the lowest incidence was in 30-35 years(15%), as shown in figure(4).in addition to the practice of the diaphragm and spermicidal contraceptives which modify the ordinary vaginal vegetation and possibly will allow establishment by pathogenic bacteria[26].

Frequency Distribution of the UTI infection According to Progesteronehormone level: The progesterone was 7.1 ng/mL which was among the class group (0-20) ng/mL, the high incidence was showed in (20-40),(40-60)and (60-80)ng/mL,the lowest incidence was in (80-100)ng/mL,this might be due to the hormonal changes through the physiological cycle of women, increase subsequently ovulation andfor the duration of the luteal period,During gravidity, the progesterone levels conserved at the same luteal planes[2].

Conclusion

The current study was aimed to point the UTI combined with the progesterone level the study concluded that the hormone levels were highest in the first months of the pregnancy, also showed that the incidence of the UTI was highest in the first months of the pregnancy, linked the two parameters (hormone level and the UTI) in the first months give a clear evidence that the hormone level no affect the UTI, the most affected age was 20-25 years.

Ethical Clearance: The Research Ethical Committee at scientific research by ethical approval of both MOH and MOHSER in Iraq.

Conflict of Interest: Non

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