Article
JOURNAL OF UNIVERSITY OF BABYLON
For Pure and Applied Sciences (JUBPAS)
Vol. 33 ; No. 3 | 2025

The Role of Complete Blood Count Test and General Urine Examination in Early Detection Of Risks And Diseases Affecting Women

Ruaa A. Talib

Babylon Education Direction
Corresponding author email: ruaaalitalibnasser8@gmail.com

Accepted: 4/8/2025 **Published:** 30/9/2025

ABSTRACT

A number of blood samples were collected from women in various locations across Babil Governorate. A Complete Blood Count (CBC) test was conducted to detect any general health issues these women might be experiencing. A table was prepared to investigate and assess the role or impact of blood analysis in determining their general health status. In addition to the blood test, a urine analysis was also conducted to provide a comprehensive understanding of each woman's health condition, including determining whether the woman is pregnant and identifying her age. The general appearance of the samples did not show the presence of blood or any abnormal features in terms of appearance.

The results indicated that the Packed Cell Volume (PCV), which reflects the concentration of red blood cells, was generally low among all women who underwent the test. This provides an initial indication of potential anemia. Most samples showed normal red blood cell (RBC) and white blood cell (WBC) counts, although some women exhibited elevated WBC levels, likely due to the presence of infections. Platelet counts were within the normal range. In the general urine examination, the ketone levels in urine were measured and found to be within normal limits, indicating no significant issues. These levels depend on dietary patterns and hormonal changes, such as those caused by pregnancy. The number of pus cells and red blood cells in urine was also measured. The majority of samples showed elevated pus cell counts, suggesting urinary tract infections (UTIs), and elevated RBCs were also observed. However, most women did not show abnormalities related to urinary crystals or bacteria. Epithelial cells were also counted, and most samples showed elevated levels, which may indicate inflammation or infection in the urinary tract.

The main issue addressed in this research is the general lack of attention to women's health until symptoms of a specific illness appear. In most cases, women only begin to prioritize their health after becoming pregnant, primarily for the well-being of the fetus. The study found that many women do not undergo regular check-ups and only begin health screenings—such as the complete blood count (CBC) test and urine analysis—after confirming pregnancy, in order to detect and prevent any potential health issues during pregnancy.

Key Word: **The complete blood count (CBC) test , urine analysis, Blood and Urine.**

ISSN: 2312-8135 | Print ISSN: 1992-0652
info@journalofbabylon.com | jub@itnet.uobabylon.edu.iq | www.journalofbabylon.com

ISSN: 2312-8135 | Print ISSN: 1992-0652
info@journalofbabylon.com | jub@itnet.uobabylon.edu.iq | www.journalofbabylon.com

INTRODUCTION:

Women's health is a critical component of public health, particularly in regions facing socioeconomic challenges and limited healthcare resources. In Iraq, women are disproportionately affected by conditions such as anemia and urinary tract infections (UTIs), which can significantly impact their quality of life and overall well-being. Anemia, often resulting from nutritional deficiencies, chronic diseases, or reproductive health issues, remains a prevalent concern. Concurrently, UTIs are among the most common infections affecting women, often leading to complications if not promptly diagnosed and treated. Recent studies have highlighted the persistent burden of these conditions among Iraqi women. For instance, a study by Al-Mashhadani *et al.* (2023) reported a high prevalence of iron-deficiency anemia among women of reproductive age in central Iraq, attributing it to factors such as inadequate dietary intake and limited access to healthcare services.[1]

Similarly, research by Al-Khafaji and colleagues (2024) indicated that UTIs continue to be a significant health issue, with Escherichia coli identified as the predominant causative agent. Given these challenges, comprehensive health assessments that include both hematological and urinary analyses are essential for early detection and management. This study aims to evaluate the general health status of women in Babil Governorate through the analysis of blood and urine samples, focusing on indicators such as Packed Cell Volume (PCV), red and white blood cell counts, platelet levels, and urinary markers including ketones, pus cells, and epithelial cells. By identifying prevalent health issues, this research seeks to inform targeted interventions and improve healthcare outcomes for women in the region. [2]

Anemia is one of the most prevalent public health problems affecting women worldwide, particularly in developing countries. It is characterized by a deficiency in the number or quality of red blood cells, which impairs the blood's ability to carry oxygen to the body's tissues. Women of reproductive age are especially vulnerable to anemia due to factors such as menstruation, pregnancy, and poor nutritional intake. The condition can lead to fatigue, weakness, impaired cognitive function, and complications during pregnancy, including increased risk of maternal and fetal morbidity and mortality [3].

MATERIAL AND METHODS:

The fieldwork was conducted in Babylon Province with the aim of studying and analyzing potential differences in laboratory test results between pregnant and non-pregnant women. The study involved visits to a number of public and private laboratories across the province, in coordination with laboratory staff to accurately and systematically collect the required data.

The focus was on gathering comprehensive information about the women visiting the laboratories, including health status (pregnant or not), age, and the results of Complete Blood Count (CBC) tests and urinalysis. The two test results were matched for each individual case, enabling the construction of a unified database suitable for statistical analysis.

This fieldwork aimed to ensure fair representation of samples across different age groups and geographic areas within the province, while maintaining the confidentiality and privacy of all participants' information.

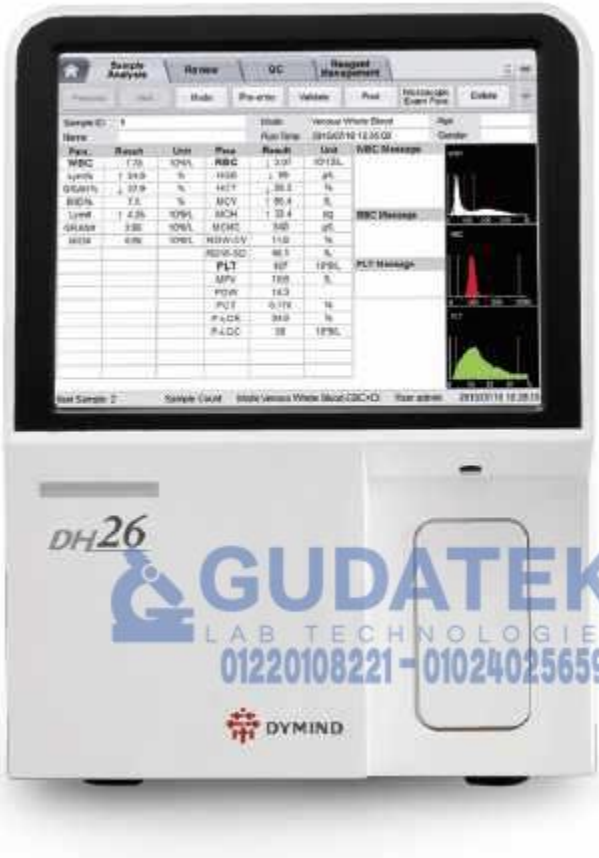
ISSN: 2312-8135 | Print ISSN: 1992-0652
info@journalofbabylon.com | jub@itnet.uobabylon.edu.iq | www.journalofbabylon.com

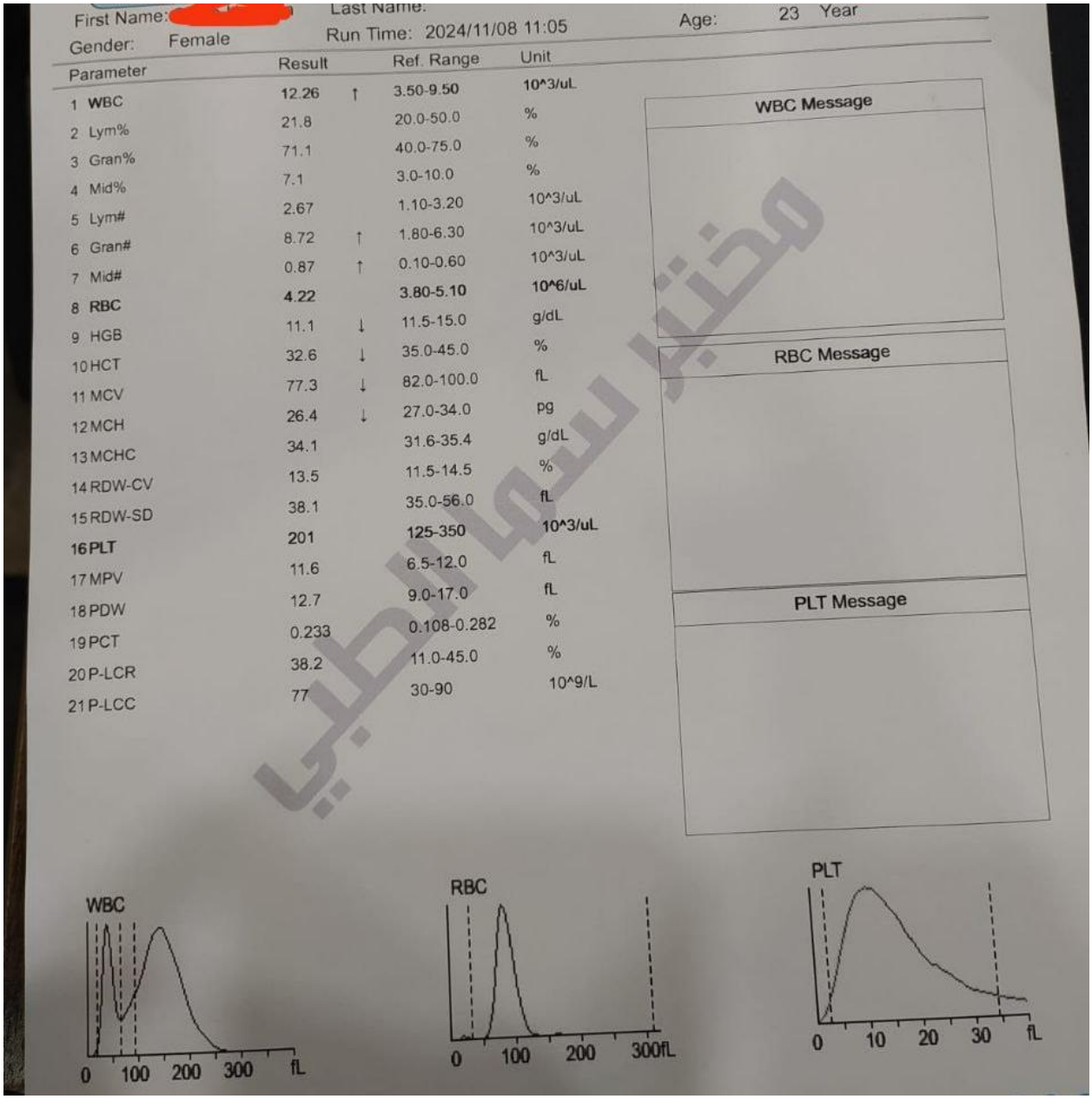
1- CBC Test :

The Complete Blood Count (CBC) is a fundamental laboratory test used to evaluate various components of blood, including red blood cells (RBCs), white blood cells (WBCs), hemoglobin (Hb), hematocrit (HCT), platelets, and red cell indices such as mean corpuscular volume (MCV) and mean corpuscular hemoglobin concentration (MCHC). [4]. The test is performed by collecting a venous blood sample, typically into a tube containing an anticoagulant such as ethylenediaminetetraacetic acid (EDTA).

Once the sample is collected, it is analyzed using automated hematology analyzers, which employ techniques such as electrical impedance or flow cytometry to count and characterize blood cells. The CBC provides essential indicators that assist in diagnosing and monitoring a wide range of conditions, including anemia, infections, hematologic disorders, and bleeding abnormalities. [5]

It is recommended that the test be performed in the early morning after a period of physical rest. Factors such as pregnancy, nutrition, general health status, and certain medications may influence the test results and should be considered during interpretation. [6]





2- General Urine Examination:

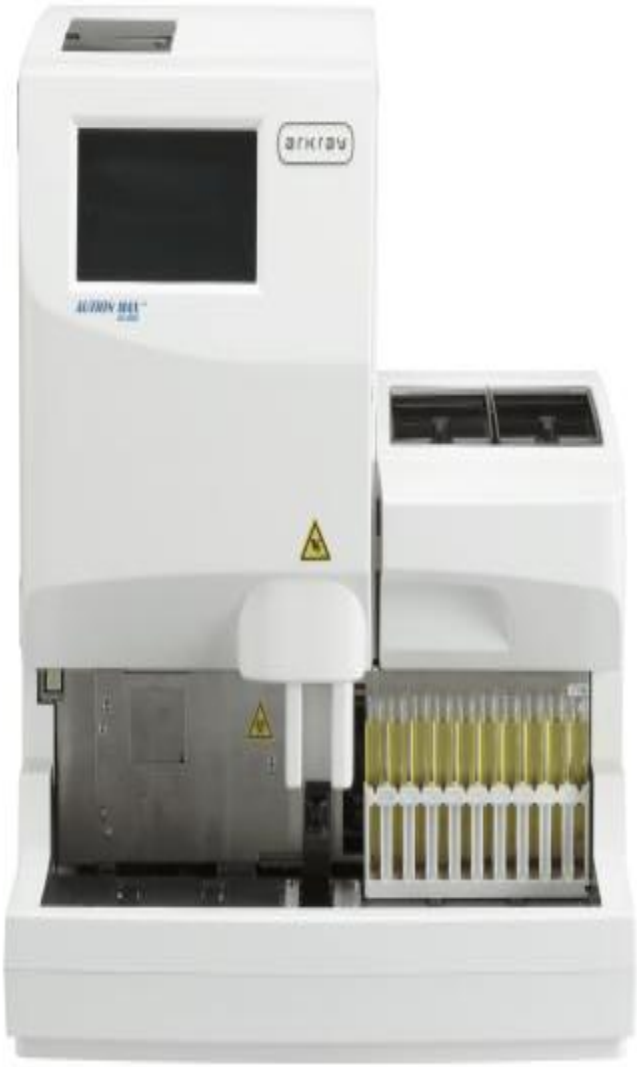
Urinalysis is a fundamental laboratory test used to assess overall health and to help diagnose conditions affecting the kidneys, urinary tract, and metabolic system. The test is typically conducted using a random urine sample collected in a clean, sterile container. Ideally, the specimen should be a first-morning sample to ensure greater accuracy, and it is recommended that the midstream portion of urine be collected after cleaning the genital area to minimize contamination. [7]

Urinalysis consists of three main components:

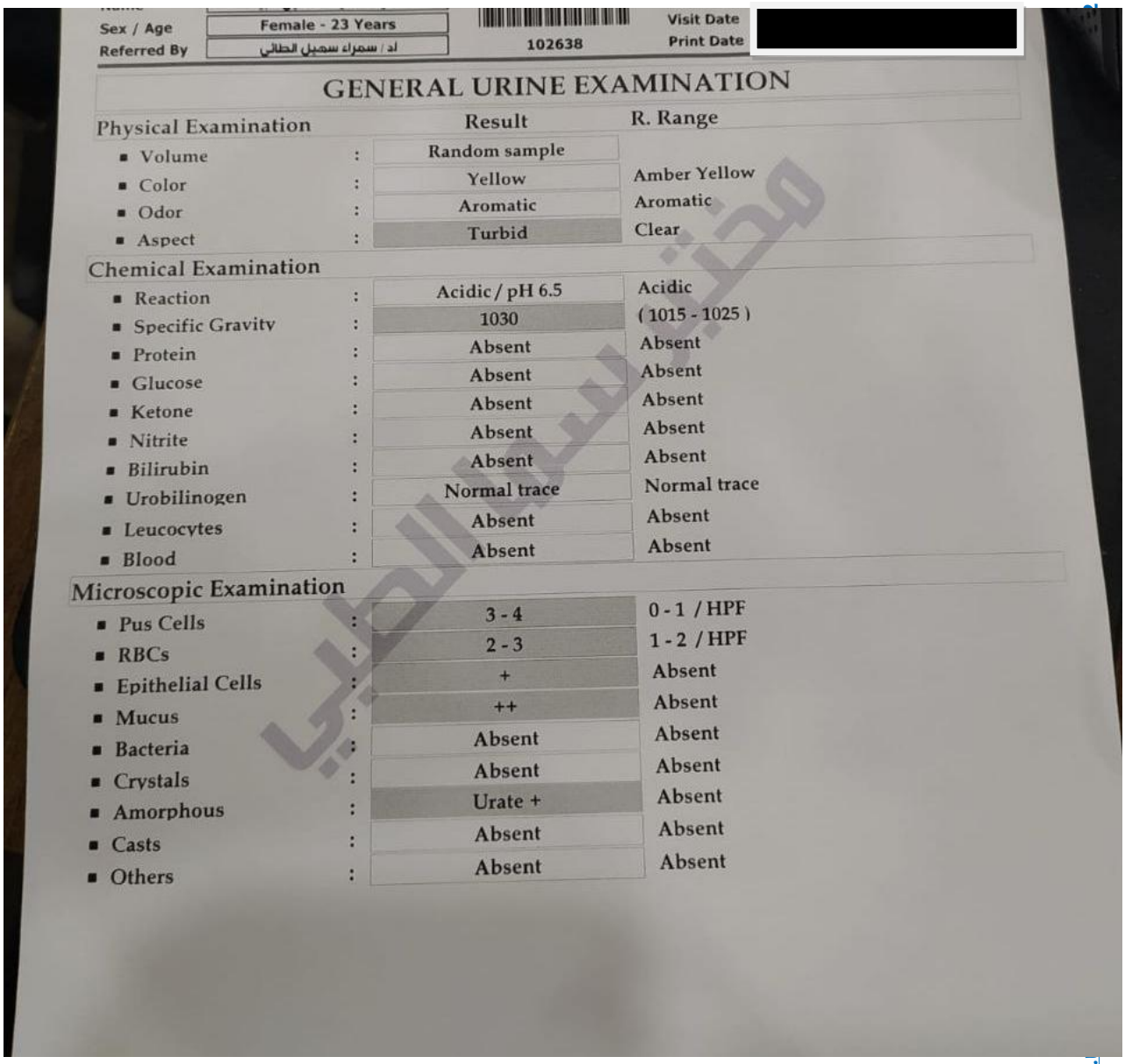
ISSN: 2312-8135 | Print ISSN: 1992-0652
info@journalofbabylon.com | jub@itnet.uobabylon.edu.iq | www.journalofbabylon.com

- Visual examination: to observe the color, clarity, and odor of the urine.
- Chemical analysis: using dipstick strips to detect substances such as protein, glucose, ketones, blood, nitrites, and pH levels.
- Microscopic examination: to identify elements in the urine sediment, such as red and white blood cells, epithelial cells, crystals, bacteria, and casts.

Urinalysis is a quick, non-invasive, and cost-effective test that plays a key role in the initial assessment of numerous health conditions.(8) (9)



ISSN: 2312-8135 | Print ISSN: 1992-0652
info@journalofbabylon.com | jub@itnet.uobabylon.edu.iq | www.journalofbabylon.com



Sex / Age: Female - 23 Years
Referred By: د / سمراء سهيل الطائي
102638
Visit Date
Print Date

GENERAL URINE EXAMINATION

Physical Examination	Result	R. Range
Volume	Random sample	
Color	Yellow	Amber Yellow
Odor	Aromatic	Aromatic
Aspect	Turbid	Clear
Chemical Examination		
Reaction	Acidic / pH 6.5	Acidic
Specific Gravity	1030	(1015 - 1025)
Protein	Absent	Absent
Glucose	Absent	Absent
Ketone	Absent	Absent
Nitrite	Absent	Absent
Bilirubin	Absent	Absent
Urobilinogen	Normal trace	Normal trace
Leucocytes	Absent	Absent
Blood	Absent	Absent
Microscopic Examination		
Pus Cells	3 - 4	0 - 1 / HPF
RBCs	2 - 3	1 - 2 / HPF
Epithelial Cells	+	Absent
Mucus	++	Absent
Bacteria	Absent	Absent
Crystals	Absent	Absent
Amorphous	Urate +	Absent
Casts	Absent	Absent
Others	Absent	Absent

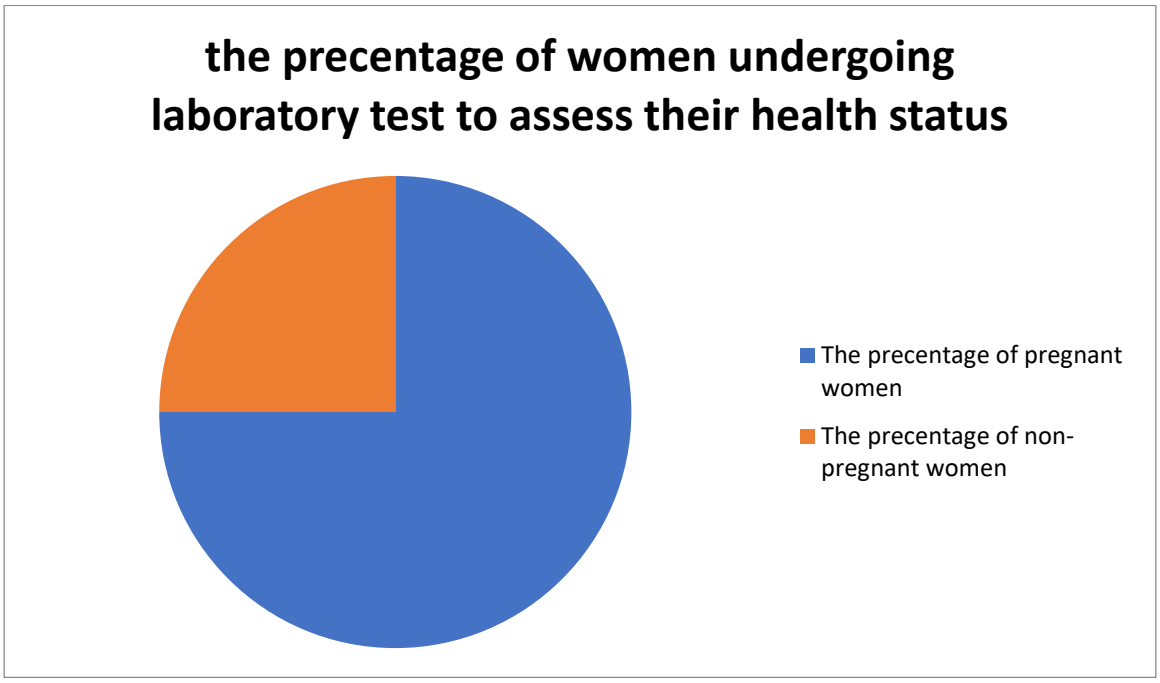
As part of the data collection process during the urinalysis, each woman undergoing the test was asked whether she was currently pregnant or not. Additionally, her age was recorded. This information was essential for correlating urinalysis findings with pregnancy status and age-related factors.

Urinalysis is a quick, non-invasive, and cost-effective test that plays a key role in the initial assessment of numerous health conditions.

ISSN: 2312-8135 | Print ISSN: 1992-0652 | jub@itnet.uobabylon.edu.iq | www.journalofbabylon.com | info@journalofbabylon.com

RESULTS & DISCUSSIONS:

The results showed that the proportion of pregnant women visiting laboratories for health assessment was three times higher than that of non-pregnant women who underwent testing solely for general health evaluation. Moreover, age appeared to be a significant factor; as women's age increased, the likelihood of undergoing medical tests also increased



Use of Laboratory Tests Among Pregnant vs. Non-Pregnant Women :Studies indicate that pregnant women undergo a higher number of laboratory tests compared to non-pregnant women, mainly due to the need for monitoring their health and the health of the fetus.(Study in New Mexico, USA) A study in New Mexico revealed that 91% of pregnant women underwent a complete blood count (CBC) test during the first trimester of pregnancy, compared to 53.6% in the third trimester. The study also found that 25.6% of women experienced anemia during pregnancy, with a noticeable increase in anemia from the first to the third trimester.

(Study in Ethiopia) A study comparing 139 pregnant women and 139 non-pregnant women at the University of Gondar Hospital showed that pregnant women had higher levels of glucose, total cholesterol, triglycerides, and low-density lipoprotein cholesterol, while high-density lipoprotein cholesterol was lower compared to non-pregnant women. [11](Study in Egypt and Saudi Arabia)

A study comparing 500 pregnant women and 200 non-pregnant women showed that pregnant women had higher levels of white blood cells, CD8 T-cells, CRP, and IL-6, while CD4 T-cell levels were lower. However, these differences were not statistically significant. [12,13] All these result agree with my result.

	CBC test		General urine Examination

Age					(microscopic)				
	RBC	WBC	Platelets		Pus cell	RBC	Epithelial cell	Bacteria	Crystal
24	4.96	10.72	195	Yes	20-25	10-15	++++	No	No
23	4.07	9.04	293	Yes	20-25	9-10	+++	No	No
19	3.58	7.62	197	Yes	3-4	1-2	Few	No	No
26	4.53	10.05	307	No	20-25	5-6	+++	No	No
28	3.67	10.99	252	Yes	5-6	1-2	++	Few	No
23	4.00	9.77	257	Yes	2-3	1-2	Few	No	No
39	4.68	7.12	270	No	3-4	6-7	Few	No	No
23	4.22	12.26	201	Yes	3-4	2-3	+	No	No
34	4.27	10.09	301	Yes	2-4	3-5	No	No	No
23	4.25	12.09	301	Yes	2-3	4-5	No	No	No
28	4.22	7.14	287	No	1-2	3-5	No	No	+
25	4.25	9.03	301	Yes	2-3	1-2	+	No	+

The normal range of Red Blood Cells (RBCs):

Men: 4.7 – 6.1 million cells/µL

Women: 4.2 – 5.4 million cells/µL

Children: 4.1 – 5.5 million cells/µL .(14)

The normal range White Blood Cells (WBCs):

Adults and children: 4,500 – 11,000 cells/µL.(15)

The normal range Platelets (Thrombocytes):

All age groups: 150,000 – 450,000 platelets/µL. (16)

The normal microscopic urinalysis includes the following reference ranges:

Red Blood Cells (RBCs): Normally 0 to 2 cells per high-power field (HPF). The presence of more may suggest bleeding in the urinary tract.

White Blood Cells (WBCs): Typically 0 to 5 cells per HPF. Slightly higher levels may be seen in females due to contamination from vaginal secretions, but elevated counts can indicate urinary tract infection (UTI) or inflammation.

Epithelial Cells: Usually 0 to 5 cells per HPF. A higher count may suggest contamination or tubular injury depending on the type of epithelial cells observed.

ISSN: 2312-8135 | Print ISSN: 1992-0652
info@journalofbabylon.com | jub@itnet.uobabylon.edu.iq | www.journalofbabylon.com

ISSN: 2312-8135 | Print ISSN: 1992-0652
info@journalofbabylon.com | jub@itnet.uobabylon.edu.iq | www.journalofbabylon.com

Casts: Up to 0 to 5 hyaline casts per low-power field (LPF) can be normal. Other types of casts, such as red cell casts or granular casts, are abnormal and indicate renal pathology.

Crystals: Occasional urate or phosphate crystals may be seen in normal urine, especially if it is cooled. However, an abundance or presence of specific crystal types (e.g., cystine, struvite) can be pathologic.

Bacteria: Normally absent. A few may be present in contaminated samples, but significant numbers suggest infection.

Yeast and Mucus: Yeast should not be present in normal urine; its presence may indicate a fungal infection. Mucus is rarely seen in small amounts and is typically of no clinical significance. [17, 18, 19]

We observe from the test results that the percentage of pus cells is significantly elevated in most of the women who underwent the analysis. Similarly, the number of red blood cells (RBCs) in the urine is also relatively high in a large portion of them. In contrast, the presence of bacteria and crystals in the urine was very low or nearly absent in the majority of the women tested. The Study from Nigeria (2014)

A study on 211 patients (149 females and 62 males) with symptoms of urinary tract infections (UTIs) showed that: 54 urine samples contained pus cells , 14 samples had calcium oxalate crystals ,Bacterial growth in urine was more common among females (36.2%) than males (19.4%) , Escherichia coli (E. coli) was the most common uropathogen. [20] The Study from Libya (2023) In a study conducted in Bani Walid, Libya, on 45 urine samples: 62.2% had pus cells ,84.4% had epithelial cells, UTI prevalence was higher among females (68%), especially in the 21–40 age group. [21] The Study from Ghana (2019) At the University of Cape Coast Hospital: Having more than 5 pus cells per high power field (HPF) was 94.4% sensitive in diagnosing UTIs , Nitrite test sensitivity was only 21% , 71.9% of UTI-positive cases were female. [22] The Study from the United States (2024)

An emergency department study found: Presence of >5 WBCs/HPF and positive nitrite tests were significantly associated with bacterial growth in urine cultures, especially among women.[23] The Study from Pakistan, Published in the Journal of the Pakistan Medical Association:Pus cells were found in 85% of culture-positive cases and only 2% of culture-negative ones, Sensitivity and specificity of pyuria as a diagnostic marker were 85% and 98%, respectively. [24]

Age	CBC test						pregnant	General urine Examination
	MCV	MCH	MCHC	P.V.C. (HCT)	RDW.CV	RDW.SD		ketone
24	68.4	19.6	28.6	33.9	26.8	66.6	Yes	+
23	77.6	24.7	31.8	31.6	14.3	40.4	Yes	No
19	88	27.7	31.5	31.5	16.1	51.6	Yes	No
26	76.9	24.4	31.7	34.8	14.3	40.1	No	No
28	90.6	27.7	30.6	33.2	13.6	44.9	Yes	No
23	85.7	27.4	32	34.3	13.2	41.3	Yes	No
39	57.9	16.2	28	27.1	18	37.9	No	Trace
23	77.3	26.4	34.1	32.6	13.5	38.1	Yes	No
34	84.2	27.1	32.2	36	12.9	54.6	Yes	No
23	80.41	28.1	33.1	37	13.4	40.7	Yes	No
28	82.2	27.2	33.4	38	12.8	50.7	No	+
25	85.9	27.4	32.2	40	13.5	38.1	Yes	+

Hematocrit (PCV) in Adult Women – Pregnant and Non-Pregnant:

Hematocrit (HCT) or Packed Cell Volume (PCV) measures the proportion of red blood cells in the blood. It is an essential parameter used to evaluate conditions such as anemia, dehydration, or polycythemia.[25] For adult non-pregnant women, the normal hematocrit range is generally:

35.5% to 44.9% (Mayo Clinic, 2024)(25)

36% to 44% (Cleveland Clinic, 2023)(26)

35% to 47% (University of Iowa Health Care, 2023)(27)

36.1% to 44.3% (MedlinePlus, 2023)(28)

36% to 44% (American Red Cross, 2023)(29)

Values lower than this range may suggest anemia, while higher values can indicate dehydration or polycythemia. During pregnancy, physiological changes cause an increase in plasma volume, which dilutes red blood cell concentration and leads to a natural decline in hematocrit. This is known as physiological anemia of pregnancy. Typical reference values during pregnancy are:

First trimester: ~33% to 38%

Second trimester (lowest point): ~30% to 36%

Third trimester: ~31% to 40%

The World Health Organization (WHO, 2012) and the Centers for Disease Control and Prevention (CDC, 2021) recommend maintaining hematocrit levels at or above 33% during

ISSN: 2312-8135 | Print ISSN: 1992-0652
info@journalofbabylon.com | jub@itnet.uobabylon.edu.iq | www.journalofbabylon.com

ISSN: 2312-8135 | Print ISSN: 1992-0652
info@journalofbabylon.com | jub@itnet.uobabylon.edu.iq | www.journalofbabylon.com

pregnancy. [30] Values below 30% during pregnancy are generally considered indicative of iron deficiency anemia and should be medically evaluated.

Physiological Anemia: Caused by a greater increase in plasma volume compared to red blood cell mass (~40–50% vs. 20–30%). Iron Supplementation:Commonly prescribed to maintain hematocrit above 33% during pregnancy.

Lab Differences: Reference ranges may vary slightly between laboratories due to method and population differences. In Non-Pregnant Women: Hematocrit levels below 35% may indicate true anemia.[31,32]

Analysis of MCV, MCH, and MCHC:

1. Definitions and Normal Reference Ranges

a**. MCV** (Mean Corpuscular Volume) Definition: Measures the average volume of a red blood cell (RBC). Unit: Femtoliter (fL)

Normal range in adults: 80 – 100 fL

Clinical relevance: MCV < 80 fL: Microcytic anemia (e.g., iron deficiency anemia)

MCV > 100 fL: Macrocytic anemia (e.g., B12 or folate deficiency)

b. **MCH** (Mean Corpuscular Hemoglobin) Definition: The average amount of hemoglobin per RBC. Unit: Picograms (pg)

Normal range in adults: 27 – 33 pg

Clinical relevance: Low MCH: Often associated with hypochromic, microcytic anemia. High MCH: Suggestive of macrocytic anemia

c. **MCHC** (Mean Corpuscular Hemoglobin Concentration) Definition: The average concentration of hemoglobin within a given volume of RBCs. Unit: g/dL

Normal range in adults: 32 – 36 g/dL

Clinical relevance:Low MCHC: Typically seen in hypochromic anemia

High MCHC: Rare; may indicate hereditary spherocytosis or dehydration.

Classification and diagnosis of anemia: Determining whether the anemia is microcytic, normocytic, or macrocytic, and whether it is hypochromic or normochromic. Monitoring response to therapy: Especially in patients receiving iron, B12, or folate supplementation. Differentiation of causes of red cell disorders. [33,34]

Differences in Pregnant vs. Non-Pregnant Individuals

Pregnancy induces physiological changes in hematologic parameters due to: Expansion of plasma volume exceeding the increase in red blood cell mass, Increased demand for iron, folate, and vitamin B12 .

ISSN: 2312-8135 | Print ISSN: 1992-0652 | jub@itnet.uobabylon.edu.iq | www.journalofbabylon.com | info@journalofbabylon.com

Pregnancy-related hematologic changes:

MCV: May remain within normal limits or show a slight increase due to folate supplementation or demand , MCH and MCHC: Often slightly decreased due to hemodilution and iron depletion

Approximate reference ranges during pregnancy:

(MCV: 80 – 105 fL) (MCH: 27 – 31 pg) (MCHC: 30 – 34 g/dL)

These variations necessitate interpretation of results in the context of pregnancy to avoid misclassification of anemia type.[35,36]

RDW-CV and RDW-SD: Clinical Significance and Reference Ranges

RDW (Red Cell Distribution Width) is a parameter included in the Complete Blood Count (CBC) that measures the variation in size (anisocytosis) of red blood cells (RBCs). Two forms of RDW are commonly reported: RDW-CV (coefficient of variation) and RDW-SD (standard deviation). RDW-CV is expressed as a percentage and is calculated based on the mean corpuscular volume (MCV). It reflects the relative variation in RBC size.[36] RDW-SD, on the other hand, is an absolute measure expressed in femtoliters (fL) and does not depend on MCV; it directly quantifies the standard deviation in RBC size distribution.[37]

These indices are particularly useful in the differential diagnosis of anemia:

Elevated RDW with low MCV may indicate iron deficiency anemia. Elevated RDW with normal or high MCV may suggest vitamin B12 or folate deficiency.

Normal RDW with normal MCV typically indicates non-regenerative or chronic anemia with uniform RBC size. During pregnancy, RDW values may rise slightly, particularly in the third trimester, due to physiological changes. However, significant increases may warrant further evaluation for nutritional deficiencies (iron, folate, or B12), which are common in pregnancy.[38]

Reference Ranges: RDW-CV: 11.5% to 14.5% (normal for adult women, both pregnant and non-pregnant) RDW-SD: 39 to 46 fL

These values may vary slightly between laboratories depending on the analytical methods used.

Clinical Relevance in Pregnancy:

Monitoring RDW during pregnancy aids in the early detection of anemia and nutritional deficiencies, which, if untreated, can have adverse outcomes for both the mother and fetus.[36]

Clinical Significance of Urinary Ketones (Ketonuria) Ketone bodies—primarily acetoacetate, β-hydroxybutyrate, and acetone—are metabolic byproducts produced in the liver during the breakdown of fatty acids. Their presence in urine, termed ketonuria, indicates a shift in the body's energy utilization from carbohydrates to fats.[39]

Primary Clinical Contexts for Urine Ketone Testing

ISSN: 2312-8135 | Print ISSN: 1992-0652
info@journalofbabylon.com | jub@itnet.uobabylon.edu.iq | www.journalofbabylon.com

1. Diabetic Ketoacidosis (DKA):

In individuals with diabetes, especially type 1, elevated urinary ketones can signal impending or established DKA—a life-threatening condition characterized by hyperglycemia, ketosis, and metabolic acidosis. However, urine ketone tests may not accurately reflect real-time ketone levels due to delays in excretion and their inability to detect β-hydroxybutyrate, the predominant ketone in DKA. Therefore, blood ketone measurements are preferred for timely and accurate assessment .[40]

2. Fasting and Low-Carbohydrate Diets:

During prolonged fasting or adherence to ketogenic diets, the body increases fat metabolism, leading to ketone production and subsequent excretion in urine. Trace to small amounts of urinary ketones in these contexts are generally considered physiological and not indicative of pathology .[41]

3. Hyperemesis Gravidarum (HG):

HG is a severe form of nausea and vomiting during pregnancy, leading to dehydration and weight loss. Ketonuria is commonly observed in HG and serves as a marker of starvation and severity. Recent studies have linked severe ketonuria in HG to adverse fetal outcomes, including increased risks of miscarriage, low birth weight, and developmental anomalies .[41]

Interpretation of Urinary Ketone Levels

- Trace to Small: May be observed in normal physiological states such as fasting or low-carbohydrate diets.
- Moderate to Large: Suggests a pathological state, potentially indicating:

Diabetic ketoacidosis (DKA) Severe caloric deprivation or malnutrition , prolonged vomiting, or gastrointestinal disturbances [42]

It's important to note that urine ketone tests primarily detect acetoacetate and may not accurately reflect β-hydroxybutyrate levels, potentially underestimating the severity of ketosis .(43) Recent Advances and Considerations

Continuous Ketone Monitoring (CKM): Emerging technologies now allow for real-time monitoring of ketone levels through interstitial fluid sensors, providing more immediate and accurate assessments, particularly beneficial in managing diabetes and preventing DKA .Limitations of Urine Ketone Testing: Factors such as hydration status, renal function, and the time lag between blood ketone levels and urinary excretion can affect the accuracy of urine ketone tests. Therefore, clinical context and additional laboratory assessments should guide interpretation . [43]

Urinary ketone testing remains a valuable tool in clinical practice for assessing metabolic states, particularly in diabetes management, dietary monitoring, and pregnancy-related conditions like hyperemesis gravidarum. However, clinicians should be aware of its limitations and consider complementary assessments, such as blood ketone measurements, for accurate diagnosis and management.

CONCLUSIONS & RECOMMENDATIONS:

ISSN: 2312-8135 | Print ISSN: 1992-0652
info@journalofbabylon.com | jub@itnet.uobabylon.edu.iq | www.journalofbabylon.com

Based on the findings of this study, the majority of participants undergoing CBC and urinalysis were pregnant women, with ages typically ranging from 19 to 37 years. The red blood cell (RBC) count was within the normal reference range in most cases. A subset of participants showed elevated white blood cell (WBC) counts, likely due to inflammatory processes. Platelet counts were generally within normal limits. Hematocrit (HCT), also referred to as packed cell volume (PCV), was found to be within normal ranges in the majority of cases, considering the physiological changes associated with pregnancy and using globally recognized reference values.

Urinalysis Observations:

Urine sample analysis revealed that ketone levels were within normal limits for the majority of women, which may reflect adequate nutritional intake and general attention to maternal health—particularly notable since most participants were pregnant. The presence of pus cells in several samples suggests underlying urinary tract or internal genital tract infections. In some cases, the detection of red blood cells (RBCs) in the urine may indicate minor hematuria, potentially related to inflammation or mild bleeding. Bacteria and urinary crystals were largely absent or negligible in most samples, suggesting no significant bacterial infections or crystalluria. Epithelial cells were present in small quantities, which may also reflect mild inflammation of the genitourinary tract, including possible uterine or lower urinary tract irritation.

RECOMMENDATIONS:

1. Regular Antenatal Monitoring:

Given that most participants were pregnant women, it is essential to maintain regular prenatal check-ups, including complete blood count (CBC) and urinalysis, to monitor for early signs of anemia, infection, or nutritional deficiencies.

2. Nutritional Support:

The presence of normal ketone levels suggests adequate nutrition in most cases. Continued emphasis on balanced dietary intake rich in iron, folic acid, and essential vitamins is advised to support maternal and fetal health.

3. Early Detection and Management of Infections:

The elevated white blood cell counts and presence of pus cells in urine suggest possible inflammatory or infectious processes. It is recommended to: Perform urine culture when infections are suspected. Provide appropriate antimicrobial treatment when clinically indicated. Educate pregnant women on hygiene and hydration to prevent urinary tract infections (UTIs).

4. Follow-Up on Hematuria Cases:

In cases where red blood cells are found in the urine, further evaluation should be conducted to rule out causes such as urinary tract trauma, infection, or other underlying pathology.

ISSN: 2312-8135 | Print ISSN: 1992-0652

info@journalofbabylon.com | jub@itnet.uobabylon.edu.iq | www.journalofbabylon.com

5. Health Education for Pregnant Women:

Enhance awareness regarding the importance of:

Routine lab testing

Recognizing early signs of infection or abnormal symptoms

Maintaining a healthy diet and hydration

Avoiding self-medication, especially antibiotics, during pregnancy

6. Further Diagnostic Workup When Indicated:

For cases with abnormal lab findings (e.g., high WBCs, persistent hematuria, or significant epithelial cells), additional testing such as renal function tests, pelvic ultrasound, or referral to a specialist may be warranted to ensure maternal safety.

Conflict of interest.

There are non-conflicts of interest.

References

1- Al-Mashhadani, S. A., Al-Taie, A. A., & Al-Saadi, H. A. (2023). Prevalence of Iron-Deficiency Anemia among Women in Central Iraq: A Cross-Sectional Study. Iraqi Journal of Hematology, 12(2), 85-92.

2- Al-Khafaji, R. H., Al-Janabi, M. A., & Al-Dulaimi, M. F. (2024). Bacterial Profile and Antibiotic Susceptibility Patterns in Urinary Tract Infections among Women in Iraq. Baghdad Medical Journal, 66(1), 45-52.

3- World Health Organization. (2021). Anaemia. Retrieved from https://www.who.int/news-room/fact-sheets/detail/anaemia

4- McPherson, R. A., & Pincus, M. R. (2017). Henry's Clinical Diagnosis and Management by Laboratory Methods. 23rd ed., Elsevier.

5- Norfleet, A. L. (2020). Clinical Hematology: Principles, Procedures, Correlations. Wolters Kluwer.

6- Mayo Clinic. (2023). Complete Blood Count (CBC).

7- Fischbach, F. T., & Dunning, M. B. (2021). A Manual of Laboratory and Diagnostic Tests. 10th ed., Wolters Kluwer.

8- Cheesbrough, M. (2009). District Laboratory Practice in Tropical Countries. Part 1, Cambridge University Press.

9- Mayo Clinic. (2023).Urinalysis.

10- https://eastwings-diagnostics.com/ar/product/fully-automated-urine-analyzer-aution-max-ax-4060/.

11- Girod, E. A., & O'Donnell, A. B. (2022). Evaluating test utilization for anemia during pregnancy. PubMed.

12- Mulugeta, A., & Tadesse, M. (2019). Biochemical profiles of pregnant and non-pregnant women attending at the University of Gondar Hospital, Northwest Ethiopia: A comparative cross-sectional study. PubMed Central.

13- Salah, M. M., & Badr, H. H. (2019). Immunological profile and bacterial drug resistance in pregnant women: A cross-sectional study. PubMed Central.
14- Pagana, K. D., & Pagana, T. J. (2021). Mosby's Manual of Diagnostic and Laboratory Tests (6th ed.). Elsevier.
15- McPherson, R. A., & Pincus, M. R. (2017). Henry's Clinical Diagnosis and Management by Laboratory Methods (23rd ed.). Elsevier.
16- Fischbach, F. T., & Dunning, M. B. (2021). Manual of Laboratory and Diagnostic Tests (10th ed.). Wolters Kluwer.
17- Fischbach, F. T., & Dunning, M. B. (2021). Manual of Laboratory and Diagnostic Tests (10th ed.). Wolters Kluwer.
18- Pagana, K. D., & Pagana, T. J. (2021). Mosby's Manual of Diagnostic and Laboratory Tests (6th ed.). Elsevier.
19- Graff, L. (2008). Urinalysis and Body Fluids (5th ed.). Lippincott Williams & Wilkins.
20- Yahaya, I. A., Pindiga, U. H., & Abubakar, M. B. (2014). Urinalysis of patients with suspected urinary tract infection in Maiduguri, Nigeria. Annals of Nigerian Medicine, 8(1), 20–24. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4085832/
21- Alrhumaidi, K. B., et al. (2023). Urinalysis and culture results in adult females at Bani Walid Hospital, Libya. Unpublished undergraduate research. Retrieved from https://www.researchgate.net/publication/289762983.
22- Ephraim, R. K. D., Dwomoh, D., & Bonsu, K. (2019). Predictive accuracy of urinalysis parameters in the diagnosis of urinary tract infections at the University of Cape Coast Hospital, Ghana. Infectious Diseases: Research and Treatment, 12, 1–7. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6527828/
23- Barros, M. D., Silva, R. A., & Johnson, C. A. (2024). Accuracy of urinalysis parameters for predicting positive urine culture results in the emergency department. International Journal of Emergency Medicine, 17(1), 6. https://intjem.biomedcentral.com/articles/10.1186/s12245-024-00656-8
24- Batool, A., Khan, R., & Zia, N. (2013). Significance of pyuria in diagnosing urinary tract infections. Journal of the Pakistan Medical Association, 63(9), 1110–1113. https://www.jpma.org.pk/article-details/4339
25- Mayo Clinic. (2024). Hematocrit test. Retrieved from https://www.mayoclinic.org/tests-procedures/hematocrit/about/pac-20384728
26- Cleveland Clinic. (2023). Hematocrit (Hct) Blood Test. Retrieved from https://my.clevelandclinic.org/health/diagnostics/17683-hematocrit
27- University of Iowa Health Care. (2023). Pathology Handbook – Hematocrit. Retrieved from https://www.healthcare.uiowa.edu/path_handbook/rhandbook/test955.html
28- MedlinePlus. (2023). Hematocrit test. Retrieved from https://medlineplus.gov/ency/article/003646.htm
29- American Red Cross. (2023). Understanding your Hematocrit. Retrieved from https://www.redcrossblood.org/donate-blood/dlp/hematocrit.html
30- World Health Organization. (2012). Daily iron and folic acid supplementation in pregnant women. Retrieved from https://www.who.int/publications/i/item/9789241501996
31- Centers for Disease Control and Prevention (CDC). (2021). Iron and pregnancy. Retrieved from https://www.cdc.gov/nutrition/infantandtoddlernutrition/pregnancy/iron.html
32- Cunningham, F. G., et al. (2018). Williams Obstetrics (25th ed.). McGraw-Hill Education.
33- McPherson, R. A., & Pincus, M. R. (2023). Henry's Clinical Diagnosis and Management by Laboratory Methods (24th ed.). Elsevier.

ISSN: 2312-8135 | Print ISSN: 1992-0652
info@journalofbabylon.com | jub@itnet.uobabylon.edu.iq | www.journalofbabylon.com

34- Rifai, N., Horvath, A. R., & Wittwer, C. T. (2018). Tietz Textbook of Clinical Chemistry and Molecular Diagnostics (6th ed.). Elsevier.
35- World Health Organization (WHO). (2017). Nutritional anaemias: tools for effective prevention and control. Geneva: World Health Organization. [Available online: https://www.who.int/publications/i/item/9789241513067]
36- Hoffbrand, A. V., & Moss, P. A. H. (2016). Essential Haematology (7th ed.). Wiley-Blackwell.
37- Bain, B. J., Bates, I., & Laffan, M. A. (2017). Dacie and Lewis Practical Haematology (12th ed.). Elsevier.
38- World Health Organization (WHO). (2012). Guideline: Daily iron and folic acid supplementation in pregnant women. Geneva: WHO.
39-Update on Measuring Ketones. Journal of Clinical Medicine.2024.
40- Hyperemesis Gravidarum. Stat Pearls.2023.
41- Offspring of women with hyperemesis gravidarum are more likely to develop cardiovascular disease .BMC Pregnancy and Childbirth .2024.
42- Continuous Ketone monitoring: Exciting implications for clinical practice. Diabetes, Obesity and Metabolism .2024
43- Controversies Around the Measurement of blood Ketones to Diagnose and Monitor Diabetic Ketones to Diagnose and Monitor Diabetic Ketoacidosis . Diabetes Care .2022.
44-Guda-Tek. (n.d.). CBC Hematology Analyzer DIMA-2. Retrieved July 30, 2025, from https://guda-tek.com/product/

ISSN: 2312-8135 | Print ISSN: 1992-0652
info@journalofbabylon.com | jub@itnet.uobabylon.edu.iq | www.journalofbabylon.com