وزارة الصحة
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Evaluation of Current Screening Test for Asymptomatic Bacteriuria during Pregnancy at First Antenatal Visit in Rimal Health Center UNRWA, Gaza 2007

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MPH Thesis

Jerusalem Palestine

2007م / 1428هـ

Evaluation of Current Screening Test for Asymptomatic Bacteriuria during Pregnancy at First Antenatal Visit in Rimal Health Center UNRWA, Gaza 2007

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A thesis Submitted in Partial fulfillment of requirements for the Degree of Master of Public Health
Al- Quds University

1428هـ / 2007م

Deanship of Graduate Studies
School of public Health
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Thesis Approval

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Jerusalem -Palestine

1428/م2007هـ

Dedication

For the souls of my beloved parents

And

For my husband for his constant encouragement,
unwavering support and tremendous patience

And
For my children,

I dedicated this work

Rasmiya Ghsoub

Declaration

I certify that all this thesis submitted for the degree of Master is the result of my own research, except where otherwise acknowledged, and that this thesis (or any part of the same) has not been submitted for a higher degree to any other university or institution.

Signed

Rasmiya Khamis Ghsoub

Date: November-2007

Acknowledgement

It is my great pleasure to express my sincere gratitude to my respected teacher, Dr. Yehia Abed Associated Professor, Al Quds University, my academic supervisor for his guidance, supervision, concern and encouragement in carrying out this research work. He has been a constant source of inspiration in all stages of this work. I am highly indebted to him for his valuable advice, kind concern and continuous guidance through out.

I am highly grateful to all staff and personnel in School of Public Health for their guidance and help.

My special thanks go to Dr Ayoub EL Alem, the Chief Field Health program, UNRWA for allowing me to carry out this work in Rimal Health Center.

I am grateful to Dr. Amna El Shurbasi, Deputy Chief Field Health Programme, UNRWA for her facilitations and support which is highly appreciated.

I would also like to thank Dr Mordi Abu Sido, the Senior Medical Officer OF Rimal Health Center, UNRWA for his facilitations and support.

I am also thankful to Mr. Omar El Emwasy, the Field Laboratory Services Officer for his support and facilitations.

I don't forge to thank senior laboratory technicians and all other staff of Rimal Health Center Laboratory's staff for their co-operation.

Thanks are undoubtedly due to Mr. Ahmad Awad, the Laboratory technician for his help by doing the urine tests of this study.

Most of all, I would like to thank all the pregnant women for their willingness to participated in this study.

Abstract

Urinary tract infection is a common problem during pregnancy and if it is not diagnosed and treated properly, bad sequels could occur affecting the mothers and their outcome of pregnancy.

The main objective of this study is to determine the prevalence of urinary tract infection (UTI) and asymptomatic bacteriuria (ASB) during pregnancy, as well as to evaluate the validity of current screening test (nitrite dipstick) at first antenatal visit.

This is a cross sectional study conducted among pregnant women in Rimal Health Center which is a Primary Health Care Center; UNRWA in Gaza City. The total study population was 160 pregnant women attending antenatal care at first antenatal visit from 12th April 2007 to 25th July 2007.

Midstream urine was collected and tested with culture, dipstick and microscopic examinations. Validity of tests was measured by sensitivity, specificity, positive predictive value and negative predictive value. Antibiotic sensitivity was also done.
Thirty one out of 160women were identified positive urine culture with prevalence of 19.4%, 18/160 was asymptomatic (11.25%) while 13/160 was symptomatic (8.15%). Among the 31 culture positive, the commonest organism was staphylococcus aureus (29%), followed by E-coli (25.80%) and klebsiella (22.58%). Ciprofloxcine was shown as the 1st sensitive drug in all cultures (93.54%) followed by cefuroxim (83.87%) and co-amoxiclave and norfloxacine were equal (70.96%) while amoxicillin, co-trimoxazol and erythromycine had the lowest sensitivity. Maximum resistance was seen to co-trimoxazol (67.74%) followed by doxycycline (29.03%). Symptoms of UTI, weeks of gestation and the previous history of premature deliveries were statistically significant risk factors for the occurrence of ASB. Age, gravidity, parity, educational level, previous CS, history of urinary catheterization and previous history of UTI were not significant risk factors for this disease. Nitrite dipstick had low sensitivity (29%), high specificity (97.7%), with positive predictive value of 75% (PPV) and negative predictive value of 85% (NPV).

Asymptomatic bacteriuria in pregnancy is a major public health problem and nitrite dipstick reagent is not sufficiently sensitive to be of use in screening of asymptomatic bacteriuria in pregnancy and many of patients would be missed for management. So, the researcher recommends the use of urine culture for screening of all pregnant women at first antenatal visit.

ملخص الدراسة

تمثل عدوى المسالك البولية مشكلة شائعة بين الحوامل، واذا لم يتم اكتشافها ومعالجتها بطريقة صحيحة فإنها قد تؤدي الى عواقب سيئة للامهات وناتج حمولاتهن. ويهدف الباحث من هذه الدراسة التعرف على معدل وقوع عدوى المجاري البولية ومعدل وقوع البيلة الجرثومية الغير مصحوبة بأعراض اثناء الحمل، كما وتهدف الدراسة الى تقييم اختبار غمسية النيتريت المستخدم للكشف عنها لدى الحوامل عند أول زيارة لهن لمتابعة الحمل في مركز الرمال الصحي التابع لوكالة الغوث الدولية الواقع في مدينة غزة .

لذا فقد قام الباحث بجمع عينات من منتصف مجري البول من 160 من الحوامل في الفترة ما بين 12 ابريل 2007 و 25 يوليو 2007 وتم فحص العينات بواسطة غمسية البول والفحص الميكروسكوبي مع عمل مزرعة واختبار حساسية للجرثوم المستفرد والمسبب لهذا المرض. بعدها قام الباحث بقياس فعالية الاختبارات المستعملة وذلك باعتبار الحساسية والنوعية والقيمة التنبؤية الايجابية والقيمة التنبؤية السلبية .

وقد أظهرت النتائج أن 31 من أصل 160 من السيدات اللاتي تم اختيارهن للاشتراك في هذا البحث كن مصابات بعدوى المجاري البوليةبواقع 19.4%. وكان معدل انتشارالمرض11.25% بين اللاتي كن يعانين من البيلة الجرثومية الغير مصحوبة باعراض و 8.15%بين اللاتي كن يعانين من البليةالجرثومية المصحوبة بأعراض. وقد تم استفراد المكورات العنقودية في 9 حالات (29%) والاشريكيات القولونية في 8 حالات (25.8%) كما واظهر اختبار الحساسية للمضادات الحيوية على عينات المزارع الإيجابية حساسية مرتفعة لكل من السيبروكسين (93.5%) والسيفيوروكزيم (83.87%) وكوأموكسيكلاف (70.96%) . أما المقاومة العليا للمضادات الحيوية فكانت مع الكوتريموكسازول (67.7%) يليها الدوكسيكلين بنسبة 29%. وكان لعدد أسابيع الحمل وحدوث ولادات مبكرة من قبل دلالة إحصائية ذات معنى لحدوث المرض. أما العمر و عدد الحمولات و الولادات السابقة ومستوى التعلم و مستوى الدخل وحدوث عدوى سابقة لمجرى البول فلم يكن لهم دلالة إحصائية كعامل خطرلعدوى المجاري البولية

وكانت لاختبار غمسية النيتريت النوعية العليا 97.7% %, اما الحساسية فكانت منخفضة 29 % كذلك القيمة التنبؤية الايجابية 75% أما القيمة التنبؤية السلبية فكانت 85 %.

إن عدوى المسالك البولية مشكلة شائعة للصحة العامة بين مجموعة هامة من من أفراد المجتمع ألا وهي السيدات الحوامل، وإن اختبار غمسية النيتريت ليس له حساسية كافية ليستخدم في الكشف عن البيلة الجرثوميه الغير مصحوبة بأعراض أثناء الحمل , فعدد كبير من الحوامل سوف يفقد ولا يتم معالجته، لذا فإن الباحث يوصي باستخدام مزرعة البول لغربلة الحوامل عند الزيارة الاولى لرعاية الحمل .

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Definition of terms

Asymptomatic bacteriuria in pregnancy

Asymptomatic bacteriuria (ASB) is defined as the presence of significant bacteriuria without obvious symptoms of UTI. Significant bacteriuria represents 100 000 or more bacteria per milliliter of urine provided that one uropathogen bacteria is isolated from the middle stream of morning urine after cleaning vulva (Gilstrap and Ramin, 2001).

Gold standard test or criterion standard test:

In medicine, it is a diagnostic test or benchmark that is regarded as definitive. This can refer to diagnosing a disease process, or the criteria by which scientific evidence is evaluated (Wikipedia, 2007)

Validity:

Validity refers to the issue of whether the test measures what it is intending to measure. The validity of a test is constrained by its reliability. If a test does not consistently measure a construct or domain then it cannot expect to have high validity coefficients. (http://web.uccs.edu/lbecker/Psy590/relval_II.htm).

Sensitivity (tests):

Sensitivity, or recall rate, is a statistical measure of how well a binary classification test correctly identifies a condition. The results of the screening test are compared to some absolute (Gold standard); for example, for a medical test to determine if a person has a certain disease, the sensitivity to the disease is the probability that if the person has the disease, the test will be positive. The sensitivity is the proportion of true positives of all diseased cases in the population. It is a parameter of the test.

High sensitivity is required when early diagnosis and treatment is beneficial, and when the disease is infectious (Wikipedia, 2007).

Specificity (tests):

The specificity is a statistical measure of how well a binary classification test correctly identifies the negative cases, or those cases that do not meet the condition under study. For example, given a medical test that determines if a person has a certain disease, the specificity of the test to the disease is the probability that the test indicates `negative' if the person does not have the disease. That is, the specificity is the proportion of true negatives of all negative cases in the population. It is a parameter of the test High specificity is important when the treatment or diagnosis is harmful to the patient mentally and/or physically (Wikipedia, 2007).

Positive predictive value:

The positive predictive value, or precision rate, or post-test probability of disease, is the proportion of patients with positive test results who are correctly diagnosed. Unless the results of the test are totally random (that is, not related to whether the person has the condition). It is the most important measure for ruling in disease as it reflects the probability that a positive test reflects the underlying condition being tested for (Wikipedia, 2007).

Negative predictive value:

The negative predictive value is the proportion of patients with negative test results who are correctly diagnosed (Wikipedia, 2007)

Abbreviations:

AN	Antenatal
ANC	Antenatal Care
ARDS	Acute Respiratory Distress Syndrome
ASB	Asymptomatic Bacteriuria
CFU	Colony Forming Unit
DM	Diabetes Mellitus
Epi-info 6	Epidemiological Information Version 6
HPF	High Power Field
GDM	Gestational Diabetes Mellitus
IMR	Infant Mortality Rate
IUGR	Intrauterine Growth Retardation
LBW	Low Birth Weight
LE	Leukocyte Esterase
MCH	Mother Child Health
MHR	Maternal Health Record
MMR	Maternal Mortality Rate
MOH	Ministry Of Health
NGOs	Nongovernmental Organizations
NPV	Negative Predictive Value
PCBC	Palestinian Center Bureau Of Statistics
PPV	Positive Predictive Value
RBCs	Red Blood Corpuscles
RHC	Rimal Health Center
SD	Standard Deviation
SPSS	Statistical Package Of Social Science
UNRWA	United Nation Relief And Work Agency
UTI	Urinary Tract Infection
WBCs	White Blood Corpuscles

Chapter 1

Introduction

1.1 Background

Pregnant women are at risk for developing urinary tract infection (UTI) due to hormonal and mechanical changes that put even a woman who is not pregnant at risk for urinary stasis and ureterovesical reflux. These changes and difficulty with hygiene because of a distended pregnant belly make urinary tract infections to become a common occurrence in pregnancy (Woodman et al, 2005). UTI in pregnancy may manifest as symptomatic and asymptomatic bacteriuria (ASB), beginning in week 6 and beaking during week 22-24, (Delzell and Lefevre, 2000).

Although pregnancy doesn't increase the rate of asymptomatic bacteriuria, it increases the risk to progressive UTI infection (Simon, 2007). About 2% - 11% of pregnant women have ASB; later on 13% to 27% will develop kidney infection (Simon, 2007).

Bacteriuria associated with pregnancy has a double burden effect on women and on pregnancy outcome in form of pyelonephritis, premature labour and low birth weight (Sheikh et al, 2000), cystitis, septic shock, respiratory failure and death are also reported (Woodman et al, 2005), therefore, all pregnant women should be screened for bacteriuria at first antenatal visit by using a valid test, (Delzell and Lefevre, 2000). If asymptomatic bacteriuria left untreated pyelonephritis well develop in 40% of cases, pyelonephritis in pregnant women leads to septicemia in 10-20%of cases and acute respiratory distress syndrome (ARDS) in 2% of cases (Michigan, 2005). Parkland Hospital in Dallas,USA reports showed a reduction in cases of acute pyelonephritis from 4% to 1-2% after implementing of screening and treatment program for ASB in pregnancy (Woodman et al, 2005).

Most of researches and guidelines recommended screening pregnant women for ASB at first antenatal visit using a urine culture as appropriate screening tool (Tincello and Richmond 1998, Michigan 2005, The Infectious Diseases Society of America (IDSA) 2005 and Molina 2000). UNRWA strategy is the use of nitrite dipstick in screening of all pregnant women for asymptomatic bacteriuria at first antenatal visit and when the result was positive a microscopic urine analysis will be questioned (UNRWA, 2003).

1.2 Research problem

Asymptomatic bacteriuria is a common problem during pregnancy; if it is not detected early and treated properly it may lead to maternal and fetal complications, so UNRWA Strategy is to screen all pregnant women for asymptomatic bacteriuria at first antenatal visit by using the nitrite dipstick. In order to achieve a proper screening the screening test must be valid and highly sensitive in detection of cases. No studies had been conducted before in Palestine for evaluation of the nitrite dipstick test in detection of ASB among pregnant women, therefore, the researcher wanted to conduct this study.

1.3 Justification of the study

UTI is relatively common in pregnancy due to many physiological changes. Untreated UTI will lead to maternal and fetal complications, Up to 50% of pregnant women developed pyelonephritis, 30% cystitis, other complications in form of hypertensive disorders of pregnancy (such as pregnancy induced hypertension and pre eclampsia), anemia, amnionitis, (Delzell and Lefevre, 2000). Fetal complications might be developed in form of prematurity, intra uterine growth retardation (IUGR) and low birth weight (Woodman et al, 2005).

Most of studies concluded that nitrite dipstick is not sensitive enough to be used as a screening test for asymptomatic bacteriuria in pregnancy. Current protocol require screening of all pregnant at their first antenatal visit for the presence of ASB using the nitrite dipstick by the midwives and sending the samples with positive results only for microscopic examination (UNRWA, 2003). Urine dipstick currently used in UNRWA health centers is only specific for the detection of glucosuria and proteinuria and not contain nitrite reagent. In Palestine the prevalence of UTI and ASB in pregnancy is not known because no studies had been conducted. Being the researcher works as MCH medical officer, she wanted to study the prevalence of UTI and associated risk factors in Palestine as well as to evaluate the nitrite dipstick test that is used for screening of ASB bacteriuria during pregnancy at first AN visit according to UNRWA strategy (UNRWA, 2003), and to make conclusion for policy makers.

1.4 Objectives of the study

1.4.1 General objective:

The main objective of this study is to determine the prevalence of ASB and UTI during pregnancy, as well as evaluation of the validity of current screening test (nitrite dipstick) at first antenatal visit at Rimal Health Center, UNRWA, Gaza.

1.4.2 Specific objectives:

1- To estimate the prevalence of UTI in pregnancy at first antenatal visit.

2- To estimate the prevalence of asymptomatic bacteriuria (ASB) in pregnancy at first antenatal visit.

3- To evaluate the validity of nitrite dipstick test for screening of symptomatic and ASB during pregnancy at first antenatal visit a RHC.

4- To identify risk factors that can be associated with UTI in pregnancy.

5- To conclude recommendations for policymakers.

1.5 Demographic context

Palestine constitutes the southwestern part of geographical unity in the eastern part of the Arab world, Palestinian occupied territories comprises two areas separated geographically, the West Bank and Gaza Strip. The total area is 6,020 sq. Km. with total population living in was 3,762,005 individuals at the end of year 2005, distributed in West Bank, 2,367,550 and 1,370,345 in Gaza, (MOH, 2005).

Gaza Strip is a narrow piece of land lying on the coast of the Mediterranean Sea. It has a position on the crossroads from Africa to Asia. It is very crowded place with area 365 Sq Km with population density is 3,808 inhabitants/sq km, People are mainly concentrated in the cities, small village, and eight refugee camps that contain two thirds of the population of Gaza Strip about 69% (MOH, 2005).

1.6 Health care system in Palestine

Ministry of Health (MOH) is the main provider of health care in Palestine in addition to United Nation Relief and Work Agency (UNRWA), None Governmental Organization (NGOs) and private sector. MOH provides primary, secondary and tertiary health care services. Women at reproductive age were 22.3% of population. Maternal mortality ratio (MMR) was 15.4 /100,000 and infant mortality rate (IMR) was 21.3/1000 at the end of the year 2005 (MOH, 2005).

1.7 Antenatal care services

Antenatal care is an essential part of modern health care; such care is every woman's right. 96.5% of pregnant women attended antenatal care out of total live births. Antenatal care

services are provided by four main sectors, the MOH, UNRWA, NGOs, and the private sector (MOH, 2005).

1.8 UNRWA Health Program

UNRWA plays an important role in providing health care services to all Palestinian refugees in five fields of UNRWA operations Gaza, West Bank, Jordan, Syria and Lebanon. **I**t provides health protection promotion, medical care services, environmental health, and school health. By the end of 2006, the total number of Palestine refugees registered in the agency's area of operation according to UNRWA registration statistics was 4,448,429, which represents an overall increase of 2.3 per cent over 2005 registered population, Agency-wide (UNRWA, 2006). The registered population was distributed as follows: Jordan 1,848,362, Lebanon 408,438, Syria 442,363, Gaza Strip 1,016,964, and the West Bank 722,302. Women in reproductive age (15-49) were 25%. It has fifteen Primary Health Care Centers (PHC) and three sub centers in Gaza Strip. Number of newly pregnant women registered for antenatal care by the end of 2006 was 35,800. The expected number of pregnant women was 36,102 with antenatal coverage of 99.2%, number of deliveries was 32,193 with 94% and that of abortions was 2011 with 5.9%, maternal mortality ratio was 16.2/100,000 agency wide and 50% of cases was in Gaza Field (UNRWA, 2006).

1.9 Rimal Health Center

Rimal health center (the study setting) is A primary heath care (PHC) center and one of four major UNRWA health centers in Gaza Strip, it provides services to about 140.000 person distributed in: Rimal, El Shiekh Radwan, Elkarama , Ebad Elrahman , El Saftawy, Eltwam, Elshiekh Ijleen , Tal Elhawa and El Zahra City.

Reproductive health care services are the main activities provided by the health center it includes Antenatal (AN), postnatal (PN) and family planning (FP) services.

At the end of the year 2006, the number of total deliveries that registered in the mother and child health care (MCH) of RHC, UNRWA was 4738 and the newly registered pregnant women was5148. Approximately 60-120 women per week attend for their first booking antenatal clinic (UNRWA, 2006).

UNRWA strategy regarding antenatal car (ANC) is screening of all newly registered pregnant women for asymptomatic bacteriuria (ASB) at first AN visit by using a nitrite dipstick, aiming early detection and proper management of infected pregnant women so as to reduce maternal and fetal complications that can occur during pregnancy (UNRWA, 2003).

Chapter 2

Literature review

2.1 Urinary tract infections

Urinary tract infections (UTI) are the most common bacterial infections during pregnancy. They are associated with risk to the fetus and the mother. Several physiologic changes occur during pregnancy that cause otherwise healthy women to be more susceptible to serious complication from the urinary tract infections. UTIs can be symptomatic or asymptomatic. Asymptomatic bacteriuria, as the name implies, is UTI without specific symptoms (Kennedy, 2007).

2.2 Epidemiology:

Urinary tract infections are the most common medical complaint after the flu and common cold, among women in their reproductive age. Every year, about one in nine American women have at least one UTI, and up to 60% of all women will develop a urinary tract infection at some time in their lives. One third of these women will have a recurrence within a year. Each year about 250,000 women develop kidney infections (pyelonephritis) and 100,000 are hospitalized for treatment (Simon, 2002).

Prevalence of UTI in pregnancy ranges from 2.3% to 30%, In the USA the prevalence of ASB in pregnant women is 2.5-11% (Woodman et al, 2000), in Pakistan 28.8% (Sheikh et al, 2000), while in India it was 8.4% (Lavanya and Jogalaksshmi, 2002), 4.3% in Philippine (Sescon et al, 2003), 4.8% in Elsharja, in Australia 15.7% (Bookallil et al, 2005) and 30% in Yemen (Al Haddad, 2005).

2.3 Risk Factors

The literature review show that the risk factors of UTI in pregnancy were age, parity, gestational age, socioeconomic status and past urological problems (Isabel et al, 2003). Sheikh et al in Pakistan showed socio economic status, educational level and pregnancy duration had no significant association with UTI occurrence, but history of past urological problems was associated with an increased incidence of UTI in pregnancy (Sheikh et al, 2000). Pregnant women with these factors are at risk of developing UTI; low family income, having many children, who had many children, cesarean section with catheterization of the bladder, diabetes, sickle cell trait, history of childhood UTI and previous UTI during pregnancy Approximately 25% to 33% of women who experience bacteriuria during pregnancy will have another urinary tract infection, sometimes as long as 10 to 14 years later (Simon, 2002).

2.3.1 Age:

The prevalence of ASB increases with age and low socioeconomic status (woodman, 2005) while another study revealed that a higher incidence of ASB is recorded with lower age group (Lavanya and Jogalahshmi, 2002**).**

2.3.2 Education level:

A study among Pakistani pregnant women revealed that educational level had no significant association with UTI in pregnancy (Sheikh et al, 2000). Also Sherazi et al found that there is no correlation between level of education and the occurrence of asymptomatic bacteriuria (Sherazi et al, 2006).

2.3.3 Socioeconomic status:

Sheikh et al found that socio economic status had no significant associated with occurrence UTI in pregnancy among Pakistani women (Sheikh et al, 2000) while other researcher stated that the prevalence of UTI increased as socio economic status decreased (woodman 2005, Lavanya and Jogalasshmi 2002).

2.3.4 Gravidity:

The prevalence of urinary tract infection significantly increases with the number of previous pregnancies. That indicates that the urogenital tract becomes more susceptible after each delivery (Ahmad et al, 2003)

2.3.5 Parity:

A study by Sescon showed that percent of culture positive was 66.6% in first para, 7.2% in second para 9.6% and 16.6% were in mutipara, in Philippine the higher incidence in primis (Sescon et al, 2003).

2.3.6 Weeks of gestation:

Studies showed that the risk of acquiring bacteriuria increased with progress duration of pregnancy (Al Haddad, 2005), while another researcher found that the incidence of UTI in relation to weeks of gestation was different and this difference was not significant statistically (Sheikh et al, 2000)

2.3.7 Antibiotics:

Antibiotics often eliminate lactobacilli, the protective bacteria as well as the harmful

bacteria. This causes an overgrowth of E. coli in the vagina and increases the risk for UTI days during the days women were taking antibiotics (Simon, 2002)

2.3.8 Past history of UTI:

Past urological problems was associated with an increased incidence of UTI in pregnancy (Sheikh et al, 2000). Shirazi also found that history of UTI were associated with an increase incidence of ASB (Shirazi, 2006).

2.4 General impact

ASB if untreated lead to many complications (maternal and fetal). The primary complication of bacteriuria in pregnancy is cystitis, although overt pyelonephritis can occur in 25-30% of cases which could permanently damage the kidneys. Septic shock, respiratory failure, and death are reported. Hypoxic fetal events can occur because of maternal complications that lead to hypo perfusion of the placenta as hypotension, septic shock, maternal anemia and maternal hypoxemia (Woodman et al, 2000). Untreated Pyelonephritis in the pregnant woman leads to septicemia in 10-20% of cases and acute respiratory distress syndrome (ARDS) in 2 % (Michigan, 2005). Untreated asymptomatic bacteriuria leads to the development of symptomatic cystitis in approximately 30 percent of patients and in up to 50 percent asymptomatic bacteriuria is also associated with intrauterine growth retardation and low birth weight (Delzell and Lefevre, 2000).

Urinary tract infections are the most expensive of all urologic diseases in USA, a report published in 2007 by the US National Institutes of Health revealed that UTIs are accounting for about $3.5 billion a year in medical costs, including $96.4 million in prescriptions. Over 60% of women will experience a UTI at least once in their life and at least one third of women experience a UTI by the time they are 24 years old (Simon, 2007).

2.5 Urinary Tract Infections in Pregnancy

UTIs are the most common renal disease occurring during pregnancy and range from asymptomatic bacteriuria to pyelonephritis **(**Agraharker, 2006**).** The infections can be symptomatic or asymptomatic where asymptomatic bacteriuria is UTI without specific symptoms (Kennedy, 2007). UTI is defined as the presence of at least 100,000 organisms per milliliter of urine in an asymptomatic patient or as more than 100 organisms per milliliter of urine in a symptomatic patient with accompanying pyuria of >7 WBCs/mL. Particularly with an asymptomatic patient, the culture should yield an organism considered to be an uropathogen (Woodman et al, 2005).

UNRWA standard: UTI is defined as the presence of at least 100,000 organisms per milliliter of urine in an asymptomatic patient or as more than 100 organisms per milliliter of urine in a symptomatic patient with accompanying pyuria of >8WBCs/ml particularly with an asymptomatic patient (UNRWA, 2005).

2.5.1 Asymptomatic bacteriuria in pregnancy:

Asymptomatic bacteriuria (ASB) is defined as the presence of significant bacteriuria without obvious symptoms of UTI (Gilstrap and Ramin, 2001). Significant bacteriuria represents 100 000 or more bacteria per milliliter of urine provided that one uropathogen bacteria is isolated from the middle stream of morning urine after cleaning vulva (Gilstrap and Ramin, 2001).

2.5.2 Symptomatic urinary tract infection:

Urinary tract infection (UTI) is defined as the symptomatic presence of microbial

pathogens within the urinary tract, typically the lower urinary tract (bladder) unless otherwise specified (French, 2006).

2.5.3 Acute cystitis:

It involves only the lower urinary tract; it is an inflammation of the bladder due to bacterial or nonbacterial causes (i.e., radiation, viral). It occurs in approximately 1% of pregnant patients, of whom 60% have a negative result on initial screening. Signs and symptoms include hematuria, dysuria, suprapubic discomfort, frequency, urgency, and nocturia. These symptoms often are difficult to distinguish from those due to pregnancy itself (Woodman et al, 2005).

2.5.4 Pyelonephritis:

It is the most common urinary tract complication of pregnancy, occurring in approximately 2% of all pregnancies. Acute pyelonephritis is the presence of fever, flank pain, and tenderness in addition to significant bacteriuria. Other symptoms may include nausea, vomiting, frequency, urgency, and dysuria (Woodman et al, 2005).

2.6 Pathophysiology of UTI in pregnancy

Physiologic changes occurring in pregnancy involve nearly every organ system, with no exception of the kidneys (Agraharkar, 2006). The physiologic changes of pregnancy predispose patients to bacteriuria. These physiological changes include urinary retention from the weight of the enlarging uterus and urinary stasis due to ureteral smooth muscle relaxation which is caused by increases in progesterone. Although progesterone influence causes a relative dilation of the ureters, ureteral tone progressively increases above the pelvic brim during pregnancy. However, controversy exists as to whether bladder pressure increases or decreases during pregnancy. In addition, glucosuria and aminoaciduria during pregnancy provide an excellent culture medium for bacteria in areas of urine stasis.

(Woodman, 2005). Infection originates from ascending harmless microorganisms in the intestines, perineum and vaginal passage, where it invades and colonizes the urinary tract. Some bacteria may be able to invade into deeper tissue in the bladder, where they survive and re infect the patient after resolution of the previous infection (Simon, 2007).

2.7 Symptoms

Patients with UTIs may not have overt urinary tract symptoms as in ASB. Symptoms can be divided into lower urinary tract symptoms and upper urinary tract symptoms. Lower urinary tract symptoms include dysuria, frequency; urgency and suprapubic pain. Upper urinary tract symptoms include fever, chills, flank pain, nausea, and vomiting and patients may also have lower UTI symptoms (Woodman, 2005).

2.8 Microbiology

Escherichia coli is the most common cause of UTI, accounting for 80-90% of cases. It originates from fecal flora that colonizes the periurethral area (ascending infection). Klebsiella, Enterobacter and Proteus species cause most of the remaining cases. Gram positive organisms, particularly Enterococcus faecalis and group B Streptococcus), are also clinically important pathogens. Infection with Staphylococcus saprophyticus, community-acquired organism, can present with upper urinary tract disease, and the infection is more likely to be persistent or recurrent (Woodman, 2005).

2.9 Complications

Primary complication of bacteriuria in pregnancy is cystitis, although overt pyelonephritis can occur in 25-30% of cases. Septic shock, respiratory failure, and death are reported. Hypoxic fetal events can occur because of maternal complications that lead to hypo

perfusion of the placenta as hypotension due to dehydration or septic shock, maternal anemia, maternal hypoxemia) (Woodman, 2005**).** Complications of untreated bacteriurea during pregnancy have been showed to be associated with low birth weight (LBW) and preterm delivery (devil et al, 2004). Incidence of prematurity was 75% and that of LBW was 50% in untreated patients complication associated with UTI during pregnancy not only resulted in increased morbidity of mother, but also have effect on fetus, bacteriuria in preterm and term groups were 36% and 12% (Lavanya and Jogalaksshmi, 2002).

2.10 Diagnosis

2.10.1 Physical:

History and examination can predict UTI but can not rule out UTI in patients with one or more symptoms. Symptoms are poor markers of UTI during pregnancy therefore, AN care should include direct question and urine examination, if it is not economically possible, at least women who had a past history of UTI should be examined (Sheikh et al, 2000)

2.10.2 Lab Studies:

Laboratory tests are in form urine culture and complete urinalysis that includes physical, chemical, and microscopic examinations. Physical and chemical examinations are done by using of a urine dipstick. Midstream clean collection is acceptable in most situations, but the specimen should be examined within two hours of collection (UNRWA, 2005).

2.10.3 Clean-Catch Urine Sample in women:

A "clean-catch" urine sample is performed by collecting the sample of urine in midstream. Women or girls need to wash the area between the lips of the vagina with soapy water and rinse well. A small amount of urine should initially fall into the toilet bowl before it is

collected (this clears the urethra of contaminants). Then, in a clean container, catch about 1 to 2 ounces of urine and remove the container from the urine stream (Sidhaye, 2004).

2.10.4 Handling:

specimen should be collected and stored in leak proof, sterile container; most laboratories will reject leaking specimens,specimen should be received and processed by laboratory within 2 hours of collection , if delayed more than 2 hours, refrigeration permitted for up to 24 hours (sub-optimal; unrefrigerated specimens are unsuitable for culture after 2 hours(UNRWA, 2005).

2.10.5 Urine dipstick:

The presence of nitrite in urine is indicated by a specific color change in the relevant panel of strip. A positive test was defined as a strip showing a positive result. Several reports describe the use of urine dip for nitrites and leukocyte esterase in the evaluation of ASB (Young and Soper, 2001). Sensitivities of dipstick range from 50-92%, and specificity is 86-97% when compared to culture in the diagnosis of ASB. In the evaluation of symptomatic patients, it is a useful and inexpensive (Woodman, 2005). Positive results of nitrites and leukocyte esterase are suggestive of a UTI. Bacteria found in the specimen can help with the diagnosis. Results of studies showed that the urine dipstick test alone seems to be useful to exclude the presence of infection sensitivity of both test (Nitrite and Leukocyte) vary between 68-88%, the combination of both tests with at least one positive result is very sensitive, but because of its low specificity the usefulness of the dipstick a lone is doubtful. (Deville et al, 2004). Another study showed that dipstick sensitivy was low with maximum 33%, specificity 99%, predictive value positive (PVP) 69% and predictive value negative (PVN) 95% so, it is not sufficient to be of use in screening of ASB (Tincello and Richmond, 1998). Urine analysis has specificity of 97 to 100% but it

has a sensitivity that ranges from 25-67% when compared to culture in diagnosis of ASB (Woodman et al, 2005).

2.10.6 Microscopic Examination of Urine:

Urinary sediment provides useful information both for prognosis and diagnosis. Urine usually contains microscopic elements such as cells, crystals and casts in suspension form. These elements can be collected by centrifugation and a drop of the deposit is examined microscopically. White Blood Cells number from 0-8/HPF is considered within normal rang and more that 8/HPF indicates bacterial infection in the urinary tract (UNRWA, 2005).

2.10.7 Urine culture

This is the criterion standard for evaluation of UTI in pregnancy adopted in all literature review. A urine culture is usually used for patients whose have recurrent infection or who are not responding to initial treatment regimens. A colony count of 100,000 colony-forming units (CFUs) per milliliter historically has been used to define a positive culture result. Powers cites evidence that indicates that a true positive result on culture may have as low as 100 CFUs per milliliter of bacteria (UNRWA, 2005). Culture results can be used to identify specific organisms and antibiotic sensitivities but the results often are not available at the time of treatment. It has an average cost of approximately $40 in USA (Woodman et al, 2005). In Palestine the average cost is $8 and $2 in UNRWA.

2.10.8 Imaging Studies:

Routine imaging studies are not indicated in the evaluation of pregnancy-related UTI. Renal ultrasound or limited intravenous pyelography (IVP) if the minor risk of radiation is

outweighed by the benefits of a definitive diagnosis—may be helpful in patients with recurrent UTI or symptoms that are suggestive of nephrolithiasis , Urolithiasis and pyelonephritis share many common symptoms as hematuria, flank pain, shaking chills, anorexia (Woodman et al, 2005). Urolithiasis usually is not associated with fever, unless urolithiasis and pyelonephritis coexist. Confusion about the diagnosis of urolithiasis, pyelonephritis, or both is an indication for obtaining imaging studies (Woodman et al, 2005).

2.10.9 Other Tests:

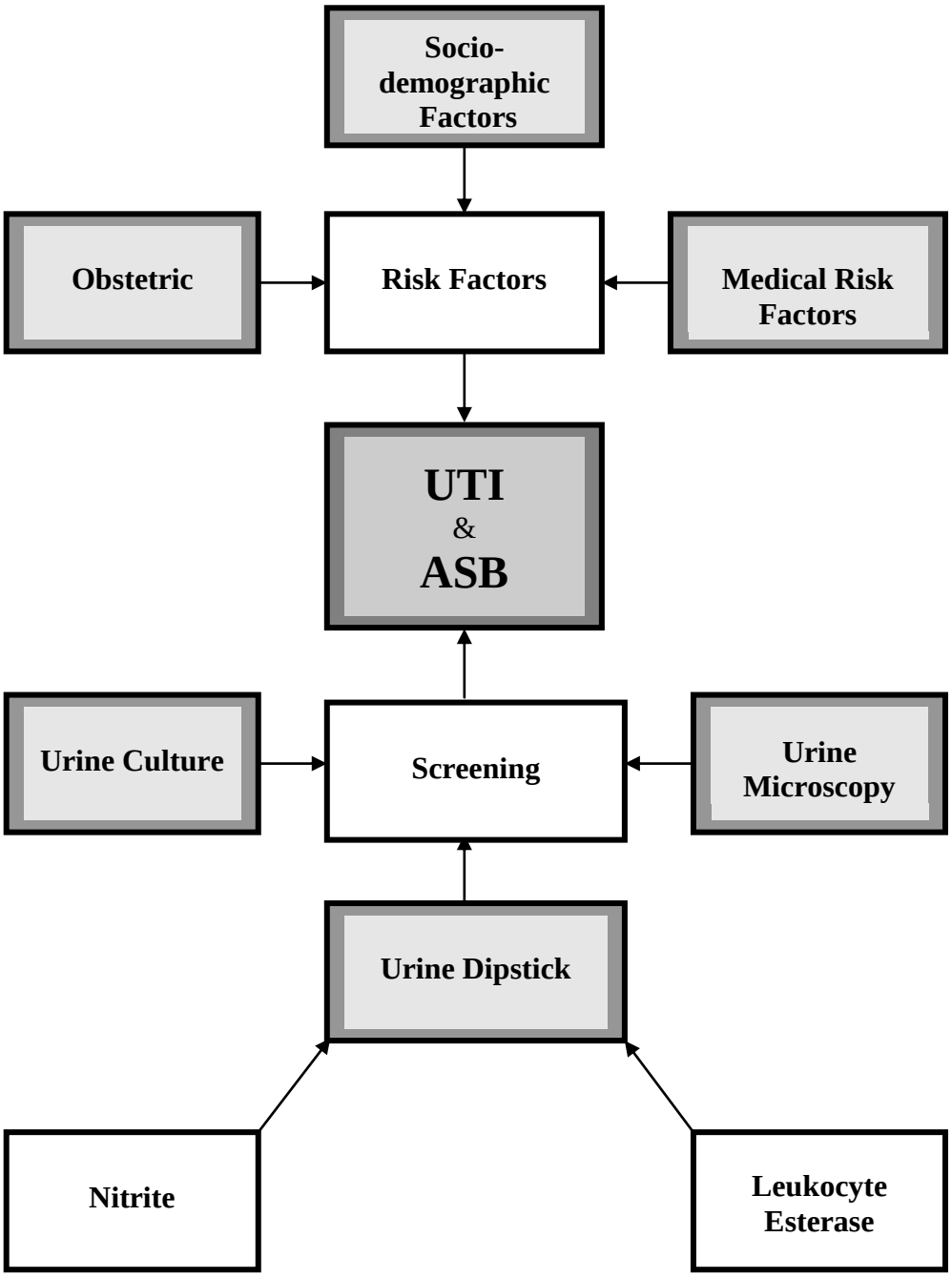
Other tests rarely are indicated in the diagnosis of UTI in pregnancy, urine cytology may be useful in detecting rare upper urinary tract lesions. An antistreptolysin-O (ASO) titer greater than 200 Todd units suggests recent group A streptococcal infection; however, as many as 20% of patients with acute glomerulonephritis have ASO titers within the reference range. The sulfosalicylic acid test measures urine turbidity when a small amount of aspirin is added to the urine specimen. A finding of +2 to +4 is suggestive of bacteriuria. (Woodman et al, 2005).

By reviewing the literatures we can say that UTI is a common infection during pregnancy specially ASB which may lead to maternal and fetal complications. Many risk factors are associated with UTI occurrence and many test are used in screening of the disease among pregnant women, all these factors and tests constitute the conceptual framework as discussed in the next chapter.

Chapter 3

Conceptual Framework of ASB

Risk factors and screening



3.1 Introduction

After reviewing the literature the researcher described the most common factors that could be associated with occurrence of UTI including ASB asymptomatic bacteriuria as well as the screening test which are our concern in this study. These factors are socio-demographic and socioeconomic factors, obstetric factors, and medical factors. The screening tests are nitrite test, leukocyte esterase test, urine microscopy and urine culture which is the gold standard test for all other tests.

3.2 Socio-demographic and socioeconomic factors

Socio demographic and socioeconomic factors that may affect the occurrence of the disease were age, educational level and family income. The prevalence of ASB increases with age and low socioeconomic status (woodman, 2005). The incidence of ASB increased as socioeconomic decreased and higher incidence was among patient with lower age group (Lavanya and Jogalahshmi, 2002). Maternal age has significant association with ASB while educational level was not significantly associated with the disease (Hazher, 2007).

3.3 Obstetric factors

Obstetric history of the participant includes many factors that could predispose to occurrence the disease; these factors factors include gravidity, parity, previous abortions, previous caesarian section, weeks of gestation, history of premature deliveries and history of low birth weight. The prevalence of UTI significantly increases with increasing number of previous pregnancy while it is not significantly related to gestational weeks (Ahmad et al, 2003). It was found that the incidence of

UTI in relation to weeks of gestation was different and this difference was not significant statistically (Sheikh et al, 2000). Parity and previous caesarian section put women at risk for UTI.

3.4 Medical history

Medical history of diseases and health events may affect the occurrence of the disease among pregnant women. These factors like previous diseases (UTI, DM, GDM) and current diseases like vaginal discharge, pelvic inflammatory diseases, anemia and DM. Other things related to health may affect also the disease occurrence e.g. use of contraceptives post coital wash and urinary catheterization.

3.5 Screening tests for ASB

A urinalysis with manual dipstick and manual microscopy is commonly ordered, and if there are any abnormalities found a urine culture will be ordered. At UNRWA Health Centers the nitrite dipstick is the only used in screening pregnant women for ASB.

3.5.1 Dipstick Tests

A urine dipstick tests the specific gravity and pH, as well as the presence of urobilinogen, ketones, glucose, hemoglobin, leukocyte esterase and nitrite. The positive result is based on comparison of color development with the standard strip provided by the manufacturer. It is valued as a quick and inexpensive test that requires little expertise to perform correctly. The most useful for UTI diagnosis are leukocyte esterase and nitrite (Young and Soper, 2001).

3.5.2 Nitrite test

The test depend on the chemical reaction on the stick that when dipped in urine reacts to

nitrites (substances produced by many of the bacteria that cause UTI). A positive test indicates that an infection is present. A negative dipstick test helps to avoid unnecessary antibiotics. These tests are not accurate and studies report that they may miss up to 25% of actual UTI (Simon, 2007).

3.5.3 Leukocyte esterase test

It is an enzyme found in neutrophil granules that reacts with agents on the dipstick to produce a blue color. Positive values vary from trace to many, correlating with a minimum number of WBC/hpf. It is not very specific for a UTI as many other conditions can cause pyuria (Young and Soper, 2001).

3.5.4 Microscopic Examination of Urine

Urinary sediment provides useful information both for prognosis and diagnosis. Urine usually contains microscopic elements such as cells, crystals and casts in suspension form. These elements can be collected by centrifugation and a drop of the deposit is examined microscopically. White Blood Cells more that 8/HPF indicates bacterial urinary tract infection (UNRWA, 2005).

3.5.5 Urine culture

A urine culture is usually done if the dipstick results are positive, but even if the results are negative, a culture may still be helpful. A urine culture uses a urine specimen that is placed on an agar plate, and then incubated in the laboratory for 24 - 48 hours then it is examined for the presence of bacterial growth. If a mix of different species is found, the test is considered contaminated. The presence of at least 100,000 bacteria per milliliter of urine usually means infection in women with symptoms. A count of 100,000 bacteria per milliliter in a woman without symptoms indicates asymptomatic bacteriuria (Simon, 2007).

From the conceptual frame work analysis we can understand how these factors can inter and how can affect the occurrence, early detection timely management, follow up and prognosis the disease among the pregnant women and how the outcome of pregnancy can be affected.

Chapter 4

Methodology:

4.1 Study design

The study design is a cross-sectional which is suitable for measurement of the prevalence of urinary tract infection (UTI) and ASB during pregnancy and identifying related risk factors in addition to evaluation of nitrite dipstick which is used in screening of ASB among pregnant women in first antenatal visit as providing a "snapshot" of the frequency and characteristics of a disease in a population at a particular point in time. This type of data can be used to assess the prevalence of acute or chronic conditions in a population. It examines the exposure and the effect at the point in time (wikipedia, 2007). It has been selected also because of the lesser cost and time consuming.

4.2 Study Population

Population was included in this study were pregnant women attended antenatal care of Rimal Health Center, UNRWA at their first antenatal visit during April, May, June and July 2007 which was the specific period within the work plan.

4.3 Eligibility Criteria

4.3.1 Inclusion criteria:

1. Any pregnant women attended antenatal care at first antenatal visit, at Rimal Health Center.
2. The subject will be eligible for inclusion if the results of negative or positive test are available in the laboratory investigation forms.

4.3.2 Exclusion criteria

1. It was excluded from study all participants who are under treatment with antibiotics or the last dose of antibiotic was less than 3 days prior to specimen collection.
2. Any participant with contaminated urine samples.
3. Any participant with vaginal blood spotting.

4.4 Setting of Study

The setting of the study was antenatal care clinic at Rimal Health Center, UNRWA, which is one of the biggest UNRWA health centers in Gaza Strip, it is a primary health care center located in Gaza City.

4.5 Sample Size

By using Epi info 6(epidemiological information for statistic program, version 6) the study sample was calculated according to prevalence of UTI in pregnancy in the region which is about10% and with 95% confidence interval. The sample was 135 and the researcher increased the sample by adding 25 subjects to become 160 pregnant women to overcome any exclusion or non respondent.

4.6 Sampling process

Sampling was carried out three days per week (every other day). Since the daily registered pregnant women ranges from 10 20with averages of 15 per day and the investigator are going toexamine 5 cases daily. So, every third pregnant woman at the first antenatal visit will be selected

4.7 Ethical considerations

Ethical official approval from the Health Ethical Research Committee in Gaza (Hilsinki Committee) was obtained (annex 5), an approval from Chief Field Health Programme, UNRWA (annex 7) and informed consent in Arabic were attached to the questionnaire (annex 8) and were signed by all participants. It described the purpose of the study, the subject rights, the right of subject to refuse participation, confidentiality and anonymity. All the ethical concepts were taken in consideration all through the study.

4.8 Research Instruments

4.8.1 Questionnaire:

A close ended, direct, clear and brief self structured questionnaire was designed; it was written in English and includes relevant details: socio demographic and socioeconomic data, obstetric history, and medical history and laboratory results. The researcher herself interviewed all participants through face to face interview to overcome the ambiguity of questions and increase the response rate (annex 9).

4.8.2 Laboratory investigations:

The laboratory investigations for each participant in form of urine analysis by dipstick,

microscopic urine analysis, urine culture and antibiotic sensitivity tests, in addition to routine hemoglobin percent test.

4.8.3 Validity of the research instruments:

The researcher depends on two types of validity to test the questionnaire: face validity that appeared in the design of the questionnaire, and the content validity were test by ten

experts specialized in public health, obstetrics, urology, microbiology and clinical pathology. Some modifications were done and some variables were added.

Validity of laboratory tests also was considered by standardization of all tests used, all participants instructed how to collect clean catch midstream urine in a given sterile cup, all urine samples are reached the laboratory and tested within less than two hours and tests were done according to the standard techniques.

4.9 Pilot study

A pilot study was conducted before starting the study by interviewing 10 participants from the same health center to check validity and ambiguity of questionnaire. After piloting some modifications and changes were done in the questionnaire and the pilot subjects were excluded from study sample.

4.10 Data Collection

The researcher explained to the participants all the objectives of the study, the purpose of data collection, and their rights in relation to participation in the study (confidentiality, anonymity, and their right to refuse participation) and all participants signed a consent form. The researcher interviewed all participants face to face by using self structured questionnaire. As soon as the participants provided their consent, they were enrolled in the study. Each one was enquired about the different variables in the questionnaire and the collected data from participants and their maternal health records (MHR) were entered in the questionnaire by the researcher herself. The laboratory results also were entered. After that the researcher instructed each participant verbally to collect a clean catch midstream urine sample into sterile cup at the health center, all samples were labeled then sent with laboratory investigation forms to the laboratory of the health center and were done by the same person except 65 samples were sent to external laboratory for microscopic analysis

because the centrifuge was out of work. Each of the specimens was subjected to culture, urine dipstick then for urine microscopy.

For culture sensitivity, one loop full of inoculums (0.004 ml) using the sterilized calibrated loop, was inoculated on Mac-Conkeys agar and blood agar, and incubated at 37 degree centigrade for 24 hours. The growth of organisms was read in the next day. A urine culture was defined as positive if the culture showed significant bacteriuria of 100,000 colony forming units per ml of urine. A culture in which there was no growth of bacteria was classified as negative. A urine culture was defined as positive if the culture showed significant bacteriuria (10^5 colony forming units/ml of urine, regardless of the presence or absence of leucocytes). A culture was defined as contaminated if there was a mixed culture of any density or if there was a pure culture of less than 10^5 colony forming units/ml. After isolating the organism Antibiotic sensitivity was done by Disc diffusion method the next day. Routinely sensitivity was tested for Gentamicin, Norfloxacin, Amoxycillin, cephalexin, Ciprofloxacin, Cotrimoxazole, cefuroxim, doxycicline and azethromicine and results were reported in the following day.

The specimens were tested by reagent test dipstick for presence of nitrite and leukocyte esterase. The presence of each of these substances is indicated by a specific colour change in the relevant panel. All samples were tested according to the manufacturer's instructions. The test results were compared visually with the colour charts on the reagent strip bottle and were read at the time specified in the instructions between 30 and 60 seconds. A positive test was defined as a strip showing of positive result for nitrite, or any positive result for leukocyte esterase. The results were recorded in the laboratory investigation forms

Microscopic analysis of urine sediment was done examining the sediment of urine which was centrifuged at 1500 rpm for 5 minutes for the presence of WBCs, RBCs, bacteriuria, trichomonas, and casts then the results were interpreted as the number of WBCs and RBCs per high power field (HPF), more than 8 WBCs per high power field was considered positive.

4.11 Statistical Analysis:

The researcher entered all the collected data into the computer and analyzed it by the use of Statistical Package for Social Sciences (SPSS) herself. Data were checked and cleaned by frequency tables and consistency on all variables. Prevalence of UTI and ASB were calculated. And Chi-Square was used to test statistical association between risk factors and UTI in pregnancy. P-value of=< 0.05 was considered statistically significant. The dependant variable was UTI while the independent variables were socio demographic, socioeconomic, and maternal factors. Sensitivity, Specificity, PVP and PVN were calculated and used for evaluating the validity of laboratory test used (Nitrite, leukocyte esterase dipstick and microscopic urine analysis.

4.12 Limitations of the study

Laboratory tests are expensive and times consuming that make the researcher to conduct her study in one health center only and to calculate the sample with 95% confidence interval to be smaller. Electricity and laboratory equipments had also an important role in the limitations of the study.

Chapter 5

Results

This chapter represents the main results of the study including the main characteristics of the study population, prevalence of urinary tract infection (UTI) and asymptomatic bacteriuria (ASB) during pregnancy, risk factors that can be attributed to UTI in pregnancy and the validity of different screening tests used for screening of UTI, culture results, the causative organisms and their sensitivity to different types of antibiotics

5.1 Characteristics of the study population

The study population was 160 pregnant women living in Gaza city and some neighbor areas around (Alzahra, El Saftawy and Eltwam AND El Karama) who were attending Rimal Health Center, UNRWA, at first antenatal visit. The study population shows variations in socio demographic characteristics, socioeconomic status and maternal factors which include obstetric history and medical history.

5.1.1 Socio demographic characteristics and socioeconomic status

This study showed many variations in socio demographic characteristics and socioeconomic status of participants as seen in table (5.1) that summarizes the main characteristics like age distribution, educational level, working status and family income.

Table 5.1: Distribution of the study population by Scio demographic an socioeconomic characteristics

Characteristics		Frequency	Percentage
Age Groups	<25	70	43.8
	25-30	53	33.1
	>30	37	23.1
Educational Level	Low (<7 years)	7	4.4
	Medium (7-12 years)	106	66.2
	High (>12 years)	47	29.4
Work of participant	Working	5	3.1
	Not working	155	96.9
Family income	Below poverty line	129	80.6
	Above poverty line	31	19.4

5.1.1.1 Age of participants:

The mean age of woman participated in the study was 26.5 years with standard deviation (SD) 5.8, years and ranges from 16 to 45 years old. About 44% of participants lie in age group of <25 years old followed by age group of 25-30 years old with percentage of 33% then the age group of >30 years old with 6.9% as shown in figure (5.1) below. This result is consistent with that of other studies of the literature where the mean age was ranging from 25 to 27and the SD 4.2 to 5.8 (Sescon et al, Cakir et al, Khattab et al).

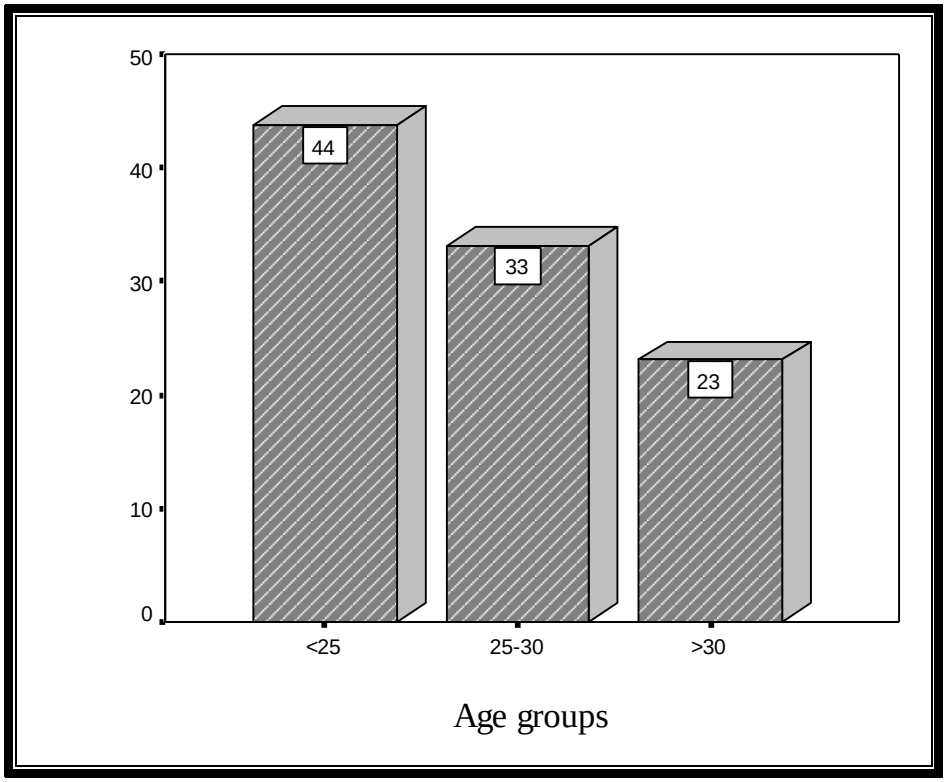


Figure 5.1: Percentage distribution of participants by age groups

5.1.1.2 Educational level of participants:

The researcher categorized and recoded the years of education into three categories. The first one was low level of 6 years and less which represented 4.4%, the second category which is the medium level from 7-12 years which represented the majority of the study population (66.2%) and the third category is high level with more than 12 years of education represented 29.4% as seen in figure (5.2) below.

The mean of years of participant's education was 11.68 years with median of 12 years, standard deviation (SD) 2.82 and range from 5 to 20 years. Similarly, in a study was conducted in Palestine about family planning, the percentage of women those had finished the secondary school was 65.8 and the percentage of those with high educational level (>12 years) was 25.5% (Abu Nahla, 2006). In this study the percentage of highly educated

women was higher (29.4%). In the year 2005, only 3.4% of mothers reached to the level of primary school, 74.8% of them reached to the level of secondary school and 11.5% completed the first university degree(MOH, 2005), this means that there is trend toward high education.

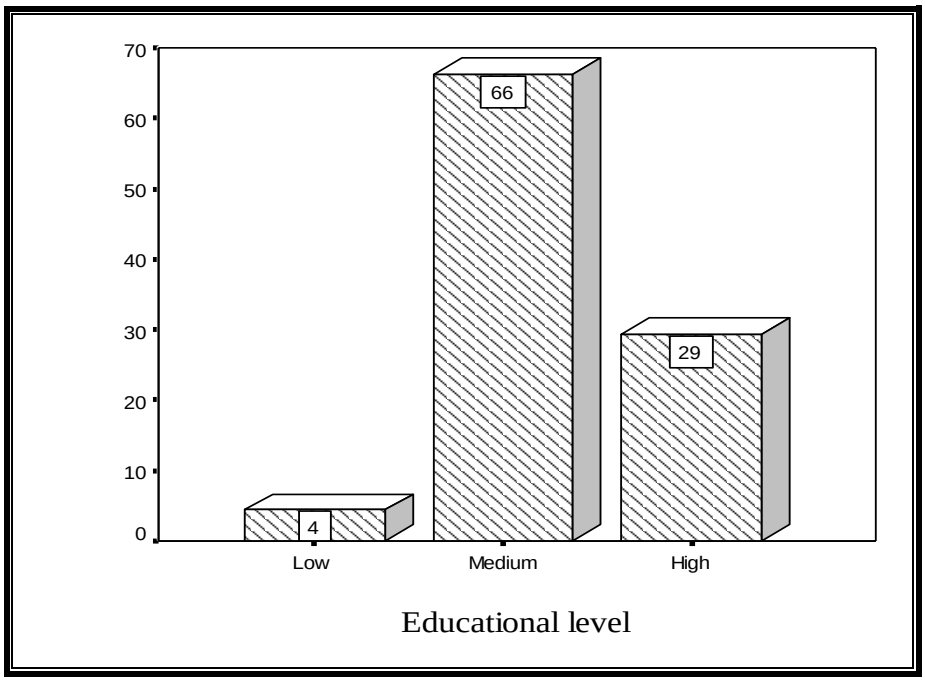


Figure 5.2: percentage distribution of participants by educational level

S.1.1.3 Work of participant:

The majority of participants were not working (96.9%) and only 5 women out of 160 were working (3.1%) as shown in figure (5.3) in spite of their high educational level (29.4%). Similarly the percentage of Palestinian women who were not working in year 2005 was 95.6% (MOH, 2005), this may reflect the low socioeconomic status of study population.

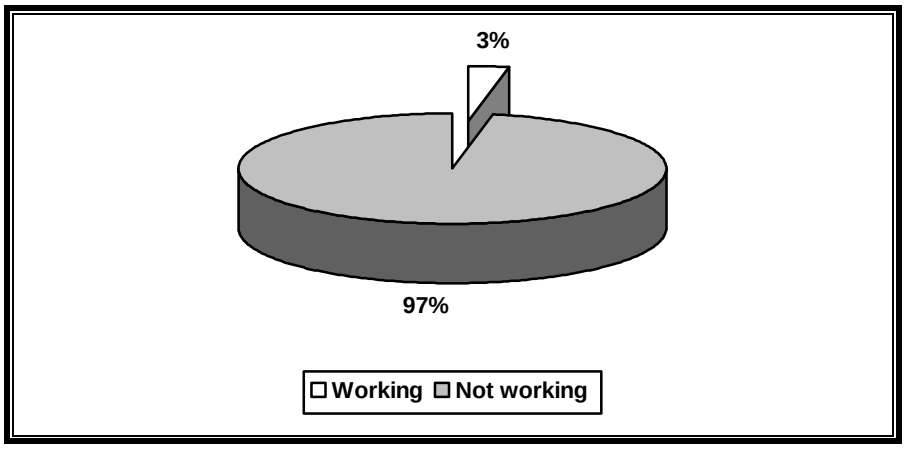


Figure 5.3: Percentage distribution of participants by occupation

5.1.1.4 Family income:

The family income was ranging from zero to 4000 NIS with mean of 962.97, median 900 NIS and 865.9 SD. The researcher recoded family income into two levelss, the first one was below poverty line with family income less than or equal to1, 642 NIS, The second was above poverty line with family income more than 1,642 NIS. This classification was according to PCBS definition of poverty (PCBS, 2005). Most families were below poverty line with 80.6% and only 19.4% of them were above the poverty line as seen in figure (5.4) below. This reflects the bad economical situation of people. This result was similar to that of Abu Nahla where 79% of families were below poverty line.(Abu Nahla, 2006).

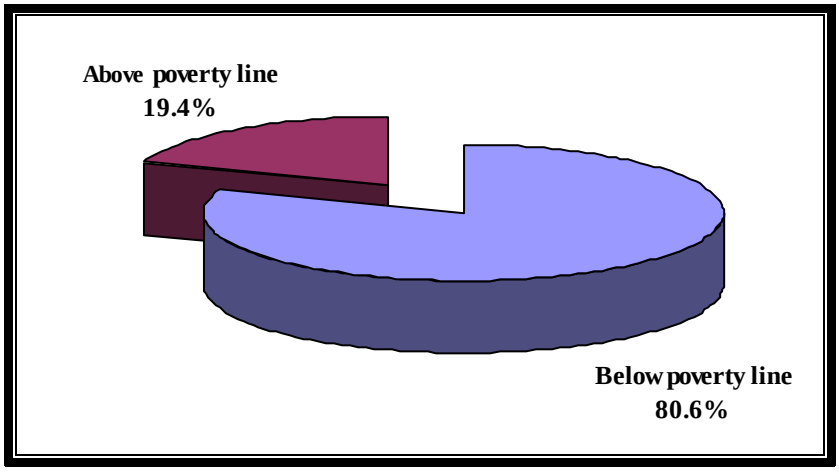


Figure 5.4: Percentage distribution of participants by family income

5.1.2 Maternal factors

Maternal factors included obstetric history and medical history that may attribute to urinary tract infection among study population.

5.1.2.1Obstetric history

Regarding obstetric history, there were variations among the study population which include gravidity, parity, previous abortions and previous caesarian sections, previous history of premature labour and history of LBW as demonstrated in table (5.2) below.

Table 5.2: Distribution of the study population by different maternal factors

Characteristics		**Frequency**	**Percentage**
Gravidity	**0-2**	57	35.6
	3-5	63	39.4
	>5	40	25.0
Parity	**0-2**	92	57.5
	3-5	56	35.0
	>5	12	7.5
Abortions	**No**	105	65.6
	Yes	55	34.4
Weeks of gestation	**1st Trimester (<14)**	94	58.8
	2nd Trimester (14-<28)	64	40
	3rd Trimester (>28)	2	1.2
Previous C.S	**No**	116	72.5
	Yes	17	10.6
	not applicable	27	16.9
Premature labour	**No**	124	77.5
	Yes	9	5.6
	not applicable	27	16.9
History of LBW	**No**	112	70
	Yes	21	13.1
	not applicable	27	16.9

5.1.2.1.1 Gravidity:

Gravidity means number of pregnancies of participant; it ranges from 1 to14 pregnancy with mean of 4 pregnancies and 2.49 SD. Most of participants had less than six pregnancies (75%) of which 35.6% had children from 0-2; participants who had more than five pregnancies were 25%as shown in table (5.2).

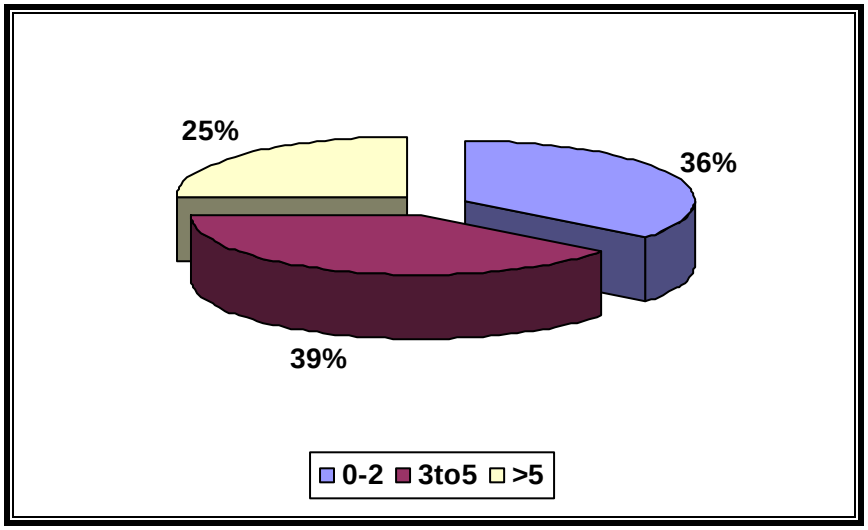


Figure 5.5: Distribution of participants by number of pregnancies

5.1.2.1.2 Parity:

The number of previous deliveries ranges from 0 to 10 deliveries; the mean was 2.4 deliveries with SD 1.99. Only 7.5% of participants had more than 5 children and 57.5% had less than three children. This may reflect awareness of Palestinians about the benefit of family planning.

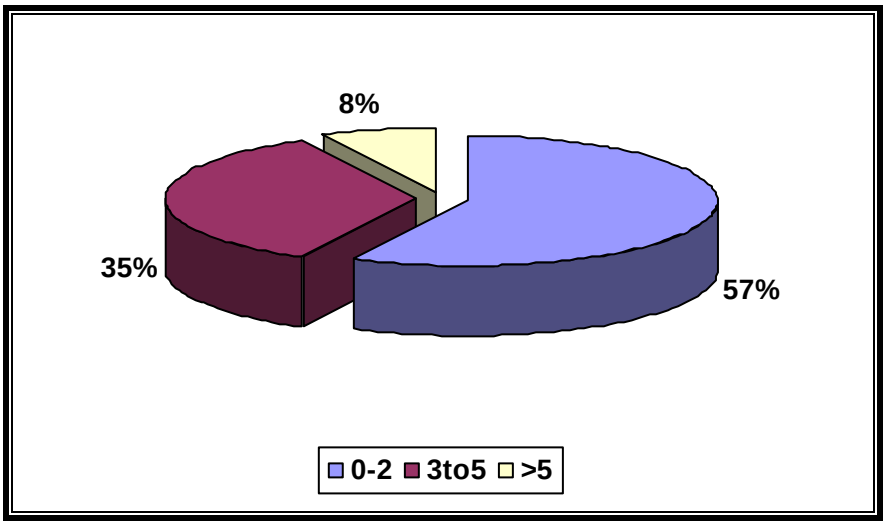


Figure 5.6: Distribution of participants by number of deliveries

5.1.2.1.3 Abortions:

About one third of participants had previous history of abortion (34.4%), the number of abortions ranges from zero to eight with mean of 0.58 and SD of 1.07.

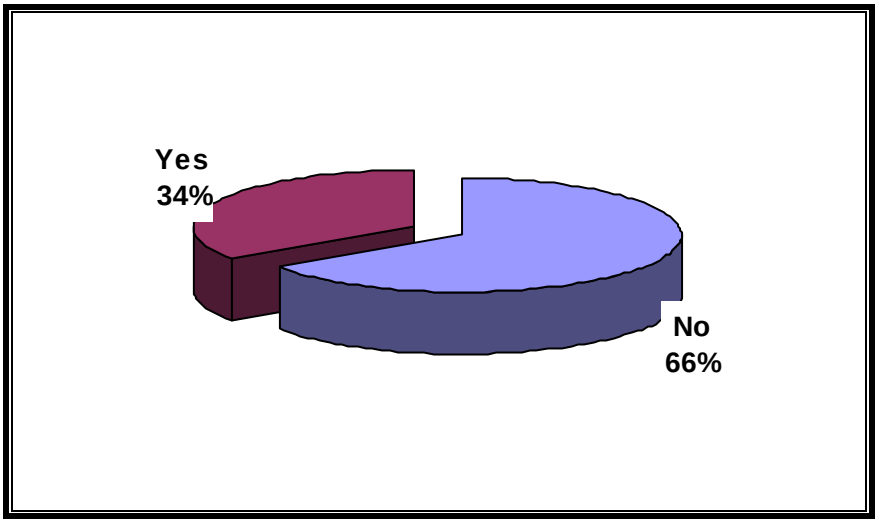


Figure 5.7: Percent distribution of participants by previous abortions

5.1.2.1.4 Weeks of gestation:

The majority of participants were in the first trimester (<14 weeks) 58.8%, in the second trimester (14-27 weeks) 40% and only 1.2% in the third trimester which can reflect awareness of population about importance of early registration.

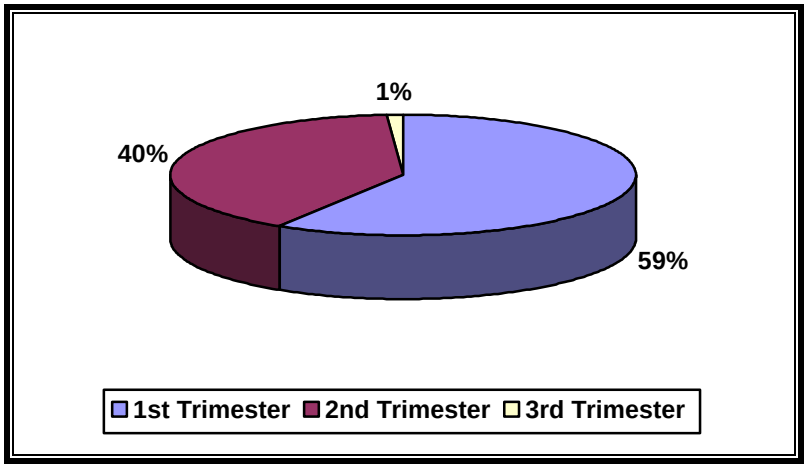


Figure 5.7: Percent distribution of participants by weeks of gestation

5.1.2.5 Previous caesarian section:

As seen in table (5.2), 10.6% of the study population had previous caesarian section and 16.9% was not applicable, either of primigravida (they didn't get pregnant before) or nullipara (they didn't have delivery before**)**. The percentage of refugee women who were delivered by caesarian section in Gaza Strip in the year 2006 was 12.2 % (UNRWA, 2006).

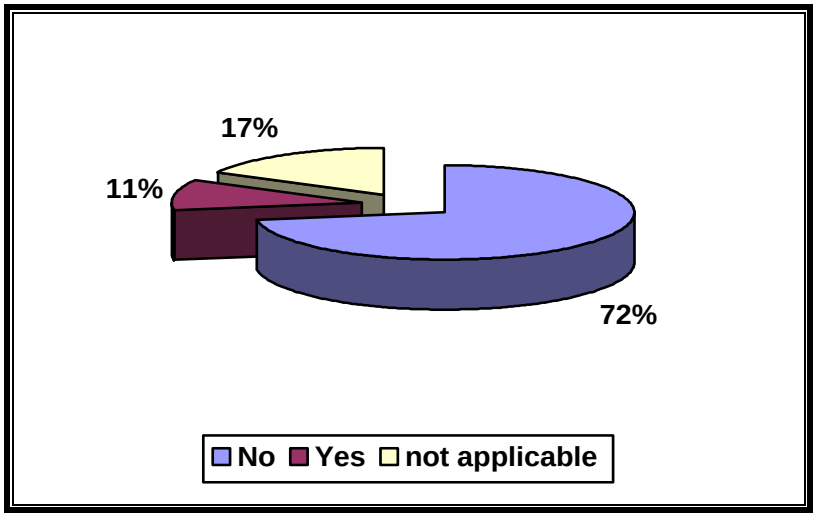


Figure 5.8 Percent distribution of participants by previous caesarian section

5.1.2.6 History of premature deliveries:

Only 6% of study population had history of previous premature deliveries, 77% of them hadn't previous premature deliveries and 17% were not applicable as seen in figure (5.9).

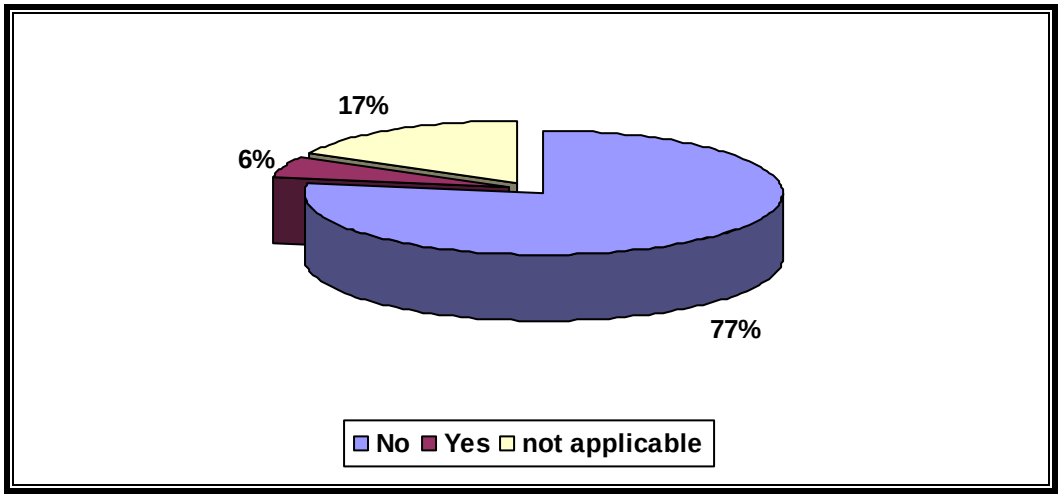


Figure 5.9: Distribution of participants by history of premature deliveries

5.1.2.7 Previous history of low birth weight:

As shown in figure (5.9) that 13% of participant had previous delivery of low birth weight baby and 17% were not applicable (nullipara and primigravida).

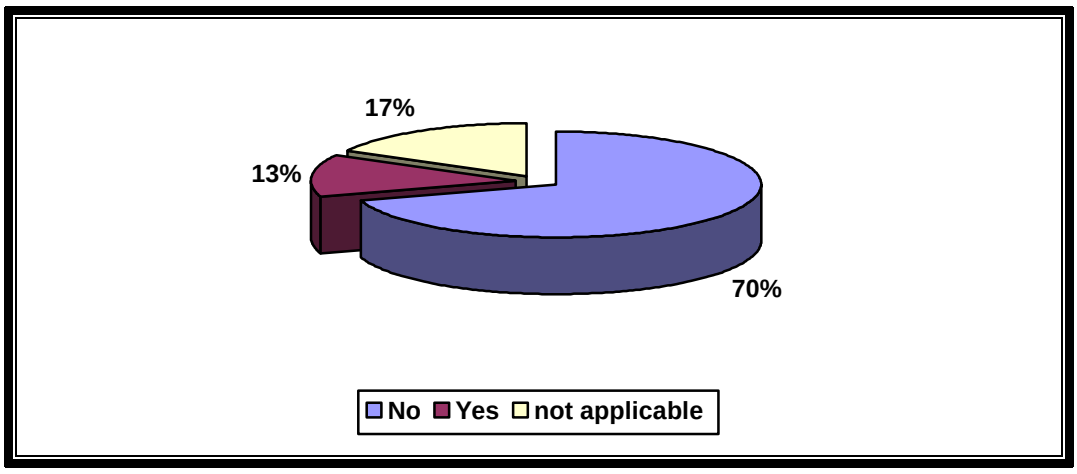


Figure 5.10: Distribution of participants by history of LBW

5.2.2 Medical history

Medical history includes present and past history of health events, study population had many variations in there medical history, table (5.3) below summarizes percent distribution of positive medical history. Twenty five percent of participants had history of urinary tract infection (UTI), Thirty four percent with previous history of urinary catheterization and 35.3% of them used contraceptives before, only two participants had history of diabetes mellitus with 1.3% and one participant have diabetes mellitus during current pregnancy with 0.6%, the prevalence of DM was lower than that of 2006 were it was 1.3%(UNRWA, 2006), this may be due to that the occurrence of gestational diabetes mellitus (GDM) most common after 24 weeks of gestation and only 3% of participants registered after 24 weeks of gestation. Twenty five percent of participants had UTI symptoms and 26.9% had dysparunia while nearly half of them (47.5%) had vaginal discharge. Post coital washing was practiced by 45% of participants. The percentage of those received antibiotics during current pregnancy was 15.6%. Among all participants 1.9% was hospitalized during current pregnancy, 27.5% were anemic, 13.1% of their husbands had been suffering from genitourinary tract infection and 5.6% of them had another wife.

Table5.3: Distribution of study population by positive medical history

Medical history	Frequency	Percentage
Previous urinary catheterization	55	34
Previous use of contraceptives	57	35.3
Previous history of Diabetes mellitus	2	1.3
Diabetes mellitus in current pregnancy	1	0.6
Previous history of UTI	92	57.5
Symptoms of UTI	40	25
Dysparunia	43	26.9
Vaginal discharge	76	47.5
Post coital washing	72	45
Local hygiene	160	100
History of receiving antibiotics during current pregnancy	25	15.6
Hospitalization during current pregnancy	3	1.9
Anemia	44	27.5
Has husband been suffering from genitourinary tract infection	21	13.1
Does he have another wife?	9	5.6

5.3 Prevalence of urinary tract infection

The result of positive urine culture was 31out of 160 with prevalence of 19.4%. Eighteen of them were asymptomatic with prevalence rate11.25% and eleven were symptomatic with prevalence rate 8.15%. This result (19.4%) of the prevalence of UTI is lower than that

in Pakistan 29.5 %(Ahmad et al, 2000), in Yemen 30% (Alhaddad, 2005), and 37% in Fiji (Wata, 2006) but higher than other countries in the world, in sharja 4.8%(Abdullah and Almoslih, 2005)and 10.3% in Jordan(Tameem et al, 2004). The prevalence of ASB is intermediate among other results in the literature where the prevalence ranges from 1.9% in Philippine (Sescon et al, 2003) to 25% in Pakistan (Ahmad et al, 2003).

5.4 Risk factors of UTI and ASB

To study the relationship between study variables and the occurrence of ASB, we considered the results of urine culture which is the dependant variable so we had two groups of the study population, one with positive urine culture (diseased) and the other with negative urine culture (not diseased) and the analysis was done by the use of cross tabulation and chi-square where p-value >0.05 was considered not statistically significant.

5.4.1 Socio demographic and socioeconomic factors

Table (5.4) below summarizes the relationship between culture result with the socio demographic, and socioeconomic factors by using cross tabulation and chi square statistical test to examine statistical significance. As shown in the table, the prevalence of the disease was more among the participants in the age group of 25-30 years old with prevalence of 20.6% while it was 14.3% among the age group of less than 25 years old and 21.6% among those aged >30 years old. This difference was not statistically significant (p=0.336), this result is similar to that of studies conducted in Malaysia and Iran and Yemen where the maternal age was not found to be a significant risk factor to UTI (Fatema and Isharat, Shirazi et al, Al haddad).

Table 5.4:The relationship between socio demographic and socioeconomic status and occurrence of UTI.

Variables	Culture result				Total
	Positive		Negative		
	n	%	n	%	n
Age					
<25	10	14.3	60	85.7	70
25-30	13	24.5	40	75.5	53
>30	8	21.6	29	78.4	37
Total	31	19.4	129	80.6	160
Chi-Square 2.181				**P=0.336**	
Educational level					
Low (<7 years)	2	28.6	5	71.4	7
Medium (7-12 years)	18	17	88	83	106
High (>12 years)	11	23.4	36	76.6	47
Total	31	19.4	129	80.6	160
Chi-Square 1.256				**P=0.534**	
Family income					
Below poverty line	26	20.2	103	79.8	129
Above poverty line	5	16.1	26	83.9	31
Total	31	19.4	129	80.6	160
Chi-Square 0.259				**P=0.611**	

Regarding the educational level of participants, the prevalence of UTI among participant of low education level was 28.6% while it was 17% among those of medium level of education and 23.4% among participants of high level of education and this difference in educational level hadn't significant effect on UTI occurrence

(p=0.534). This result is consistent with a study among Pakistani pregnant women that educational level had no significant association with UTI in pregnancy (Sheikh et al, 2000). Also Sherazi et al found that there is no correlation between level of education and the occurrence of asymptomatic bacteriuria (Sherazi et al, 2006).

The family income also hadn't any significant effect on the occurrence of UTI (p=0.611). The prevalence was high among those participants whose live below the poverty line (20.2%) and 16.1% among those with family income above the poverty line, Similar results were found with a study in Pakistan and another one in Iran that socioeconomic status had no significant effect on UTI occurrence (Sheikh et al, Sherazi et al) while in other studies the incidence increased as socioeconomic status decreased (Lavanya and Jogalakshmi, 2002) and a significant effect of socioeconomic class was seen with women from lower classes (Fatema and Isharat, 2006).

5.4.2 Obstetric history:

In table (5.5) below we noticed that the prevalence of the disease was nearly the same among participants who had 3-5 pregnancies (20.6%) and those who had >5 and less in participants with 0-2 pregnancies but this difference was not statistically significant (p=0.906). This result was similar to that of Sherazi et al, where they concluded that the number of fertility was not significantly associated with the occurrence of ASB (Sherazi et al, 2006). The disease was more frequent with parity >5 (25%) while it was 16.1% among those of group 3-5 deliveries and 20.7% among those with parity 0-2 but this difference between groups was not statistically significant(p=0.694). Other studies found that the prevalence of UTI significantly increased with parity (Fatema and Isharat, Ahmad et al).

Regarding the history of previous abortion, this study showed that the prevalence of the disease among participants whose had previous history of abortion was (16.4%) and 21% among those who hadn't abortion before. History of previous abortion was not a significant rish factor of the occurrence of the disease (p=0.487), this result was consistent with that concluded by Sherazi et al in Iran (Sherazi et al, 2006)

Table 5.5: Relationship between obstetric history and the occurrence of UTI

Variables	Culture result				Total
	Positive		Negative		
	n	%	n	%	n
Gravidity					
0-2	10	17.5	47	82.5	57
3-5	13	20.6	50	79.4	63
>5	8	20	32	80	40
Total	31	19.4	129	80.6	160
Chi-Square .196			**P=0.906**		
Parity					
0-2	19	**20.7**	73	**79.3**	92
3-5	9	**16.1**	47	**83.9**	56
>5	3	**25**	9	**75**	12
Total	31	19.4	129	80.6	160
Chi-Square .730			**P=.694**		
					abortions
Yes	9	**16.4**	46	**83.6**	55
No	22	**21**	83	**79**	105
Total	31	19.4	129	80.6	160
Chi-Square .487			**P=0.485**		
Weeks of gestation					
1st trimester	16	17	78	83	94
2nd trimester	13	20.3	51	79.7	64
3rd trimester	2	100	0	0.0	2
Total	31	19.4	129	80.6	160
Chi-Square 8.692			**P-0.013**		
Previous caesarian sections					
Yes	4	**23.5**	13	**76.5**	17
No	24	**20.7**	92	**79.3**	116
Not applicable	3	**11.1**	24	**88.9**	27
Total	31	19.4	129	80.6	160
Chi-square 1.497			**P=0.473**		
History of premature deliveries					
Yes	6	**66.7**	3	**33.3**	9
No	22	**17.7**	102	**82.3**	124
Not applicable	3	11.1	24	88.9	27
Total	31	19.4	129	80.6	160
Chi-Square 14.278			**P= 0.001**		

Previous caesarian sections in this study had no significant association with the disease (p value = 0.473). There was a little difference in the prevalence of the disease among those who had previous history of caesarian sections (23.5%) and those who hadn't (20.7%). Women who had caesarian sections are at risk of developing UTI (Simon 2002).

Our results showed that the prevalence of UTI In pregnancy was increased increased as gestational weeks increased. It was 17% in the first trimester, 20.35 in the second trimester and 100% in the third trimester. The duration of pregnancy was significantly associated with occurrence of UTI (P=0.013). A similar result was found by Al Haddad in Yemen where there was an increase in prevalence of bacteriuria with progress of pregnancy (Al Haddad, 2005). It was contradict with the results of Sescon, et al who found that the prevalence of the disease was greater with the earlier gestational age (Siscon et al, 2003) and Fatema and Isharat, Ahmad where they found a similar prevalence at different periods of gestatinal weeks (Fatema and Isharat, 2006).

The previous history of premature deliveries in this result was significantly associated with UTI (P = 0.001) where the prevalence of UTI was higher (66.7%) among participants who had premature delivery before than those who hadn't (17.7%).

5.4.3 Medical history:

Table (5.6.) above summarizes the relationship between medical history and the occurrence of UTI**.** The prevalence of the diseases was 20.5% among anemic participants and 19% among not anemic. Anemia was not a significant risk factor of UTI occurrence (p=0.831). This result was consistent with that of Fatema and Isharat where they found that anemia was not significantly associated with ASB (Fatema and Isharat, 2006).

Table 5.6: Relationship between medical history and the occurrence of UTI

Variables	Culture result				Total
	Positive		Negative		
	n	%	n	%	n
Anemia					
Yes	9	**20.5**	35	**79.5**	44
No	22	**19**	94	**81**	116
Total	31	19.4	129	80.6	160
Chi-Square .045				**P=.831**	
Past history of UTI					
Yes	21	**22.8**	71	**77.2**	92
No	10	**14.7**	58	**85.3**	68
Total	31	19.4	129	80.6	160
Chi-Square1.650				**P=0.199**	
Past history of urinary catheterization					
Yes	9	**16.4**	46	**83.6**	55
No	22	**21**	83	**79**	105
Total	31	19.4	129	80.6	160
Chi-Square 0.487				**P=0.485**	
Dysparunia					
Yes	9	**20.9**	34	**79.1**	43
No	22	**18.8**	95	**81.2**	117
Total	31	19.4	129	80.6	160
Chi-Square .091				**P=.763**	
Vaginal discharge					
Yes	17	**22.4**	59	**77.6**	76
No	14	**16.7**	70	**83.3**	84
Total	31	19.4	129	80.6	160
Chi-Square 0. 830				**P=0.362**	
Past history of using contraceptives					
Yes	10	**17.5**	47	**82.5**	57
No	21	**20.4**	82	**79.6**	103
Total	31	19.4	129	80.6	160
Chi-Square 0.190				**P=0.663**	
Symptoms of UTI					
Yes	13	**32.5**	27	**67.5**	40
No	18	**15**	102	**85**	120
Total	31	19.4	129	80.6	160
Chi-Square 5.881				**P=0.015**	

Past history of UTI was found not a significant risk factor of UTI (p= 0.199) inspite of the high prevalence of the disease among those participants with a previous history of UTI 22.8%. Most of the studies revealed that previous history of UTI was a highly significant risk factor (Skeikh et al, Amad et al, Fatema and Isharat).

Past history of urinary catheterization was not significant risk factor to UTI (p=0.458). Twenty one percent of the diseased participants hadn't any history of urinary catheterization while 16.4% of them had it. Previous urinary catheterization makes woman to be at risk of UTI (Simon, 2003).

The same result was with dysparunia were p=0.763. Vaginal discharge was common complaint where 54.8% of participant with the disease had vaginal discharge but the relation was not significant (p=0.362).

As seen in table (5.6), that the prevalence of UTI among participants who had a Past history of using contraceptives was 17.5% and 20.4% among those who didn't use any contraceptive method before. This difference in prevalence hasn't any statistical significant for the disease occurrence (p=0.663).

Symptoms of urinary tract infection were significantly associated with the presence of UTI (p=0.015), the prevalence of the disease among the study population who hah UTI symptoms was 32.5% while it was 15% among those who hadn't. In other studies of the literature, symptoms of UTI are not significantly associated with presence of UTI (Sheikh et al, Ahmad et el).

Table (5.7) below summarizes the relationship between the other variables in medical history and the UTI occurrence. Most of participants (being Moslems) were practicing ablution and post coital wash. As shown in table 19.4 % of participants who were practicing post coital wash had UTI and 21.4% of those not practicing post coital wash had the disease. There was no significant relationship between post coital wash and UTI occurrence (p=0.892). This result agreed with that of Sheikh et al who found that no significant association between post coital wash and UTI occurrence (Sheikh et al, 2000).

In table (5.7) we notice that receiving antibiotics during current pregnancy was not significant risk factor of UTI (p=0.642). The prevalence of the disease was 16% among those who received antibiotics during pregnancy and 20% among those who didn't receive antibiotic during pregnancy. The hospitalization during current pregnancy was also not significant statistically with the disease occurrence.

Past history of genitourinary tract infection of husband hadn't any significant association with the occurrence of the diseased (p=0.462) although the prevalence of the disease was (23.8%) higher among those who their husbands have been suffering from genitourinary tract infection. The prevalence of UTI among participants whose their husbands have another wife was 22% while it was 19.2% among those where the husband haven't another wife. This factors had no significant relationship with UTI occurrence (p=0.428).

Table 5.7: Relationship between other variables in the medical history and the occurrence of UTI

Variables	Culture result				Total
	Positive		Negative		
	n	%	n	%	n
Post coital washing					
Yes	14	**19.4**	58	**80.6**	72
No	9	**21.4**	33	**78.6**	42
sometimes	8	17.4	38	82.6	46
Total	31	19.4	129	80.6	160
Chi-Square 0.229				**P=0.892**	
Receiving antibiotics during current pregnancy					
Yes	4	**16**	21	**84**	25
No	27	**20**	108	**80**	135
Total	31	19.4	129	80.6	160
Chi-Square .216				**P=.642**	
Hospitalization during current pregnancy					
Yes	1	**33.3**	2	**66.7**	3
No	30	**19.1**	127	**80.9**	157
Total	31	19.4	129	80.6	160
Chi-Square .381				**P=.537**	
Suffering from genitourinary tract infection					
Yes	5	**23.8**	16	**76.2**	21
No	26	**18.7**	113	**81.3**	139
Total	31	19.4	129	80.6	160
Chi-Square .304				**P= .581**	
Does he have another wife?					
Yes	2	**22.2**	7	**77.8**	9
No	29	**19.2**	122	**80.8**	151
Total	31	19.4	129	80.6	160
Chi-Square .049				**P=.824**	

5.2 Performance of different screening tests:

For the evaluate the accuracy of nitrite dipstick test in screening pregnant women for asymptomatic bacteriuria, we used urine culture as a golden standard test for comparing the different urine screening tests, the performance of other tests used was examined alone and in combination with others. A urine culture was defined as positive if it showed 100,000 pure colony forming units (CfU) and more/ml of urine (most of literatures). A culture was considered contaminated if there was a mixed growth of bacteria or if there was a pure culture of less than 100,000 CPU/ ml. If there was no growth of bacteria, the culture was considered negative. Using these criteria, the sensitivity, specificity, positive predictive value (PPV) and negative predictive value (NPV) were calculated for each test, nitrite, leukocyte esterase (LE) and direct microscopy. We considered sensitivity to be the most important attribute of the test, with positive predictive value the second most important attribute.

5.2 Calculation of the validity of different tests used

1. **Nitrite dipstick test:**

Table 5.8: Validity of nitrite test

		Urine culture		
		Positive	**Negative**	**Total**
Nitrite	**Positive**	**TP** 9	**FP** 3	**12**
	Negative	**FN** 22	**TN** 126	**148**
	Total	**31**	**129**	**160**

In table (5.8) above there was only 12 cases of nitrite positive, 9 were true positive (TP) and 3 were false positive cases (FP) while 22 of all negative cases were false negative (FN) and 122 cases were true negative(TN).

Sensitivity = TP/ (TP+FN) *100 = 9/31= 29%

Specificity = TN/ (TN+FP)*100 = 126/129= 97.7%

Positive predictive value (PPV) = TP/ (TP+FP)*100 = 9/12=75%

Negative predictive value (NPV) =TN/ (TN+FN)*100= 126/148= 85%

2. Leukocyte esterase test

Table 5.9: Validity of Leukocyte esterase test

		Urine culture		
		Positive	**Negative**	**Total**
Leukocyte Esterase	**Positive**	**TP** 8	**FP** 17	**25**
	Negative	**FN** 23	**TN** 112	**135**
	Total	**31**	**129**	**160**

As seen in table (5.10) 25 cases only were leukocyte esterase positive, 8 cases were TP and 17 cases were TN

Sensitivity = TP/ (TP+FN) *100 = 8/31= 25.8%

Specificity = TN/ (TN+FP)*100 = 112/129= 86.8%

Positive predictive value (PPV) = TP/ (TP+FP)*100 = 8/25=32%

Negative predictive value (NPV) =TN/ (TN+FN)*100= 112/135=82.9%

3. Nitrite or leukocyte esterase

Table 5.10: Validity of Nitrite or leukocyte

		Urine culture		
		Positive	**Negative**	**Total**
Nitrite + LE	**Positive**	**TP** 13	**FP** 16	**29**
	Negative	**FN** 18	**TN** 113	**131**
	Total	**31**	**129**	**160**

Sensitivity = TP/ (TP+FN) *100 = 13/31= 41%

Specificity = TN/ (TN+FP)*100 = 113/129= 87.6%

Positive predictive value (PPV) = TP/ (TP+FP)*100 = 13/29=44.8

Negative predictive value (NPV) =TN/ (TN+FN)*100= 113/131=86.3%

4. Microscopic analysis

Table 5.12: Validity of microscopic analysis

		Urine culture		
		Positive	**Negative**	**Total**
Microscopic Analysis	**Positive**	**TP** 16	**FP** 16	**32**
	Negative	**FN** 15	**TN** 113	**128**
	Total	**31**	**129**	**160**

Sensitivity = TP/ (TP+FN) *100 = 16/31= 51.6%

Specificity = TN/ (TN+FP)*100 = 113/129= 87.6%

Positive predictive value (PPV) = TP/ (TP+FP)*100 = 16/32=50

Negative predictive value (NPV) =TN/ (TN+FN)*100= 113/128=88.3%

Table (5.12) below summarizes the distribution of study population by the results of different tests used, while table (5.13) summarizes the validity of all tests used.

Table 5.12: Distribution of study population by the results of the screening tests

Screening test (n=126)	Total positive	Total negative	True positive	False positive	True negative	False negative
Nitrite	12	148	9	3	126	22
Leukocyte esterase	25	135	8	17	112	23
Nitrite, Leukocyte	29	131	13	16	113	18
Microscopic analysis	32	128	16	16	113	15

As demonstrated in table (5.13) below the sensitivity of different tests ranges from 25.8% to 51.6%, microscopic test had the highest sensitivity while leukocyte esterase test had the lowest one. Nitrite test had the highest specificity and the other tests were more or less similar to each other. Sensitivity of urine dipstick increased up to 41% when the result of the two positive tests (nitrite and Leukocyte esterase) was combined. Positive predictive value (PPV) was high with nitrite (75%) and the lowest value was with leukocyte esterase. The negative predictive value (NPV) was more or less the same of all tests (82.9 - 88.3%).

Table 5.13: Results of screening tests used compared with urine culture

Screening test (n=126)	**Sensitivity (**%)	**Specificity (%)**	**PPV (**%)	**NPV** (%)
Nitrite	29	97.7	75	85
Leukocyte esterase	25.8	86.8	32	82.9
Nitrite, Leukocyte	41	87.6	44.8	86.3
Microscopic	51.6	87.6	50	88.3

5.3.1 Nitrite dipstick test:

Sensitivity of nitrite was low, 29% (9cases out of 31 positive culture were truly positive TP)), positive predictive value (PPV) was75% while specificity was 97.7 % (126 out of 129 truly negative TN) and negative predictive value (NPV) was 85% as seen in table (5.14). This result is similar to that conducted by Tameem among pregnant Jordanian women where nitrite sensitivity was 31 %(Tmeem et al, 2004), very low sensitivity of 17% resulted from a study conducted in United Arab Emirates (Abdullah and Amoslih, 2005). Nitrite test was the most specific test; this finding is supported by other studies where the specificity was 98.5%, 99% and 97% (Tameem ea al, Abdullah and Amoslih et al, Buisson et al). Deville et al founded that the sensitivity of nitrite dipstick was low (45-60%) with higher level of specificity (85-98%), it had the lowest sensitivity in screening of pregnant women and only reach high sensitivity in the elderly.

5.3.2 Leukocyte esterase dipstick:

Sensitivity of leukocyte esterase was 25.8%, with specificity of 86.8%, PPV was 32% and NPV was 82.9%, the test has low sensitivity and low PPV. This result is similar to that conducted by Tameem where the sensitivity was 23.33 %(Tameem et al, 2004).Its sensitivity was lower than nitrite (29%) and microscopic (51.6%) as seen in table (5.14). A meta analysis study conducted by Deville et al showed that sensitivity of leukocyte esterase dipstick was ranging from 48%-86% while specificity was from 17%-93%with lower positive predictive values(PPV) and similar negative predictive values(NPV) and its accuracy was higher in detecting symptomatic UTI (Deville et al, 2004).

5.3.3 Microscopic urine analysis:

Sensitivity was 51.6%, with specificity of 88.4%, PPV was 50% and NPV was 88.3%, the test has low sensitivity, it was higher in sensitivity than nitrite. The PPV of microscopic urine analysis were lower than nitrite test but higher than that of leukocyte esterase. This may be due to doing the test by two laboratory technicians which might cause inter rater bias in interpretation of the result. Results of microscopic analyses of this study showed that 16 cases were false positive with WBCs count >8 / HPF this may be due to infection by other organisms that couldn't be cultured like Chlamydia and mycoplasma which can be diagnosed by polymerase chain reaction (PCR). A study was conducted at the Islamic university in 2006 showed that the prevalence of sterile pyuria caused by clamydia in Palestine was 5% and mycoplasma 3% (Nssar et al, 2006), clamydial infections are associated with sterile pyuria and account of more than 30% of non bacterial UTIs (Woodman et al, 2005). This low sensitivity of microscopic analysis makes it a poor predictor of true asymptomatic bacteriuria, so it is not recommended as a screening test for asymptomatic bacteriuria (Molina, 2000).

5.3.4 Nitrite or leukocyte esterase tests:

When we use the result of both tests we consider any positive result of both tests as seen in table (5.114). Sensitivity was 41.9%, with specificity of 87.6%, PPV was 44.8% and NPV was 86.3%, combination of both positive tests increased the sensitivity and decreased the specificity. Similar finding were reported in most of studies (Olsen et al, Rehmany), Combining the results of both tests with one or both showing a positive result increased sensitivity from 68% to 80% but had different effects on specificity and the negative result excluded the presence of UTI in most studies In pregnant women a negative result for both tests rule out infection. On the other hand if the two tests were available and one of them was negative, confirmation is still needed (Deville et al, 2004).

Table 5.14: Comparison of sensitivity and specificity of different tests with that of literature

Studies	Screening tests							
	Nitrite		LE		Nitrite or LE		Microscopic	
	Sens.	Specif.	Sens.	Specif.	Sens.	Specif.	Sens.	Specif.
Present study	29	97.7	25.8	86.8	41	87.6	50	88.4
Tameem ea al.	31.14	98.51	23.33	97.82	-	-	-	-
Abdullah and Al moslih	17	99	17	86	-	-	67	66
Olsen et al	46	60.8	72.9	36.1	79.2	29.2		
Buisson et al	57	97	17	97			25	99
Rehmany	81	87	77	45	94	50		

5.4. Microbiological results

5.4.1The presenting bacteria in urine culture

Urine culture was positive in 19.4% of cases (31 out of 160 study population). The most

frequently isolated organism was Staphylococcus aureus (29%), followed by E-coli (25.80%) and klebsiella (22.58%), enterobacter constituted 9.67% while proteus as well as Streptococcus 6.45% for each as seen in table (5.15). The most common bacteria were Ecoli in most of literature. Our result agree with those of researches conducted in other countries, with minor differences, which may be due to differences in culture, social habits personal hygiene and environment (Alhaddad in Yemen, Abdullah and AL-moslih in Sharja). Sheikh et al found that the maininfcting bacteria in pregnancy were Staphylococcus albus, E coli, and Psodomonous species (Sheikh et al, 2000).

Table 5.15: Type of presenting bacteria

presenting bacteria	Frequency	Percent
Staph.aureus	9	29.03
E coli	8	25.80
Klebsiella	7	22.58
Enterobacter	3	9.67
Proteus	2	6.54
Streptococcus	2	6.45
Total	**31**	**100**

5.4.2 Antibiotic sensitivity

The antibiotic sensitivity test showed that the most isolated bacteria were sensitive to ciprofloxacin, cefuroxim co-amoxiclave and norfloxacine. Ciprofloxcine was shown as the 1st sensitive drug in all cultures (93.54%). Second sensitive drug was cefuroxim (83.87%) and co-amoxiclave and norfloxacine were equal in (70.96%) while amoxicillin, co-trimoxazol and erythromycine had the lowest sensitivity. Maximum resistance was seen to

co-trimoxazol (67.74%) followed by doxycycline (29.03%). Our results were more or less agreed with results of some researches in the literature (Abdullah and AL Moslih, 2005). Results of sensitivity to antibiotics are summarized in table (5.16) below.

Table: (5.16) culture's sensitivity to antibiotics

Antibiotic name	Culture n=31	Sensitivity	Resistance
Ciprofloxacine	29	**93.54**	3.22
Cefuroxim	26	83.87	3.22
Co-amoxiclave	22	70.96	12.9
Norfloxacine	22	70.96	3.22
Doxycycline	19	51.61	29.03
Cephaloxine	18	58.06	16.12
Gentamycine	17	54.83	3.22
Azithromycine	14	45.16	19.35
Amoxycillin	3	9.67	16.12
Cotrimoxol	3	9.67	**67.74**
Erythromycine	1	3.22	12.9

As seen in the above table the different bacteria develop resistance to many antibiotics that Have been used in treatement of UTI for many years as Cotrimoxazol while bacteria show high sensitivity to the new generations of antibiotics like Ciprofloxacine, Cefuroxime, Coamoxiclave and Norfloxacine. Ciprofloxacine and Norfloxacine are contra indicated in pregnancy while Cefuroxime and Coamoxiclave are not contra indicated.

Chapter 6

6.1 Conclusions

The results of our study demonstrated that urinary tract infection and asymptomatic bacteriuria were common among pregnant women. The prevalence rate of UTI was 19.4% and that of ASB was 11.25% which is relatively high although it is intermediate among the world and regional countries where the prevalence ranges from 2.3% to 30%.

Common isolated bacteria were Staphylococcus Aureus (29%), E coli (25.8%) and klebsiella (22.6%). Most isolated bacteria were sensitive to ciproxine(93.5%), cefuroxime (83.87%) and co-amoxiclave (70.96%) and showed high resistance to co-trimoxazole (67.7%) and doxycycline(29%).

The socio-demographic and socioeconomic status of participants were found to be not significant risk factors for UTI during pregnancy, while symptoms of UTI, history of premature delivery and weeks of gestation were significant risk factors. All other medical and obstetric factors were not significantly associated with occurrence of the disease.

The prevalence of the disease was more common among age group 25-30 (24.5%) and 25% among those who had delivered more than five children. It was high among women with 3-5 pregnancies (20.6%) and those are live below the poverty line but the relation didn't reach statistical segnificant. The prevalence of the disease among women those had previous history of UTI was 22.8% which was not significant risk factor.

Nitrite dipstick had low sensitivity (29%) and high specificity (97.7%), it is good to rule out infection but it is not efficient enough to detect all cases of the disease. So, many cases

of false negative result(71%) will not be treated and may develop complications. PPV of the test is 75%that means 25% of false positive cases will be exposed to antibiotic squeals in addition to development of drug resistance and waste money; therefore it can not be recommended for screening of asymptomatic bacteriuria in this group of population.

Leukocyte esterase dipstick had the lowest sensitivity (25.8%), PPV (32%). So, it is not sufficient for screening of UTI. By considering the positive results of nitrite or leukocyte esterase, the sensitivity increases to 41% and the specificity decreases to 87.6%. The sensitivity of both was lower than nitrite or leukocyte esterase tests separately, and less than that of microscopic analysis.

Microscopic urine analysis is a poor predictor of true asymptomatic infections because of low sensitivity (51.6%) in addition to low positive predictive values (50%), thus, it is not recommended as a screening test for asymptomatic bacteriuria. Its low PPV makes it not to be recommended. So, none of nitrite, leukocyte esterase and microscopic urine tests was able to detect all cases of UTI in pregnant women.

This study shows that urine dipstick methods, whether alone or in combination, have low sensitivity variable specificity, positive and negative predictive values. There is a tendency for high false negativity especially for the nitrite test because some uropathogens cannot reduce nitrates and others convert nitrates to ammonia rapidly so that appreciable levels are not detected during nitrite reduction. Urine dipsticks in general, are insufficient as screening tests for asymptomatic bateriuria in pregnancy.

Evidence does not support the use of urine tests other than urine culture in screening.

Almost every test has false positive and false negative rate. False negative test may result in under treatment that cause maternal and fetal complications and false positive test results in misdiagnosis of UTI that may expose mothers and their fetuses to the adverse effects of unnecessary antibiotics in addition to increased costs. Consequences of failure to detect the condition and the missing for treatment are more important than those who actually do not have infection.

6.2 Recommendations

On the light of the relatively high prevalence of urinary tract infection (19.4%) and asymptomatic bacteriuria (11.25%), among pregnant women and the low sensitivity and the low positive predictive value of nitrite dipstick which is used in screening for ASB at first antenatal visit according to UNRWA protocol, more than two thirds (70.1%) of pregnant women with urinary tract infection will be missed for treatment and could have mental and fetal complications. Many of false positive cases would be exposed to unnecessary use of antibiotics and their adverse effects, the researcher recommends the following:

- All pregnant women must be screened for asymptomatic bacteriuria at first antenatal visit by the use of urine culture.
- All pregnant women with urinary tract infections should be managed properly with aggressive treatment of cystitis and pyelonephritis to prevent maternal and fetal morbidity
- Reviewing the protocol of reproductive health regarding the screening of pregnant women during the first antenatal visit.
- Improve the awareness of medical staff and pregnant women about the importance of the screening and proper management of urinary tract infections
- Ongoing supervision to ensure accurate and timely screening and management of pregnant women with urinary tract infection

- Further more studies to evaluate the accuracy of urine tests in screening of asymptomatic bacteriuria in pregnancy by including all Gaza governorates for generalization of results.
- It would be important to study the pregnancy outcome in relation to the test results observed.
- Further studies are recommended for cost effectiveness of the screening by using urine culture.

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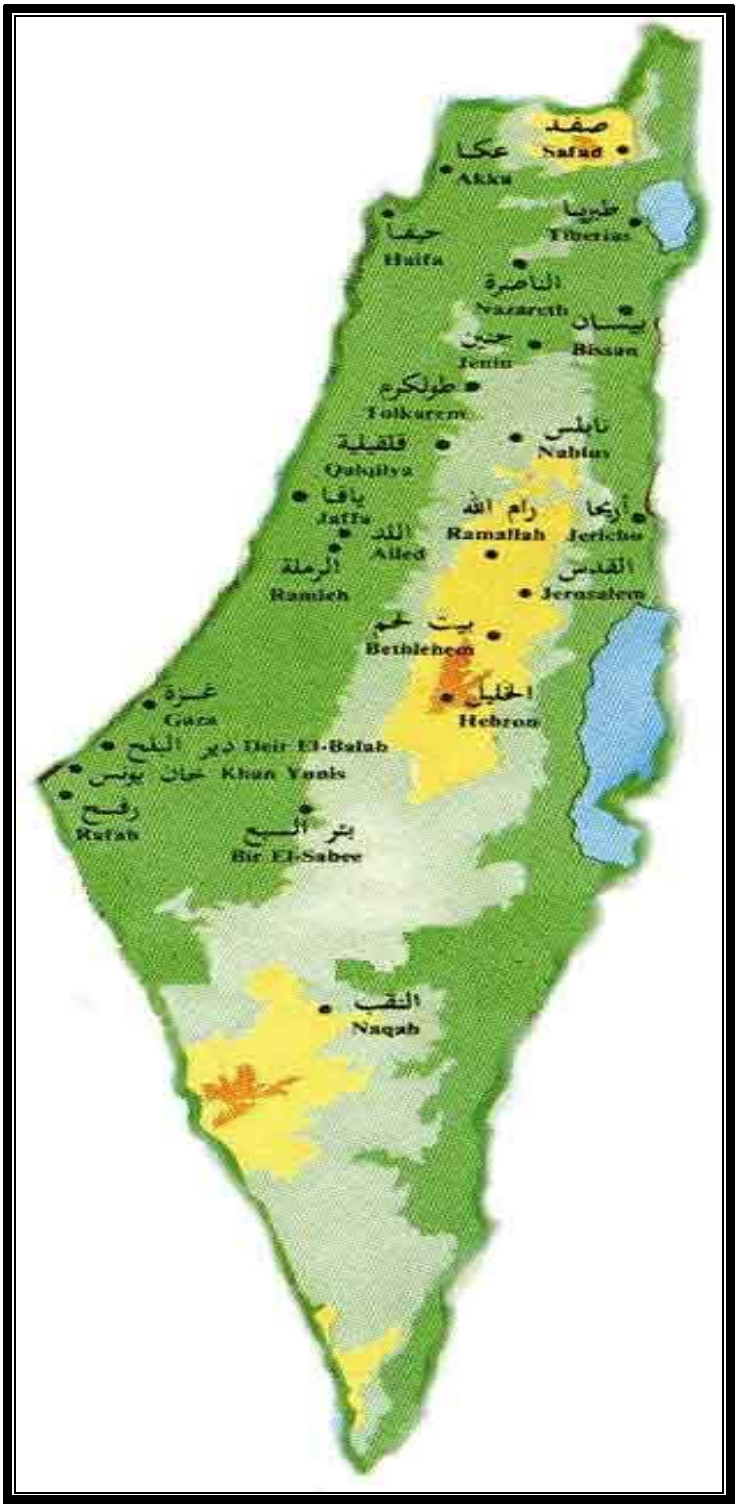
Annexes

Annex (1)

Map of Palestine

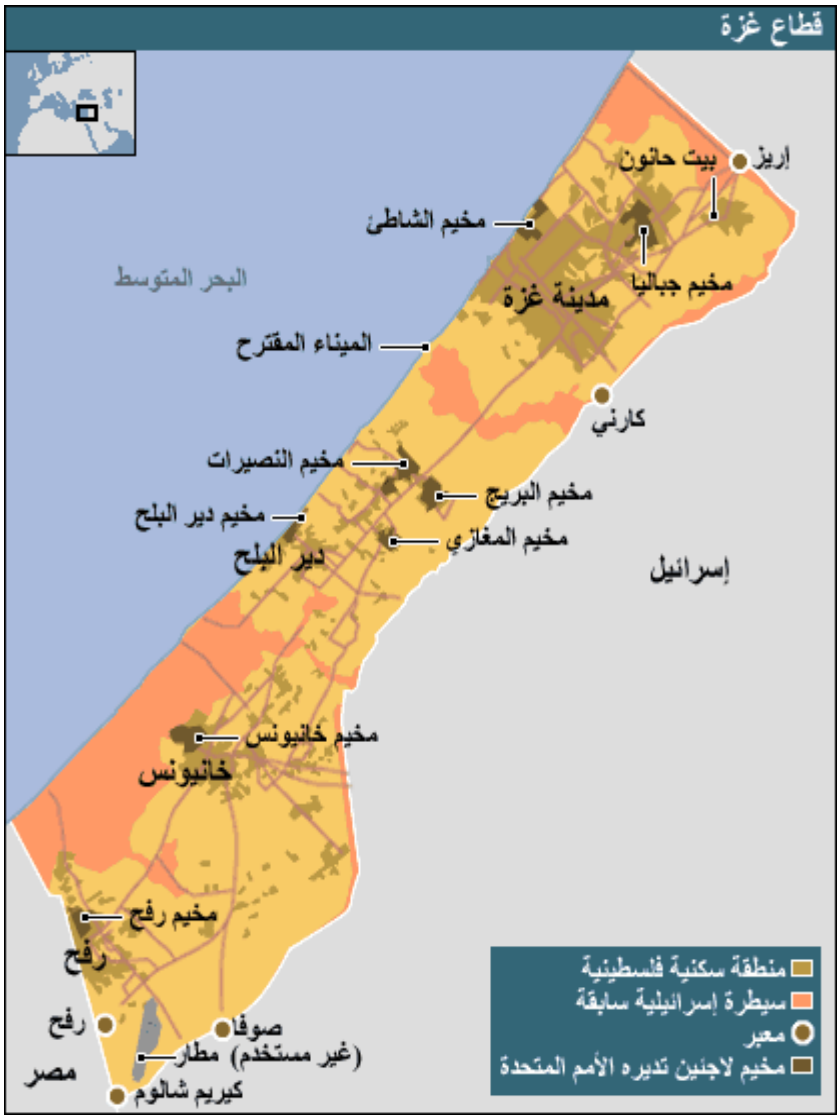


(http://img.photobucket.com/albums/v329/a_mouhtaseb/falasteneiat/Palestine20.jpg

15-11-2007)

Annex (2)

Map of Gaza strip



(www.al-almya.com/images2/Ghazza.gif 15-11-2007)

Annex (3)

Map of Gaza city

(www.mogaza.org/images/sitesmap.jpg 18-11-2007)

Annex (4)

Palestinian National Authority
Ministry of Health
Helsinki Committee

السلطة الوطنية الفلسطينية
وزارة الصحة
لجنة هلسنكي

Date: 25 / 6 /2006

التاريخ: 2006/6 / 25

Mrs./ Rasmiya Ghsoub

السيدة: رسمية غصوب

I would like to inform you that the committee has discussed your application about:

نفيدكم علما بأن اللجنة قد ناقشت مقترح دراستكم حول:-

Evaluation of Current Screening Test for Asymptomatic Bacteriuria During Pregnancy at First Antenatal Visit in Rimal Health Center UNRWA Gaza, 2006.

In its meeting on June 2006

و ذلك في جلستها المنعقدة لشهر يونيو 2006

and decided the Following:-

و قد قررت ما يلي:-

To approve the above mention research study.

الموافقة على البحث المذكور عاليه.

Signature

توقيع

Member

عضو

Member

عضو

Chairperson

Ministry of Health
Helsinki Committee

Conditions:-

- Valid for 2 years from the date of approval to start.
- It is necessary to notify the committee in any change in the admitted study protocol.
- The committee appreciate receiving one copy of your final research when it is completed.

Gaza Etwam – Telefax 972-7-2878166

Annex (5)

وزارة الصحة

كليـة الصحـة العامـة

School of Public Health

القدس - فلسطين

جامعة القدس

2006/10/31

الأخ/ د. أيوب العالم المحترم

مدير برامج الصحة- وكالة الغوث

تحية طيبة وبعد،،،

الموضوع: مساعدة الطالبة رسمية غصوب

تقوم الطالبة المذكورة أعلاه بإجراء بحث بعنوان:

"Evaluation of Current screening test for asymptomatic bacteruria during pregnancy at first antenatal visit in Rimal health center UNRWA Gaza 2006"

"

كمتطلب للحصول على درجة الماجستير في الصحة العامة-مسار وبائيات و إحصاء حيوي علماً بأن الطالبة قد حصلت على موافقة لجنة هلسنكي لأخلاقيات البحوث، و ستكون المعلومات متوفرة لدى الباحثة فقط. و عليه نرجو التكرم للإيعاز لمن ترونه مناسب لتسهيل مهمة الطالبة في جمع البيانات الخاصة.

موافقتكم دعماً للمسيرة الأكاديمية

و تفضلوا بقبول فائق الاحترام ،،،

د سوزان شعشاعه

عميد كلية الصحة العامة المساعد

كلية الصحة العامة / غزة
120
2006/11/01

نسخة: الملف

Annex (6)

UNITED NATIONS
RELIEF AND WORKS AGENCY FOR PALESTINE REFUGEES IN THE NEAR EAST

NATIONS UNIES
OFFICE DE SECOURS ET DE TRAVAUX POUR LES REFUGEES DE PALESTINE DANS LE PROCHE-ORIENT

Postal Address:
P.O. Box 61, Gaza City
Or
P.O. Box 781, Ashqelon, Israel

Web Site:
http://www.unrwa.org

وكالة الأمم المتحدة
لإغاثة وتشغيل اللاجئين الفلسطينيين في الشرق الأدنى
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١٠ إبريل ٢٠٠٧

إلـــــى : الدكتور/ مدير عيادة الرمال
السيد/ مدير المختبرات

مـــن : مدير البرامج الصحية بالوكالة، غـزة

الرجاء التكرم بمساعدة الدكتورة رسمية الغصوب و تسهيل مهمتها في عمل البحث.

ولكم جزيل االشكر ،،،

الدكتور أيوب العالم
مدير البرامج الصحية بالوكالة

Annex (7)

إشعار موافقة

غزة / فلسطين / بتاريخ.....

السيدة الفاضلة / .....

أنا الطالبة رسمية خميس غصوب أ قوم بإجراء هذه الدراسة و ذلك كمتطلب لنيل درجة الماجستير في الصحة العامة قسم وبائيات وهي بعنوان :

تقييم التحليل المخبري المستخدم للكشف عن البيلة الجرثومية غير مصحوبة بأعراض أثناء الزيارة الأولى لرعاية الحوامل في مركز الرمال الصحي التابع لوكالة الغوث الدولية .

تهدف هذه الدراسة للتعرف على معدل إنتشار البيلة الجرثومية الغير مصحوبة بأعراض أثناء الحمل وعوامل الخطر المصاحبة لها، بالإضافة إلى تقييم الاختبار المستخدم للكشف عنها عند الزيارة الأولى لرعاية الحوامل، ومشاركتك في الدراسة تتطلب الإجابة عن بعض الأسئلة ، والموافقةعلى اجراء فحص وعمل مزرعة لعينة وسط البول لك.

من حقك المشاركة بالدرجة التي تريدينها ولك الحق في الإمتناع عن اجابة أي سؤال في أي وقت، وستظل المعلومات المعطاة في إطار السرية التامة ولغرض البحث العلمى فقط فنحن لا ننشرأية أسماء أو عناوين خاصة فى مجال دراستنا، و سننشر النتائج من خلال صورة جماعية وليست فردية.

نتمنى مشاركتك الفعالة لكي تساعدينا في تقييم الوضع الصحي بشكل صحيح والإستفادة من ذالك ربما في تحسين الوضع الصحي للسيدات الحوامل مما قد يحقق لهن رعاية صحية أفضل

شكراً لك على مشاركتك.

توقيع المشاركة الباحثة

رسمية خميس غصوب

Annex (8)

Evaluation of Current Screening Test for Asymptomatic Bacteriuria during Pregnancy At First Antenatal visit in Rimal Health Center UNRWA,Gaza 2007

Questionnaire:

Serial No: …….

Date: ……

Maternal Health Record No.....

Socio demographic data

Age (years) ……

Address……

Telephone / Mobile No: ……

Educational years……

Work of client Yes ☐ No ☐

Work of husband Yes ☐ No ☐

Family income (NIS)……..

Obstetric history:

Gravidity…….

Parity……..

Abortions…

Previous caesarian sections: Yes ☐ No ☐ Not applicable ☐

History of premature deliveries Yes ☐ No ☐ Not applicable ☐

History of delivery of low birth weight: Yes ☐ No ☐ Not applicable ☐

Past history:

Past history of UTI: Yes ☐ No ☐

If yes, how many times? ……

Past history of urinary catheterization: Yes ☐ No ☐

Past history of using contraceptives Yes ☐ No ☐

If yes: Which method was used? IUD ☐ Spermicidal ☐ Pills ☐

Condom ☐ Others ☐

History of diabetes mellitus: Yes ☐ No ☐

If yes, what is the type? Gestational ☐ IDDM ☐ NIDDM ☐

Present history:

Gestational weeks of current pregnancy……

Blood pressure……

Diabetes mellitus: Yes ☐ No ☐

Symptoms of UTI: Yes ☐ No ☐

Dysparunia Yes ☐ No ☐

Vaginal discharge: Yes ☐ No ☐

If yes, what's the colour of discharge? Whitish ☐ Yellowish ☐

Blood tinged ☐

Post coital washing: Yes ☐ No ☐ Sometimes ☐

Local hygiene: Yes ☐ No ☐

History of receiving antibiotics during current pregnancy: Yes ☐ No ☐

If yes, why?.....

For how long?.....

When was the last dose? …….

Hospitalization during current pregnancy: Yes ☐ No ☐

If yes, why?.....

Has husband been suffering from genitourinary tract infection? Yes ☐ No ☐

Does he has another wife? Yes ☐ No ☐

Laboratory results:

Hb%.....

Dipstick:

Nitrite test: Negative ☐ Positive ☐

Leukocyte esterase test: Negative ☐ Trace ☐ +1 ☐ +2 ☐

Protienuria: Negative ☐ Trace ☐ +1 ☐ +2 ☐

RBC's Negative ☐ Trace ☐ +1 ☐ +2 ☐

Glucosuria: Negative ☐ Trace ☐ +1 ☐ +2 ☐

Microscopic urine analysis:

Pyuria: WBCs / HPF……

Heamaturia: RBCs / HPF …….

Bacteriuria: No ☐ Yes ☐

Yeast like cells No ☐ Yes ☐

Trichomonas: No ☐ Yes ☐

Cast: No ☐ Yes ☐

Culture result:

Positive ☐ Negative ☐ contaminated ☐ Candida ☐

If positive, what is the name of the presenting organism: ……

Antibiotic sensitivity of the organism:

Amoxicillin	☐	Aotrimoxazol	☐
Azithrimacin	☐	Doxycyline	☐
Cefuroxime	☐	Erythromycine	☐
Cephalexim	☐	Gentanycin	☐
Ciprofloxacin	☐	Norfloxacin	☐
Co-amoxiclav	☐	Tetracyclin	☐

Annex (9)

Validity of Laboratory Tests

Relationships among terms

		Condition (as determined by "Gold standard")		
		True	***False***	
Test outcome	***Positive***	**True Positive**	**False Positive**)	**→ Positive predictive value**
	Negative	**False Negative**)	**True Negative**	**→ Negative predictive value**
		↓ Sensitivity	↓ Specificity	

Sensitivity = TP/ (TP+FN) *100

Specificity = TN/ (TN+FP)*100

Positive predictive value (PPV) = TP/ (TP+FP)*100

Negative predictive value (NPV) =TN/ (TN +FN)*100

(http://en.wikipedia.org/wiki/Sensitivity_%28tests%29 20-11-2007)