

**PREVALENCE AND AWARENESS OF URINARY
TRACT INFECTION AMONG FEMALE SECONDARY
SCHOOL STUDENTS AT SEKOLAH MENENGAH
KEBANGSAAN KUBANG KERIAN 1**

by

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**Dissertation submitted in partial fulfilment of the
requirements for the degree of
Bachelor of Health Sciences (Nursing)**

JUNE 2013

DECLARATION

I certify that this thesis does not incorporate without acknowledgement any material previously submitted for a degree or diploma in any university; and that to the best of my knowledge and belief it does not contain any material previously published or written by another person except where due reference is made in the text.



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Date: 16 JUNE 2013

CERTIFICATE

This is to certify that the dissertation entitled Prevalence and Awareness of Urinary Tract Infection among Female Secondary School Students in Kelantan is the bonafide record of research work done by Maanurfarhana binti Mohamed Amin, matric no. 105130, during the period of September 2012 until May 2013 under my supervision. This dissertation submitted in partial fulfillment for the degree of Bachelor of Health Sciences (Nursing). Research work and collection data belongs to Universiti Sains Malaysia.



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ABBREVIATIONS

ESRD	-	End Stage Renal Disease
HBM	-	Health Belief Model
PMR	-	Peperiksaan Menengah Rendah
SPM	-	Sijil Pelajaran Malaysia
SPSS	-	Statistical Package Social Sciences
STI	-	Sexually Transmitted Disease
UTI	-	Urinary Tract Infection

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**PREVALENCE AND AWARENESS OF URINARY TRACT INFECTION
AMONG FEMALE SECONDARY SCHOOL STUDENTS AT SEKOLAH
MENENGAH KEBANGSAAN KUBANG KERIAN 1**

ABSTRACT

Urinary tract infection is one of infection that commonly affected female population. Substantial evidence can be found in the literature to show the prevalence as well as facts on UTI including risk factors, sign and symptoms, treatment and complications. The general objectives of the study were to find the prevalence and awareness of UTI among female adolescent in Sekolah Menengah Kebangsaan Kubang Kerian 1. A cross sectional study was done on 154 female students and validated questionnaires were given to students. Data was analyzed using descriptive statistic and Pearson Chi-square test. Results showed that the prevalence of UTI among student was low which was 1.3%. As for awareness, mostly the students were highly aware regarding UTI. However, there was no association found between family relationship and awareness ($p>0.05$). There was also no association found between family income and student's awareness ($p>0.05$). Besides that, the result also showed that there was no association between treatment seeking behavior and awareness ($p>0.05$). Therefore, further study need to be done to emphasized on the prevalence, preventive measures and support from family and health professionals.

**PREVALENS DAN KESEDARAN TERHADAP RISIKO MENDAPAT
JANGKITAN SALURAN KENCING DALAM KALANGAN PELAJAR
PEREMPUAN DI SEKOLAH MENENGAH KEBANGSAAN KUBANG KERIAN**

1

ABSTRAK

Jangkitan saluran kencing merupakan salah satu jangkitan yang sering menyerang kaum wanita. Pelbagai bukti dapat ditemui berdasar kajian-kajian lepas mengenai prevalens dan juga factor risiko, gejala jangkitan, rawatan dan juga komplikasi jangkitan. Objektif umum kajian ini ialah ingin menentukan prevalens dan tahap kesedaran jangkitan saluran kencing dalam kalangan pelajar perempuan di Sekolah Menengah Kebangsaan Kubang Kerian 1. Satu kajian telah dijalankan ke atas 154 pelajar perempuan dan set soalan yang telah disemak juga diberi kepada responden. Data dianalisis menggunakan statistik deskriptif dan Pearson Chi-square. Keputusan yang telah dianalisis menunjukkan tahap prevalens jangkitan saluran kencing dalam kalangan pelajar adalah rendah sebanyak 1.3%. Manakala tahap kesedaran pelajar mengenai jangkitan saluran kencing adalah tinggi sebanyak 69.5%. Akan tetapi, tiada perkaitan antara hubungan keluarga dan tahap kesedaran pelajar ($p=1.000$). Selain itu, tiada perkaitan ditemui antara pendapatan keluarga dan tahap kesedaran pelajar ($p=0.151$). Di samping itu, keputusan juga menunjukkan tiada perkaitan ditemui antara tabiat mendapatkan rawatan dan tahap kesedaran pelajar ($p=0.613$). Oleh yang demikian, kajian lanjut diperlukan untuk mengenalpasti prevalens, langkah pencegahan dan juga sokongan daripada keluarga dan professional kesihatan.

CHAPTER 1: INTRODUCTION

1.1 Background of The Study

Urinary tract infections (UTIs) are the second most common type of infection in the body, accounting for about 8.1 million visits to health care providers each year (National Kidney and Urologic Diseases Information Clearinghouse, 2012). Generally, women are prone to get UTI for anatomical reasons. One of the factors is that a woman's urethra is shorter, which the average length is 4 cm, that increase the chances for bacteria to have quick access to the bladder (Earhart, 2010). In spite of that, woman's urethral opening is also near to the sources of bacteria, which is from the anus and vagina (National Kidney and Urologic Diseases Information Clearinghouse, 2012). Moreover, the meatus, or commonly known as urinary opening, is in front of the vagina and closer to the rectum than it is in males (Earhart, 2010). Urine drains from the bladder through a canal called the urethra. In males, the canal transports semen as well as urine. A long urethra makes bladder infections in males younger than 40 very rare. However, bladder infections in older men are usually linked to prostate problems (Earhart, 2010). Therefore, females are much more susceptible to UTI.

According to National Kidney and Urologic Diseases Information and Clearinghouse (2012), the lifetime risk of having UTI in women is greater than 50%. Besides that, it is also reported that one in five women will develop UTIs in their lifetime (Rightdiagnosis.com, 2012). While in Foxman (2002), it is estimated that one in three women will have at least one UTI diagnosed by a clinician requiring antimicrobial treatment by the age of 24 years. Apart from that, about 40% to 50% of

women will experience at least one episode of UTI during their lifetime (Foxman, 2002). A survey of 2,000 women in the United States found that 10.8% of women above 18 years reported at least one presumed UTI during the prior 12 months, and the majority of women who had UTI reported a history of more than two UTI episodes in their life (Foxman, 2002).

Meanwhile, as for children aged of 16, approximately one in ten girls and one in thirty boys will have a UTI (Kennedy, Glynn & Dineen, 2010). Throughout childhood, the risk of having a UTI is 2% for boys and 8% for girls (National Kidney and Urologic Diseases Information Clearinghouse, 2011). Untreated UTI may cause immediate and long-term morbidity including hypertension, renal scarring, pre-eclampsia and end-stage renal disease (Heffner and Gorelick, 2008). Renal scarring as a result of UTI may lead to hypertension, decreased renal function, proteinuria and end-stage renal disease (ESRD). In spite of that, it was also reported that development of hypertension in children with reflux and renal scarring is between 10 and 20% (Sinha & Postlethwaite, 2003). In some children, having UTI may be a sign of an abnormality in the urinary tract that leads to repeated problems (National Kidney and Urologic Diseases Information and Clearinghouse, 2011).

Apart from that, according to Ministry of Health in 2010, UTI is accounting for 20% of all infections among Malaysian hospitals. Meanwhile, a study in Kelantan, reported that the prevalence of asymptomatic bacteriuria among female school children is 0.17%. The study was done in three districts area which is, Tumpat, Bachok and Kota Bharu with 21 684 female students as respondents (Ettehad, Tazakori, Hosseinkhani, Refahi, Nemati, Arab & Asl, 2007).

Treatment of UTI generally depends on the underlying medical conditions related to which pathogen caused the infection (Davis, 2012). Usually, treatment of UTI begins with administration of antibiotics either oral or parenteral. In spite of that, common antibiotic choices are cephalosporins, amoxicillin plus clavulanic acid, or trimethoprim sulphamethoxazole (Habib, 2012). Mild infection such as acute cystitis is treated with oral antibiotics that may quickly resolve. It is also reported that in treating acute cystitis, empirical 3-day regimens of trimethoprim, oral cephalosporin or nitrofurantoin are recommended and achieve a cure in 85–90% of patients (Lee and Neil, 2007). However, for those with severe kidney infection, hospitalization is needed for further treatment. According to Davis (2012), severe infection such as pyelonephritis requires intravenous antibiotics in order to prevent bacteremia.

1.2 Problem Statements

Women are significantly more likely to experience UTIs compared to men (Foxman, 2002). Meanwhile, it was accounting for 5% to 14% of annual visits made by children with UTI (Heffner & Gorelick, 2008). Other than that, up to 3% of young girls reported frequent event of UTI (Barroso, Jacobino, Vinhaes, Macedo & Srougi, 2003). It is estimated that about 35% of healthy women suffers symptoms of UTI at some time in their life. Symptoms suggestive of UTI are the reason for 0.5–1% of consultations, and each year about 5% of women visited their general practitioner with painful urination (dysuria) and frequency (Lee & Neil, 2007). However, most female express their initial reluctance to visit general practitioners. The only reasons that prompt them

to seek treatment for UTI include severe UTI with painful and bleeding urination or when the symptoms worsen such as they have to visit toilet frequently, or both (Leydon, Turner, Smith & Little, 2010). In spite of that, 25% of those who have had one infection will have at least one further infection, and sometimes, multiple recurrences (Larcombe, 2012).

According to Wing, Kwaadsteniet, Harmsen, Suijlekom-Smit, Schellevis & Wouden (2006), UTI in younger children, is mainly caused by autoinfection with organism from the intestinal tract, whereas UTI in adolescent girls are often related to sexual activity. This is supported by Huppert, Biro, Lan, Mortensen, Reed, & Slap (2007) that among sexually active female, urinary symptoms are the common reasons for outpatient visits. Due to the similar symptoms, general practitioners may fail to detect the sexually transmitted infections (STI) that can exist alone or concurrently with UTIs.

Other studies have reported that 20% of adult females with culture-proven UTIs have concomitant vaginal or cervical infections with sexually transmitted organisms such as *Trichomonas vaginalis* (TV). This is due to UTI and STI share similar risk factors such as recent sexual contact and this is also applied to adolescent in the Western countries (Huppert *et al.*, 2007). Apart from that, it was reported that UTI and STI may shared similar symptoms such as dysuria (Welch, 2012). Additionally, another study in Kelantan reported that knowledge regarding sexual health among adolescent is lacking due to case of reproductive and sexual health issues that are still considered taboo subjects in many countries (Azriani Ab Rahman, Razlina Ab Rahman, Mohd Ismail Ibrahim, Halim Salleh, Shaiful Bahri Ismail, Siti Hawa Ali, Wan Manan Wan

Muda, Maizun Ishak & Amaluddin Ahmad, 2011). Thus, preventing adolescents from obtaining adequate and related knowledge, guidance and services regarding sexual health is thought to be the best way to avoid social issue. Consequently, due to this problem students are prone to get infectious diseases such as STI or UTI.

On the other hand, UTI among female adolescent is a most challenging condition to treat in primary care since symptoms can be minimal in the early stages and urine samples are often difficult to obtain (Kennedy *et al.*, 2010). UTI in childhood are common and may be difficult to diagnose because of non-specific symptoms. Symptoms such as fever, vomiting, and irritability may indicate UIT, but they are also common for other diseases (Wing *et al.*, 2006). According to Öner, Ahangari, Artinyan, Öz & Kocazeybek, 2004, due to the non-specific symptoms as well as embarrassment among female adolescent to tell health professionals about the problem, causes the probability of routine urine examination to be very low. Thus, bacteriuria can be masked for a long time and may cause further complications such as kidney insufficiencies (Öner et al, 2004). In fact, many parents usually bring their children to practitioners only once the child show different behaviors and the symptoms experienced look more severe and worsening (Harmsen, Wensing, Wouden & Grol, 2007). Other reasons that influence the higher prevalence among female adolescence are lack of health education on toileting, personal hygiene particularly the genital region as well as lower socioeconomic status (Öner *et al.*, 2004).

Due to these phenomena, a research will be conducted to determine UTI among female secondary school children. This study is crucial in order to increase awareness or knowledge of UTI regarding sign and symptoms, risk factors, treatments as well as

preventions of UTI among female students. Particularly, it is important since female adolescent are prone to get UTI. Although there are many studies involving both female and pediatric population, however, numbers of studies focusing on adolescent group are very scant particularly in Malaysia. Apart from that, health education at school so far did not cover the UTI. Therefore, researcher believes that it is important to include topic on UTI to increase awareness among adolescent. Researcher believes that it is important for female adolescent to have knowledge on UTI so that they could practice a healthy lifestyle.

A theoretical framework used in this research is Health Belief Model (HBM). HBM is one of the longest established theoretical models that designed to explain health behavior by better understanding beliefs about health (Nutbeam & Harris, 2002). Since 1950s, HBM has been used both to explain change and maintenance of health-related behaviors and as a guiding framework for health behavior interventions (Champion & Skinner, 2008). Generally, HBM is used as the model to illustrates the importance of individual beliefs about health, and beliefs about the about the relative costs and benefits of actions to improve health.

1.3 Research objectives

1.3.1 General objectives

This study will be going to determine the prevalence and awareness of UTI among female secondary school students in Kelantan.

1.3.2 Specific objectives

- 1) To determine the prevalence and awareness of UTI among female secondary school students.
- 2) To identify factors associated to UTI among female secondary school students.
- 3) To determine the influence of demographic characteristics on the student's awareness of UTI.
- 4) To assess the association between awareness of UTI and treatment seeking behavior for UTI among female secondary school students.

1.4 Research Questions

- 1) How many female students had experience UTI?
- 2) What are factors associated with UTI among female secondary school students?
- 3) Is there any influence of demographic characteristics on female secondary school student's awareness of UTI?
- 4) Is there any association between awareness on UTI and treatment seeking behavior of female secondary school students?

1.5 Hypothesis

- 1) Null hypothesis, H_0 : There is no significant association between awareness on UTI and selected demographic factors among female secondary school students.
Alternative hypothesis, H_A : There is a significant association between awareness on UTI and selected demographic factors among female secondary school students.
- 2) Null hypothesis, H_0 : There is no significant association between awareness on UTI and treatment seeking behavior among female secondary school students.
Alternative hypothesis, H_A : There is a significant association between awareness on UTI and treatment seeking behavior among female secondary school students.

1.6 Definition of Terms

1.6.1 Awareness

Awareness is defined as the state or condition of being aware, having knowledge or consciousness. Awareness is also synonym to words such as cognizance, consciousness, knowingness and sentience (The Free Dictionary, 2012b). In spite of that, awareness can also be defined as knowledge, understanding, appreciation, recognition, attention to, perception, consciousness, acquaintance with, enlightenment with, sensibility, realization to, familiarity with, mindfulness, cognizance and sentience (The Free Dictionary, 2012). Based on Macmillan Dictionary (2012), awareness is a

knowledge or understanding of a subject, issue or situation. It also can be defined as the ability to notice things. Awareness also is about knowing something, knowing something that exists and important, and being interested in something (Oxford Learners Dictionary, 2011).

1.6.2 Urinary tract

Urinary tract or urinary system consists of kidney, ureters, bladder and urethra. The primary purpose of the urinary system is to maintain the state of homeostasis of body by regulate the fluids and body electrolytes, removing waste products and providing other functions such as urine formation, control of water balance and control of blood pressure (Smeltzer, Bare, Hinkle & Cheever, 2010). The kidneys are a pair of bean-shaped; brownish-red structures which located retoperitoneally (behind and outside the peritoneal cavity) on the posterior wall of the abdomen, precisely from the twelve thoracic vertebra to the third lumbar vertebra in the adult. Ureter is a long fibromuscular tubes that connect each kidney to the bladder. Apart from that, bladder is defined as a muscular, hollow sac located just behind the pubic bone. Basically, bladder is characterized by its central, hollow area which called as vesicle, and has two inlets (ureters) and one outlet (urethra) (Smeltzer *et al.*, 2010). Last but not least, urethra is arising from the base of the bladder. Particularly, urethra passes through the penis in male while in female it opens just anterior to the vagina (Smeltzer *et al.*, 2010).

1.6.3 Urinary Tract infection

Urinary tract infection (UTI) refers to the presence of microbial pathogens within the urinary tract (Foxman, 2002). Usually, UTI is classified based on the site of infection such as cystitis-infection at bladder, pyelonephritis-infection at kidney or bacteriuria-infection in urine. According to Lee and Neild (2007), UTI is the presence of bacteria in the urine (bacteriuria). Bacteriuria is defined as bacteria present in at least 10^5 bacteria/ml in freshly-voided urine. In spite of that, UTI is defined as bacterial in origin and can involve the urinary tract anywhere from the distal portion of urethral meatus to the perinephric fascia and any structure in between including the urethra, bladder, ureters as well as renal pelvis and parenchyma (Tsiouris and Lowy, 2004).

1.6.4 Adolescence

Adolescence is the period between puberty and completion physical growth, roughly from 11 to 19 years old. In other words, adolescence is a young person who has undergone puberty but who has not reached full maturity (The Free Dictionary, 2012a). Besides that, adolescence is described as the teenage years between 13 and 19 and can be considered the transitional stage from childhood to adulthood (Psychology Today, 2012). On the other hand, adolescence can be divided into different stages. Firstly is early adolescence

which comprises of individual between ages of 11 to 13 years old. Then, middle adolescence- individual between 14 to 18 years old and last but not least is late adolescence which consists of individual between 19 to 24 years old (Office of Population Affairs, 2012).

1.7 Significance of The Study

No doubt, women particularly younger female are more susceptible to UTI due to anatomical reasons and their lifestyle as mentioned earlier. Although, it is a common health problem and is acknowledged can lead to more serious complication, attention to it is still lacking and there was no routine health education specific on UTI provides to female students at school so far, who are at risk to have UTI. Many studies have been conducted across the world. However, most of these studies were conducted in the Western countries (Barroso *et al.*, 2003), (Huppert *et al.*, 2007). Moreover, limited numbers of published studies with the Malaysia found (Ettehad, 2007), (Azriani Ab Rahman, 2011).

This study will primarily benefit both the public people and healthcare professional such as physician and nurses. Basically, this study aims to increase awareness of UTI among female secondary school students as researcher believes that knowledge on UTI is important so that female adolescent able to live a healthy life.

Given the importance of good health, those with UTI may have difficulties to stay focus in school as they have to live deal with UTI and worrying about the symptoms. Students' awareness of the risk for UTI and personal-hygiene knowledge of female students regarding the risk for UTI and self-hygiene also needs consideration

because these may have some influence on the occurrence of effect UTI. It is hoped that this study would provide knowledge and information required to nurses in delivering appropriate health education to those who are in need, particularly the young ones. Apart from that, the researcher also hopes that this study would be able to increase public knowledge and awareness of UTI particularly female population. It is important to have adequate knowledge on UTI. This is to encourage the public to take preventive measures to avoid UTI since prevention is better than cure.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

Literature search covering a period between 2002 to September 2012 revealed English language listings articles in nursing and medical journals citing urinary tract infection (UTI). This search was done by using keywords such as UTI, adolescent, management and nursing.

This chapter is reviewing the current literature related to UTI in women with the intention of helping build a current knowledge base to justify this study and determine the research design and tools required to achieve its objective. Major sections on prevalence, risk factors, health seeking behavior and strategy to deal UTI are discussed.

2.2 Urinary tract infection

Urinary tract infection (UTI) is defined as a bacterial infection that affects part of urinary tract. Besides bacteria, UTI can also caused by other infectious agents such as viruses or fungi (Habib, 2012). Also, UTI is considered to be the most common bacterial infection to women as well as female adolescent (Foxman, 2002). Moreover, UTI is regard as a common bacterial infection and generally produce benign conditions among healthy, sexually active young women without long-term medical treatment (Shortliffe & McCue, 2002). According to Foxman (2002), it is reported that UTI is the common reason for about 7 millions outpatients visit as well as 1 million emergency

department visits, and that eventually lead to 100,000 of hospitalizations at United States within year of 1997.

2.2.1 Types of UTI

Generally, UTIs are classified into upper or lower UTIs. Along with the classification, UTI can be further divided as uncomplicated or complicated, which depends on patient-related condition. Most women as well as female adolescent are commonly infected with uncomplicated UTI (Tsiouris & Lowy, 2004).

2.2.1.1 Upper UTI

Upper UTIs are infections that affect the upper urinary tract, consisting of pyelonephritis-inflammation of the renal pelvis, interstitial nephritis-inflammation of the kidney and renal abscesses. Generally, upper UTI is caused by either the upward spread of bacteria from bladder or from systemic sources, that spreading to the kidney via bloodstream (Smeltzer *et al.*, 2010). Barosso *et al* (2003) in their study in Brazil on UTI indicated that 24 out of 39 young girls, aged between 3 to 14 years old, had pyelonephritis.

2.2.1.1 Lower UTI

Lower UTIs are infections involving lower urinary tract such as cystitis-inflammation of urinary bladder, prostatitis-inflammation of prostate gland and urethritis-inflammation of urethra (Heffner and Gorelick, 2008). Most commonly, bacteria ascend through the urinary tract from the urethra. A study done in Brazil showed that among 39 girls that ranges from 3 to 14 years old, 11 of them experienced cystitis (Barroso *et al.*, 2003).

2.2.1.4 Complicated UTI

Regarding complicated UTI generally infected individual with structural or anatomic abnormalities of urinary tracts and probably be the results of antibiotic-resistant bacteria or less common uropathogens such as *Klebsiella spp* (Tsiouris and Lowy, 2004). This includes outflow obstruction, renal scarring, presence of foreign body like tumor and lastly pregnancy (Lee and Neil, 2007). The types of bacteria involves are *Klebsiella*, *Enterobacter*, *Proteus* species and enterococci (Ronald, 2002).

2.2.1.3 Uncomplicated UTI

While uncomplicated UTIs is commonly occurs in person with normal urinary tracts which generally caused by pathogens such as *Escherichia Coli* species (Tsiouris and Lowy, 2004). There are several risk factors associated to

uncomplicated UTIs. Firstly is due to bacterial virulence. This includes *E.coli* that causes 80% or *Staphylococcus saprophyticus* that ranges from 10% to 15% of infection (Ronald, 2002). It is also a complication of antimicrobials consumption that cause loss of commensal organisms. Other causes include sexual intercourse and ageing process; particularly because of decreasing of post-menopausal estrogen that functions to protect the urinary tract (Lee and Neil, 2007).

2.3 Prevalence of UTI

The prevalence of UTI in both sexes and age groups are varying. As for the first 3 months of life, UTI mostly infected males due to their structural abnormalities such as the presence of posterior urethral valves. However, after the age of 3 months, UTI is much more common in females due to functional cause, in which relating to the reflux of urine due to vesicoureteral valve incompetence that is usually being corrected spontaneously along puberty (González-Chamorro, Palacios, Alcover, Campos, Borrego & Dámaso, 2012). This is emphasized by Tsiouris and Lowy (2004) that from adolescent until young adulthood, the prevalence of UTI is significantly higher in female compared to male. They also added that the lifetime risk of a woman to be infected with UTI ranges between 20% and 50%. Although every female individual is susceptible to UTI, UTI however, is commonly associated with frequent sexual intercourse or the use of spermicidal or a diaphragm (Tsiouris and Lowy, 2004).

2.4 Etiology of UTI

Bacteria that cause UTI mostly enters urinary tract from urethra in ascending manner, but can also enter via bloodstream (Lee and Neil, 2007). This is also supported by Heffner & Gorelick in 2008 based on their study regarding UTI in children. They also reported that most pathogen identified is gram-negative bacteria, which *Escherichia coli* represented most frequently about 70% to 80% among healthy children. Ronald in 2002 claimed that *Escherichia coli* remains the predominant uropathogen (80%) isolated in acute community-acquired uncomplicated infections, followed by *Staphylococcus saprophyticus* (10% to 15%). Moreover, *Escherichia coli* is also proven to have two virulence factors that cause UTI which are 'P fimbriae' and 'Type I fimbriae', in which helps to enhance the ability of *Escherichia coli* to attach to urogenital epithelial surface (Tsiouris and Lowy, 2004).

Generally, most female adolescent infected with UTI due to pathogen *Staphylococcus saprophyticus* (Heffner and Gorelick, 2008). In contrast, a study in Kelantan, Malaysia among female school students showed that *Escherichia coli* is the common pathogen (51.85%), followed by *Klebsiella pneumoniae* (18.52%) and lastly *Staphylococcus saprophyticus* (16.67%) (Ettehad *et al.*, 2007). Almost similar to this finding, a study in Istanbul also found that the most frequent bacteriuria that caused UTI in adolescent were *Escherichia coli* (74%), followed by *Proteus mirabilis* (18.7%) and *Klebsiella pneumoniae* (6.3%) (Öner *et al.*, 2004).

2.5 Risk factors of UTI

The risk factors of UTI are varying and it can be categorized into two groups.

2.5.1 Intrinsic factors

Intrinsic factors include vesicourethral reflux, dysfunctional voiding, constipation, obstruction, and gender-specific anatomy (Freedman, 2012).

Of this group, vesicourethral reflux is the main risk factors for UTI (Barosso et al, 2003). This is also supported by Freedman in 2012 that among adolescent infected with UTI, 35% of them reported of reflux. Therefore, he claims that reflux increases the risk of infection, in part by increasing post-void residual. Moreover, involuntary contraction of bladder proven to be the main cause of reflux in 87% of female school children in Brazil presented with voiding urgency, which is a clinical sign of involuntary contraction of detrusor (Barroso *et al.*, 2003).

Besides that, dysfunctional voiding and dysfunctional elimination such as constipation or functional fecal retention is thought to be the important risk factors. Dysfunctional voiding refers to a behavior related to voiding process that usually begins with voluntary holding (Freedman, 2012). Dysfunctional voiding may also presented with urgency, frequency, urge incontinence, pelvic pain, and signs of holding such as squatting (Freedman, 2012). Additionally, dysfunctional voiding can also be compounded by chronic constipation. In a Turkish study, it was reported that of 766 females, 240 who experienced UTI claimed they had constant chronic constipation (Timur-Tashan, Beji, Aslan & Yalcin, 2012).

Freedman also emphasize that constipation frequently coexists in children with recurrent UTI.

Meanwhile, urinary tract obstruction due to the presence of stones is also found to be one of the main causes of UTI. For example in a Pakistani study among patients with UTI, it was reported that, 15% of the patients had kidney or bladder stone (Muhammad Ramzan, Sattar Bakhsh, Abdus Salam, Gul Majid Khan & Ghulam Mustafa, 2004).

As mentioned previously, the relatively shorter length of female urethra is acknowledged as the main cause of UTI (Freedman, 2012). This is followed by poor personal hygiene that may due to infrequent genital cleansing, incorrect “wiping” technique and tight panty hose (D'Angelo, 2012). It is advisable that the direction of movement during genital cleansing or wiping should be antero-posteriorly . Therefore, incorrect “wiping” technique will introduce fecal flora into periurethral region, thus leads to infection (González-Chamorro *et al.*, 2012; Oner 2003).

2.5.2 Extrinsic factors

Extrinsic factors include catheterization and Diabetic Mellitus. Of this group, catheterization is proven to be one of the causes of UTI. Study in Pakistan among 100 patients with UTI revealed that single transient catheterization of bladder induces bacteriuria approximately in 1% of ambulatory and 10% of bed

ridden patients (Muhammad Ramzan *et al.*, 2004). Similar findings were also found in Ronald (2002) and D'Angelo (2012).

The other extrinsic factor is those with Diabetes Mellitus. Individual that has been diagnosed with diabetes is at higher risk to have UTI., due to the unfavorable metabolic changes such as elevated blood sugar levels that suppress the immune system, poor glycemic control, duration of disease, diabetic microangiopathy, impaired leukocyte function due to hyperglycemia, recurrent vaginitis as well as anatomic and functional abnormalities of the urinary tract (Muhamad Fauzan 2004; Stapleton 2002).

2.6 Symptoms of UTI

Symptoms of UTI are different between lower and upper UTI. Lower UTI such as acute cystitis usually presented with frequency, urgency and dysuria. Generally when infected, urine is discolored, and appears hazy and offensive (Lee and Neil, 2007; Clayson et al.2005; Timur-Tashan). While for urethritis that is commonly related to sexually transmitted infection, it is normally presented with dysuria and urethral discharge (Lee and Neil, 2007).

Whereas for upper UTI, acute pyelonephritis is commonly presented with fever, malaise, groin pain which may be bilateral, bacteriuria as well as pyuria, the existence of pus cell in the urine (Lee and Neil, 2007: Muhamad Ramzan, 2004). Similar symptoms may occur in chronic pyelonephritis and it is known to be one of major causes of renal failure in children and young adults (Lee and Neil, 2007).

Other symptoms of UTI reported in the literature include hematuria, back pain and stinging or burning sensation during voiding (Leydon et al. 2010).

2.7 Complications of UTI

Studies have proven that UTI have some considerable complications to its sufferers. This include renal scarring, adverse outcomes during pregnancy, systemic arterial hypertension, and also chronic renal failure that eventually lead to end stage renal disease (ESRD) (Harmsen *et al.*, 2007; Sinha & Postleth 2003; Habib 2012). Once diagnosed with UTI, prompt and appropriate antibiotic as well as other treatments are required to prevent progression of UTI complications.

2.8 Treatment of UTI

Prompt treatment is essential for UTI as delayed diagnosis and therapy can leads to morbidity and long term complications. In order to treat UTI effectively, several factors need to be considered including age, severity of infection as well as rates of antimicrobials resistant in community (Heffner and Gorelick, 2008). Basically, treatment of UTI can be divided into two parts; short term or acute treatment and long term treatment.

2.8.1 Short term management of UTI

Short term management mainly aims to decrease morbidity and prevent long term renal damage. According to Heffner and Gorelick (2008), simple cystitis among female adolescent is normally treated with a 1 to 3 days shorter course of oral antibiotics that proven effective. The usual antibiotics of choices are cephalosporins, amoxicillin as well as clavulanic acid, or trimethoprim sulfamethoxazole (Habib, 2012; Malhotra & Kennedy 2004; Lee & Neild 2007).

2.8.2 Long term management of UTI

As for long term management, adolescent should be taught about healthy bowel and voiding habits. This is because, adolescent commonly presented with dysfunctional voiding syndromes and constipation as reported by Habib (2012) that most adolescent presented with constipation as well as day-time enuresis and encopresis. Encopresis is defined as the voluntary or involuntary passage of stools in a child who has been toilet trained which is over age of 4 that causes the soiling of clothe (Kaneshiro, 2012).Therefore, health education regarding personal hygiene, hydration as well as normal micturition process should be delivered to adolescent in order to prevent from the development of long term complication of UTI.

2.9 Prevention of UTI

Preventive measures are crucial to reduce the incidence of UTI among female population particularly female adolescent. As for general prevention, ones should increase fluid intake to dilute and remove the bacteria that reach the bladder with frequent urination (González-Chamorro *et al.*, 2012). While Lee and Neild (2007) emphasized that avoidance of antibiotics and spermicidal cream as well as daily drinking of cranberry juice may help to reduce incidence of UTI.

Apart from that, proper cleansing technique of the genital area particularly for women is encourage to helps preventing fecal flora from entering periurethral area (González-Chamorro *et al.*, 2012).

It is also advisable to treat constipation particularly for those who frequently experience this problem. This is because constipation may cause increase in abdominal pressure during physical activity or defecation process. This later on increases the bladder pressure and urethral mobility that interrupts the normal flora, thus leads to UTI (Wenju, Yanfeng, Xiaoyu, Huijuan, Chunni, Lan & Yaqin, 2005).

2.10 Awareness of UTI

It is acknowledge that UTIs are commonly affects women compared to men and the prevalence rates increases in women from adolescent to young adulthood. (Tsiouris and Lowy, 2004). Most UTI studies previously focuses mainly on prevalence and incidence of UTI in adult female population (Foxman, 2002; Timur-Tashan *et al.*, 2012). The aims of the studies were commonly to determine associated risk factors of UTI among female population which is useful as the references for the current study

(Timur-Tashan *et al.*, 2012), (Wenju *et al.*, 2005). However, UTI studies specifically on adolescent group are scarce (Öner *et al.*, 2004). At this stage, the researcher could not find any study assessing adolescents' awareness of UTI. There was only one study found assessing awareness but the focus was on parent's awareness of UTI (Harmsen *et al.*, 2007).

2.11 Conceptual/ Theoretical Framework

This study will be going to utilize the Health Belief Model (HBM) to help guide the researcher understands about adolescent awareness of UTI. This model was initially developed in 1950s by a social psychologist in US Public Health Services. In the earlier years, it was used to explain the widespread failure of people to participate in prevention and screening programs of particular diseases. The model was then improved and evolved gradually and being used to explain people's responses to symptoms, behavior in response to illness, and adherence to medical regimens (Champion & Skinner, 2008).

Basically, the model suggests that the likelihood of a person to take action which related to a given health problems that based on four different types of belief as in Figure 2.1 below. Besides that, the model also predicts the action of an individual either to protect or promote health once they accepted the problems, understand the consequences of problem, believed that specific actions will eventually overcome the consequences and the benefits are far outweighs the cost or barriers.