THE EFFECT OF ANTIBIOTIC THERAPY IN URINARH TRACT INFECTION IN INSULIN DEPRENDENT DIABETIC PATIENTS

THESIS

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C O N T E N T S

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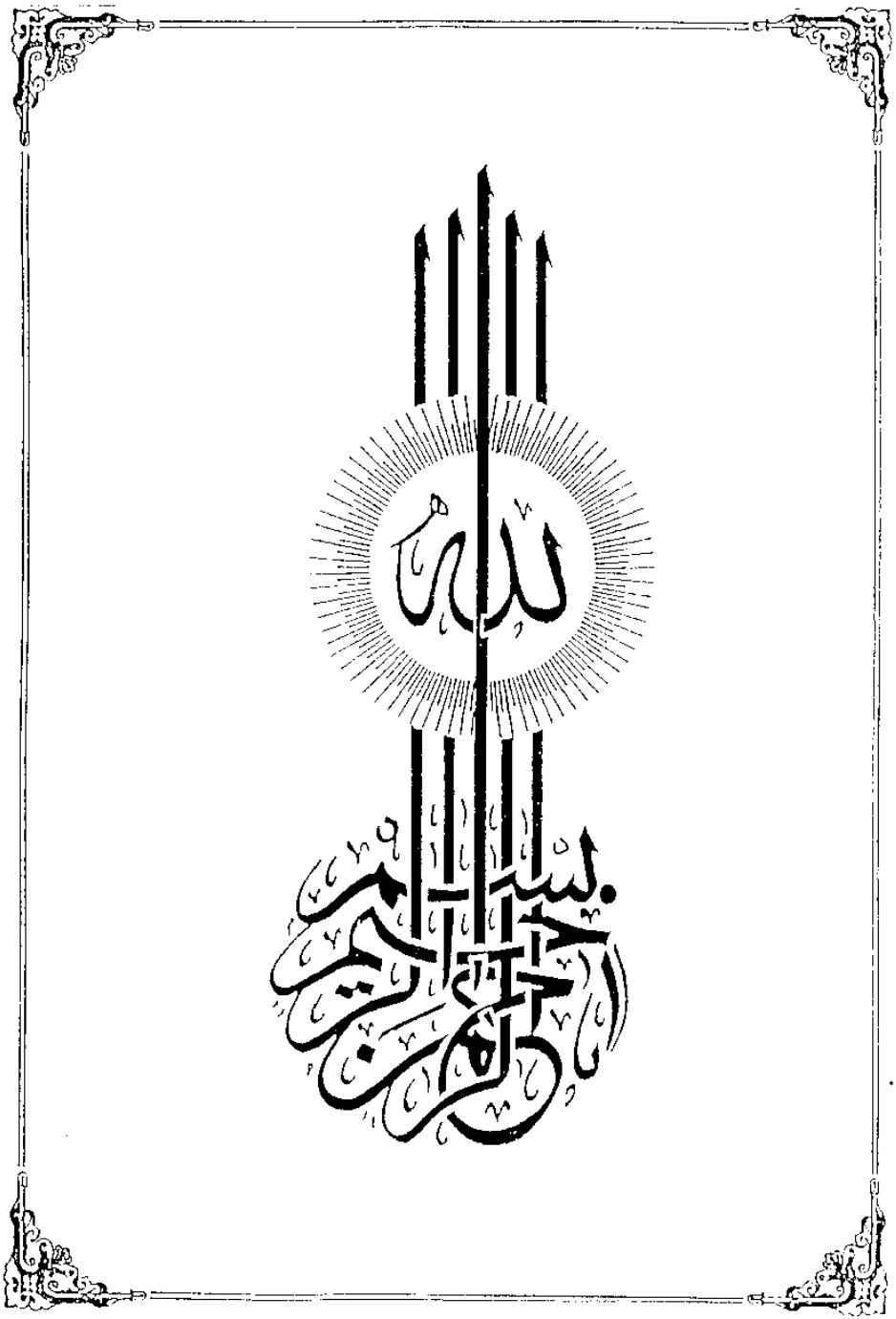

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I N T R O D U C T I O N:

Diabetes mellitus is the most common of the serious metabolic diseases. The disesae is characterized by metabolic abnormalities, by long-term complications involving the eyes, kidneys, nerves and blood vessls.

Urinary tract infection is a common complication of the urinary tract.

According to Beeson, (1958) the U.T.I.s are three to four times as common in diabetics as in non-diabetics of comparable age, also, both diabetes and pregnancy predispose to UTI. (Oxford, 1983).

Therefore, with adequate control and attentive management, the incidence of this complication can be greatly reduced. The main treatment of UTI in diabetic patients includes special care and proper control of the disease to eradicate the infection as it is supposed to be more invited by glycosuria. (Williams, 1981).

Our study will include UTI in juvenile insulin-dependent diabetic patients being a common infection. This work is for study the effect of antibiotic therapy in UTI of insulin-dependent diabetic patients.

B A C T E R I U R I A

Bacteriuria means the presence of bacteria in urine. Significant bacteriuria is defined as the finding on two successive occasions of more than 10^5 organisms per ml. of urine when a clear voided midstream specimen is collected and cultured immediately, as does a single suprapubic aspiration with any bacterial growth. (Roberts, 1965 and Alvarez, 1976).

Urinary tract infection is defined as the presence of significant amounts of actively multiplying micro-organisms in the urinary tract. (Smellie, Normand, 1982).

A number less than 10^5 / ml. is considered as contamination because organisms which have multiplied in the bladder urine before voiding will be present in large number, whereas contamination are added to the urine during or after collection are found in small numbers (Nozden and Kass, 1968).

Certain factors such as the rate of flow of urine, the amount of vaginal discharge in women and the method of collection of the midstream specimen may affect the level of bacteriuria, so considerably that occasionally a false positive or a false negative diagnosis may result. (Roberts, et al,. 1967).

Symptomatic and asymptomatic bacteriuria:

Studies have suggested that the presence of more than 10^5 organisms of a single species per ml. of freshly voided and cultured urine in a patient with symptoms of dysuria, increased frequency and urgency of micturition is highly 80% to 85% indicative of acute urinary tract infeciton. The likelihood of active urinary tract infction increases to about 96% if two consecutive cultures reveal 10^5 organisms per ml. (Orga and Faden, 1985).

In symptomatic subjects, the presence of even lower numbers of organisms 200 to 1000 bacteria / ml. in catheterized or aspirated suprapubic samples of urine have been considered indicative of urinary tract infection. Symptomatic infections are usually accompanied by more than 10 white cells per ml. of uncentrifuged fresh urine. (Smellic, 1970).

Healthy individualsl or otherwise asymptomatic patient being screened for bacteriuria has been considered at risk of urinary tract infection if two or three consecutive cultures reveal more than 10^5 organisms per ml. of freshly voided urine. (Orga and Faden, 1985).

Eastwood, (1982) reported that significant bacteriuria does not necessarily imply tissue infection and vice versa. Changing the figure limiting significant bacteriuria from 10^5 to 10^2 does not get round this problem. For we still have patients with inflammatory diseases of the urinary tract

and sterile urine.

Classification of U.T.I.:

Symptomatic UTI on the basis of symptoms and on complementary laboratory tests. The diagnostic criteria for symptomatic bacteriuria, include dysuria, frequency, fever not exceeding 38°C, backache, loin pain and laboratory tests showing bacterial counts more than 10^5 organisms / ml. in freshly voided urine. (Hanson et al,. 1981).

Thus UTI classified into:

1- Acute pyelonephritis.

2- Acute cystitis.

3- Asymptomatic bacteriuria.

Patients with loin pain, tender kidneys, fever above 38°C and positive blood culture, this clinical picture was regarded as acute pyelonephritis (Fairly et al., 1971).

If bacteriuria is demonstrated plus backache, loin pain, dysuria, frequency, fever not exceeding 38°C and laboratory tests showing bacterial count 10^5 or more organisms / ml. is referred as cystitis. (Gallagher et al., 1965).

Pus and UTI:

Pyuria is defined as the presence of ten or more pus cells per cubic millilitre in uncentrifuged urine. (Tapsall

et al., 1975). Baily (1970) suggested that symptomatic urinary tract infection is usually accompanied by the presence of pus cells more than 10 / ml. of uncentrifuged urine.

Causative organisms of UTI:

James (1972) and Orga & Faden (1985) stated that the organisms most commonly responsible for UTI are the gram-negative enteric organisms that are normal inhabitants of the large bowel. E. coli accounts for about 80% for uncomplicated infections, followed by Klebsiella, Enterobacter and Proteus.

The less common primary invaders are pseudomonas, Enterococci, Staphylococcus aureus and Staph. albus.

Winberg (1986) and Brener & Rector (1981) added that pure cultures of coagulase negative Staph. were found in 3% of children with symptomatic urinary tract infections. Turner, (1961) stated that while E. coli is the commonest organism found in acute and chronic symptomatic urinary infection, proteus, pseudomonas, pyocyanea, Strept. faecalis, Staph. aureus and Aerobacter aerogens are also frequently isolated. In chronic cases the infection is often a mixed one. He found also that over 90% of cases, only one type of organisms was present and E. coli is the most predominant strain. Gruneberg (1980) found that organisms causing UTI vary from place to place and from time to time. The most

causative organisms were E. coli, proteus, Klebsiella and enterococci, Staph. aureus, Pseudomonas aerogenosa and others.

The most majority of UTI are produced by single organism. Rarely, two types of bacteria may be responsible for producing infection. (Braude, 1982).

Adelman (1984) stated that seventy percent of E. coli strains causing acute pyelonephritis in children belong to only types of different K-antigen.

Insulin-dependent diabetes mellitus and urinary tract infection:

The relationship betwen bacteriuria and diabetes is not entirely clear, many reports have shown an increased prevalence of UTI in diabetics.

Under normal conditions, a number of host factors contribute to the natural resistance to the UTI. These include the ability of the bladder to empty completely and the intact vesico-ureteric valve. Hence, the high susceptibility of infection with diabetic neuropathy and neurogenic bladder dysfunction due to presence of residual urine and vesico-ureteric reflux. The resistance to the UTI also includes the hypertonicity of the renal medulla, and the antibacterial activity of the prostatic secretions.

Asymptomatic bacteriuria in D.M.:

Asymptomatic infections are common in diabetic patients who complain of symptoms have no bacteriuria.

Beeson (1958) stated that urinary tract infections are three to four times as common in diabetics as in non diabetics of comparable age. As possible reasons for this, he suggested, increased susceptibility to infection, enhanced growth of bacteria in sugar containing urine and relatively frequent catheterization.

Huvos and Rocha (1959) and Rengarts (1960), found that hospitalized diabetic and non-diabetic patients had approximately equal rates of bacteriuria.

Szucs et al., (1960), found significant bacteriuria in 6% of diabetic patients. This does not differ essentially from the results obtained by other authors in the normal population.

Vejlsgaard, (1966) reported that diabetic females have a higher incidence of bacteriuria than non diabetic.

Murvin (1977) confirmed the findings of other investigators who reported a high prevalence of asymptomatic UTI among diabetic women, explanations for this high prevalence in women remain speculative.

Oxford (1983) stated that both diabetes and pregnancy predispose to UTI.

Asymptomatic bacteriuria was found to occur more commonly in females than males and in the patients who were over 40 years old. The incidence of bacteriuria was not found to be related to the degree of control in the diabetic patients. The most common organism cultured was E. coli. (A. Abu-Bakare and S.M. Oyaide, 1986).

The prevalence of asymptomatic bacteriuria in D.M. has been reported to be between 7 and 34%. (Vigg & Rai, 1977), Ooi et al., (1974), Rengarts (1960), and Jackson et al., (1962). However, whether thre is an increased incidence of overt bacteriuria in diabetes compared with normal population has remained controversial. (Huvos , Rocha (1959), O'Sullivan et al., (1961), and Pometta et al., 1967)).

A similar conclusion as A. Abu-Bakare and S.M. Oyaide (1986) was reached by Vigg & Rai, (1977), and Jaspan et a., (1977) in their studies.

Schmitt J.K., Fawcett, C.J., (1986) stated that the prevalence of bacteriuria was significantly greater in diabetic women than in controls but not in diabetic men. However, mean duration of diabetes mellitus was significantly greater in diabetic women with bacteriuria, than in those without infection and the prevalence of bacteriuria was significantly greater in patients with complications of long standing diabetes mellitus than in those without complications.

The high susceptibility of UTI in females is probably due to local risk factors such as diabetic cystopathy and vaginitis, the latter being frequently associated with glycosuria. UTI in diabetic individuals often have a complicated course which may be explained by the aforementioned compromised host defence mechanism. (Zimmerli W., 1984).

Lindberg, U., Bergstrom A.L., Carlsson E., Dahlquist G., (1985), reported that the rate of UTI in young diabetic - persons does not differ from that present in healthy young people.

There is an increased risk of perinephric abscess and renal medullary necrosis in diabetics. (Balodimos , 1971). Ooi et al,. (1974) have recently reported that there was indirect evidence that the kidney was affected in 62.5% of diabetic females with asymptomatic bacteriuria. These hazards associated with urinary tract infection in diabetics tend to makek bacteriuria highly significant, however, small the incidence (A. Abu-Bakare and S.M. Oyaide, 1986).

Residual Urine and UTI in D.H. "IDDM and NIDDM":

The presence of residual urine was strongly associated with peripheral neuropathy. In contrast, of all the manifestations of autonomic failure studied, only impotence and decreased pupil motility were associated with residual urine. The prevalence of UTI was higher in women than in

men. This prevalence was increased in the presence of residual urine but only for men. (Beylot M., 1983).

Localization of the site of UTI:

There are various techniques and laboratory studies to determine the site of infection:

1- Ureteric Catheterization:

A decision as to whether the renal infection is unilateral or bilateral can be made. The most serious complications are introduction of bacteria into the kidney, bacteriuria and septic shock. For these reasons this procedure is infrequently used. (Warren et al., 1978).

b- Bladder washout:

For assessing ureteric bacteriuria, Fairly technique is used, the patient empties the bladder and midstream urine samples is collected. Multilumen is introduced into the bladder and a baseline urine culture obtained. The bladder is then filled with saline solution containing an aminoglycoside antibiotic "neomycin" and mucolytic agent, for 30 to 45 minutes. This solution is then washed out with saline. Serial urine cultures are obtained at 10 minutes intervals over a period of about 30 minutes. These samples represent ureteric urine so any organisms found indicate upper urinary tract infection. (Fairly et al., 1971).

In most cases of infection contained to the bladder the post-washout culture are sterile. If bacteria are detected and specially if their number increases in the serial post-washout culture, they are mostly likely emanating from the kidney. (Thomas et al., 1974).

3- Determination of serum antibody of infecting micro-organism:

Cystitis is thought to be a more superficial infection and therefore does not lead to serum antibody formation. (Winberg, 1963).

Patients with pyelonephritis may develop rising antibody titre or have high circulatory antibody to their infecting micro-organisms.

4- Detection of antibody-coated bacteria in urine:

Jones and his-colleagues (1974) stated that the detection of antibody-coated bacteria has been used as an indicator of renal infection.

5- Determination of maximum concentrating ability:

Patients with pyelonephritis frequently unable to concentrate their urine to the same extent as normal control of patients with cystitis after overnight fast or following infusion of antiduretic hormone.