URINE EXAMINATION IN RHEUMATIC DISEASES

THESIS
Submitted In Partial Fulfilment
For The Master Degree In
Physical Medicine

By

Hanaa Fathy Saad Mohamed

M. B., B. Ch.

Under Supervision Of

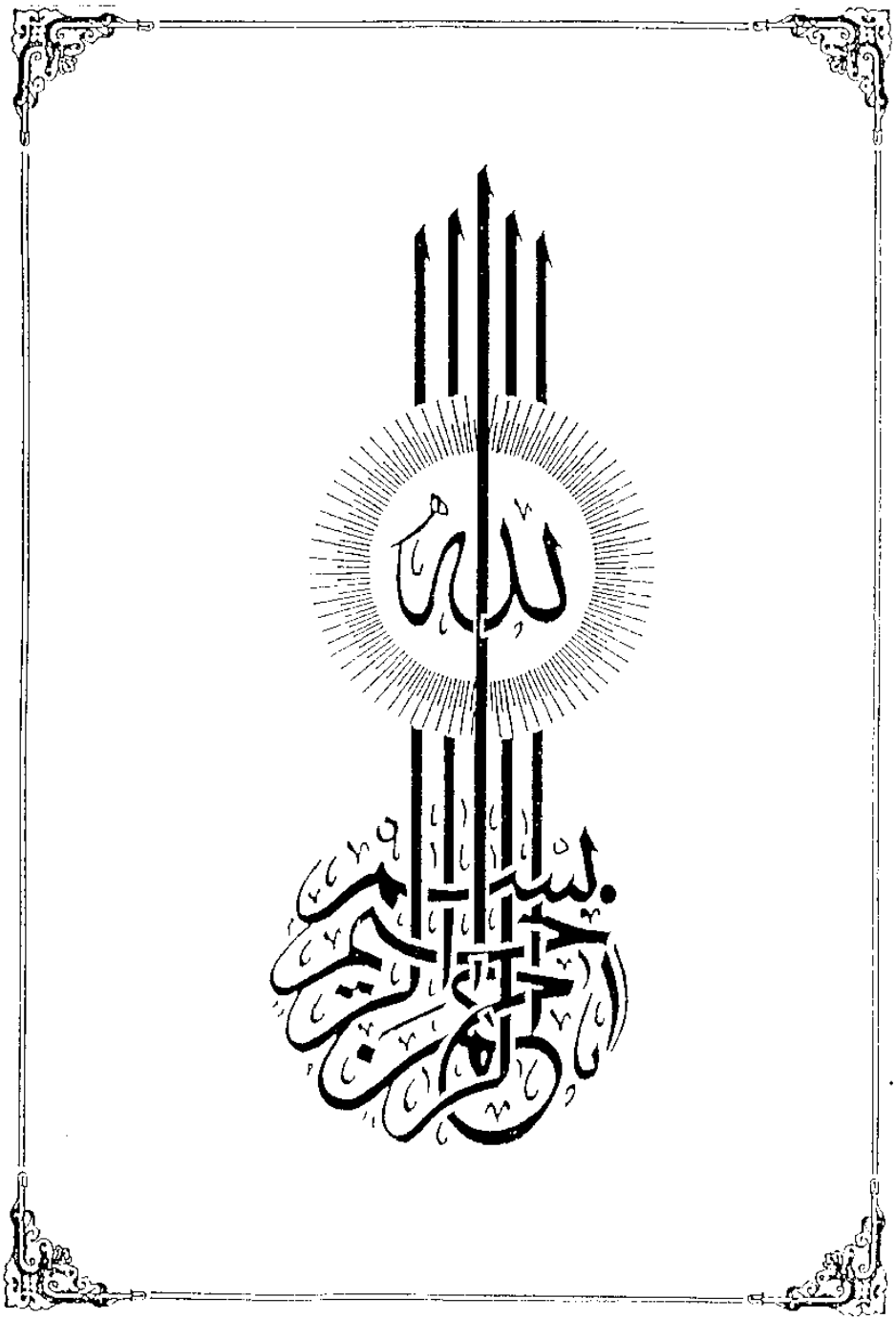
Prof. Dr. HATEM EL-EBIARY
Prof. And Head Of
Physical Medicine Department

Dr. MOHAMED GAMAL EL-DIN ZAKI
Lecturer Of Physical Medicine

Faculty Of Medicine
Ain Shams University

1987

بسم الله الرحمن الرحيم



ACKNOWLEDGEMENT

I would like to express my deepest gratitude to my Prof. Dr. **HATEM EL-EBIARY,** Head of the Physical Medicine Department for his kind guidance and encouragemet.

I am also grateful to Dr. **MOHAMED GAMAL EL-DIN ZAKI** for his kind supervision, encouragement and useful directions all through the work.

Special thanks to every one helped me in preparing this thesis.

CONTENTS

INTRODUCTION

INTRODUCTION

Urine examination is important in the diagnosis and treatment of many of the rheumatic diseases. Urinary changes may be in association with the known signs of some rheumatic diseases or may be a complication of others.

Microscopic haematuria, proteinuria and clyinduria include red cell casts are the manifestations of lupus nephritis which is present in approximately one half of systemic lupus erythematosus patients (Rodnan et al., 1983).

Certain renal complications was occasionally found to follow use of certain drugs such as gold and D-penicillamine in the treatment of some rheumatic diseases. Therefore, the urinary proteins was used to help in monitoring whether the drugs used should be discontinued or not.

In 1976, Bacon et al. found that patients with rheumatoid arthritis treated with D-penicillamine may develop proteinuria which usually resolves when the drug is withdrawn.

Moreover, urine examination is of value in assessment of some rheumatic disease activity. Reibnegger et al. (1986) revealed that urinary neopterin level is significantly high in rheumatoid arthritis and strongly dependent on the stage and activity of the disease.

In this thesis, we are going to review the laboratory investigations of urine in different rheumatic diseases.

AIM OF THE WORK:

The aim is to review the literature on urine examination in different rheumatic diseases in order to clarify its value in the diagnosis and follow up of these diseases, also to prevent possible complications which might occur during treatment.

EXAMINATION OF URINE

EXAMINATION OF URINE

Urine analysis can provide a wide variety of clinical information regarding urinary tract involvement or systemic diseases. Careful laboratory examination of urine often narrows the clinical differential diagnosis of numerous diseases and also, important in monitoring the treatment and convalescence of certain diseases.

Currently urine analysis procedures include physical, chemical and microscopic examination (Schumann, 1984).

I. Physical Examination:

It includes examination for volume, odour, appearance, specific gravity and osmolarity.

Volume:

Urinary volume is influenced by the fluid intake, solutes which are excreted as sodium and urea, loss of fluid in perspiration and respiration, also it is influenced by cardiovascular and renal status.

Normally adults excrete 750 to 2000 ml/24 hours.

Odour:

Although odour change is not a diagnostically significant criterion, it can provide clues to certain urine abnormalities for e.g. an ammonia-like odour suggests urea-splitting bacteria, fruity odours indicate the presence of acetone and a sweet or

foul odour suggests pus or inflammation.

Normal fresh urine is odourless.

Appearance (Colour and Turbidity):

Colour:

Colour of urine is determined to a large degree by the specific gravity. Normal urine colour varies widely from colourless to deep yellow.

Turbidity:

Normally freshly voided urine is clear. The most common causes of cloudy urine are the presence of urates, phosphates, calcium oxalates, bacteria, erythrocytes and leucocytes.

Specific Gravity:

Urinary specific gravity can serve as a partial assessment for the ability of the kidneys to concentrate urine. The normal value is ranged from 1.005 to 1.030 g/ml.

Osmolarity:

Osmotic pressure is determined by the number of particles per unit volume. Normal values are ranged from 300 to 1200 mosm/kg in adults and from 200 to 220 mosm/kg in infants.

II. Chemical Examination:

It includes:

Urinary pH:

Urinary pH measures the concentration of free hydrogen ions in urine. The normal pH value is ranged from 4.7 to 7.8. The pH

is used to monitor the adequacy of treatment in several conditions e.g. in cases of salicylate intoxication which might occur during the course of treatment of many rheumatic diseases, the alkaline pH is maintained.

Examination for Sugars:

Sugar appears in urine in diabetes mellitus, renal glucosuria and other clinical situations.

Examination for Ketones:

Ketone bodies appear in the serum and then in the urine of persons in starvation, with diabetes or with increased fat utilization.

Examination for Bilirubin:

Normal urine does not contain any bilirubin.

Examination for Urobilinogen:

Urobilinogen is a colourless compound. It is formed in the intestine by the bacterial reduction of bilirubin. Normal urine contains a small amount of urobilinogen.

Examination for Blood and myoglobin:

Normal urine contains only a few erythrocytes (less than 5 erythrocyte per high power field). Haematuria most often represents a combination of intact erythrocytes, degenerated erythrocytes and free haemoglobin.

Examination for Porphyrins:

Small amount of porphyrin is normally excreted in urine. It is approximately 2mg/day.

Examination for Melanin:

Normal urine does not contain melanin.

Examination for Fats:

Fats are found in the urine of patients with fatty degeneration of the kindey or in nephrotic syndrome.

Examination for Proteins:

Human urine contains many different proteins, all are in trace amounts. Normally urianry proteins should represent less than 75 mg/l.

Types of Proteins Found in Urine (Anderson et al., 1979):

(1) Normal Plasma Proteins, or Fragments of them:

Probably all of the proteins present in normal plasma can be found in normal urine if sensitive methods are used. In normal plasma, only trace amounts of proteins with molecular mass of less than 40,000 are present which pass through the glomeruli, then largely reabsorped and possibly catabolized in the renal tubules. Among these proteins, retinal binding protein, α_1 microglobulin, B_2-microglobulin, fibrinogen split products, fragments of factor B, a protein co-isolated with B_2-microglobulin and IgG light chains have been identified.

(2) Proteins Released into the Urine from the Kidney itself:

The Tamm-Horsfall protein (or uromucoid) originates in the kidney tubules and is the predominant protein of urinary casts.

Normal urine also contains basement-membrane antigens, alkaline phosphatase, gamma glutamyl transferase, urokallikerein and erythropoietin. Most of the enzymes that have been detected in urine probably originate in the kidney.

(3) Proteins Reaching the Urine After its Formation in the Kidney:

They may arise from the surface epithelium of urogenital tract e.g. acid phosphatase from prostatic secretion.

(4) Proteins Leaked from Tissues Outside the Urogenital Tract:

Ten antigens have been described in normal human urine, some of which were common to the submaxillary gland, pancreas, heart, liver and kidney.

Blood group A and B substances and transplantation antigens have been reported as constituents of normal urine.

(5) Hormones or Other Signal Substances:

All of the known pituitary proteins hormones appear to be detected in urine. However, questions have been raised concerning prolactin in particular.

Examination for Hydroxyproline:

The excretion of hydroxyproline in the urine provides a useful reflection for collagen metabolism. Hydroxyproline is a

modified amino acid which makes up approximately 13% of the weight of collagen except for a small amount in elastin (about 1.5%) are brain lipoprotein, very small quantities of hydroxyproline and present in other tissue constituents (Smiley and Ziff, 1964). The hydroxyproline in collagen arises from the hydroxylation of proline with ascorbic acid serving as a cofactor. This hydroxylation reaction occurs after the proline is incorporated into peptide (Bollet, 1975).

Urinary Hydroxyproline Excretion in Normal Individuals:

Subject	Total hydroxyproline mg./day	
	Average	Range
Children	62	15-150
Normal pubertal adolescents	350	150-700
Adults	30	15-55

(From Smiley and Ziff, 1964)

Forms of urinary hydroxyproline: 2 forms of urinary hydroxyproline are present.

(1) Peptide bound form: It comprises 95% or more of the total hydroxyproline excreted in urine. Isolation and characterization of hydroxyproline containing peptides from human urine have indicated that the dipeptide prolylhydroxyproline accounts for