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Editorial

Original Articles

Editorial

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Need of Health Policy and System Research for Improvement of EmONC Services in Pakistan

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HPSR can explain the reason as to why a certain policy and practice does or does not work. This is the segment that can be described with more clarity as it delves into those parts where interaction is absolutely essential. The interaction is very important as HPSR can be described as a process where there is an attempt to measure the pessimistic assumptions that these people have which call for no investment in health systems, interactive systems, and different markets. There are HPSR Policy Studies which discuss Moving Research into Practice And also Global Development with the World Health Organization for instance. Health policy and systems research can be designated as HPSR encompassing multiple elements that do not fit into single descriptive whereas the overreaching aim of HPSR is to evaluate effectual strategies and policies which promote safe and healthy population growth.

Health policy and systems research matter for better decision making and through evidence based. Every day, ministers of health, senior policy makers and health service managers make critical decisions about how to organize the health system and effect changes. Few would dispute that decisions such as these are likely to lead to better results if they are informed by evidence. Through multiple researches it has been concluded that 97% of grants were for developing new technologies, which could reduce child mortality by 22%. This reduction is one third of what could be achieved if existing technologies were fully utilized (2).

Strengthening service delivery is crucial to the achievement of the health-related Millennium Development Goals (MDGs), which include the delivery of interventions to reduce child mortality, maternal mortality and the burden of HIV/AIDS, tuberculosis and malaria. Life threatening pregnancy related complications take the life of approximately 15% of expected births globally (3). To reduce such complications, the World Health Organization, the United Nations Children's Fund, and the United Nations Population Fund established the workflow for the provision of Emergency Obstetric and Newborn Care which was published in a guidance document in the year 1997. EmONC services include Basic Emergency Obstetric and Newborn Care (BEmONC): antibiotics' dosage management, anticonvulsants, uterotonics, removal of retained products, assisted vaginal delivery, placental removal, and revival of newborn; and Comprehensive Emergency Obstetric and Newborn Care: all BEmONC services, surgical capacity, and blood transfusion. This makes a health facility capable of treating obstetric and pregnancy emergencies.

In Pakistan, maternal mortality is a public health concern which needs to be highlighted. Poverty is its most significant determinant that prevents females from receiving education, having nutritious foods and accessing reproductive healthcare services. A study conducted in Pakistan to assess the status of EmONC services concluded that a total of 32 health care facilities were surveyed: 14 (43.75%) providing basic care and 18 (56.25%) providing comprehensive obstetric care. All required signal functions were available at 4 (22%) in the latter category and 3 (21%) in the former category. The met need for EmONC was 17.8% (4). Pakistan has a good healthcare system which encompasses a Basic Health Unit (BHU), a Rural Health Center (RHC) and a tertiary unit. These services are underutilized due to inaccessibility, poor referral system, broken roads, and unavailability of working ambulances hinder the timely transfer of women to hospitals. A cross-sectional survey on emergency obstetric care services revealed that more than 50% of public health facilities lacked female physicians to provide EmONC services (4). Maternal mortality due to obstetric emergencies can be prevented by strengthening the available healthcare facilities. Moreover, governmental and nongovernmental organizations should implement a focused program for female education, which would consequently reduce the rate of early marriage.

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Original Article

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Association of Bicarbonate level in Stage 3 and Stage 4 of Chronic Kidney Disease (CKD) Patients

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ABSTRACT

Background and Objectives: Chronic kidney disease (CKD) disrupts acid-base balance, leading to metabolic acidosis. The impaired kidneys cannot remove acid effectively or reabsorb enough bicarbonate, resulting in low bicarbonate levels and metabolic acidosis. To evaluate the association of bicarbonate in patients among chronic kidney disease (CKD) stage 3 and stage 4. To evaluate the metabolic acidosis in the progression of chronic kidney disease (CKD).

METHODOLOGY: A retrospective study was conducted in the Department of Nephrology, Sheikh Zayed Hospital, Lahore, Punjab. The study was conducted during the 3 months from May to July, 2023. The study included a total of 150 patients diagnosed with chronic kidney illness. Among these individuals, 74 were found to have stage 3 CKD, while the remaining 76 were evaluated to have stage 4 CKD. Cobas C-311 and Microlab 300 were used to analyze bicarbonates level. A self-designed Performa was used to collect the patient data. Data were entered and analyzed by using excel and displayed by using Tables and Bar Charts.

RESULTS: In chronic kidney disease (CKD) stage 3, results indicated that 45% of male patients and 32% of female patients had normal serum bicarbonate levels ranging from 22 to 29 mEq/L, while the level was less than 22 mEq/L in 55% of males and 68% of females. According to the results from chronic kidney disease (CKD) stage 4, 15% of male and 14% of female patients had normal serum bicarbonate levels ranging from 22 to 29 mEq/L, and 85% of male and 86% of female patients had a serum bicarbonate level < 22 mEq/L.

CONCLUSION: In conclusion, individuals with CKD, especially those in late stages, frequently have metabolic acidosis, which is characterized by low blood bicarbonate levels. This condition has been associated with higher mortality rates and greater risk of kidney disease progression.

KEYWORDS: Chronic kidney disease (CKD), Nephrology, Metabolic acidosis, Bicarbonate.

INTRODUCTION

The kidneys, a pair of organs resembling beans, are positioned beneath the rib cage on both sides of the spine. To maintain body homeostasis, kidneys remove acid produced by cells and regulate the balance of water, salt, and minerals in the body(1). The kidneys have a crucial role in upholding the balance of various electrolytes (bicarbonates and phosphate ions) in the body, thereby contributing to the maintenance of overall body homeostasis(2). In mitochondrial energy production, pyruvate is oxidized into acetyl CoA and CO2 in the presence of pyruvate dehydrogenase. As CO2 is metabolized by carbonic anhydrase enzyme, it becomes carbonic acid. As carbonic acid dissociates into bicarbonate, it forms bicarbonate. As a labile molecule, bicarbonate increases pH causing alkalosis, and removing it causes acidosis(3). In human body bicarbonate play important role in pH buffering system (maintaining homeostasis). Bicarbonate is an anionic chemical compound consisting of a carbon atom bonded to three oxygen, along with a hydrogen atom

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attached to one of those oxygen atoms(4).

When the kidneys are unable to effectively filter blood, they develop chronic kidney disease (CKD), which makes them work harder just to survive. It is the most prevalent, slowly progressive and irreversible condition of the kidneys which usually remains asymptomatic(5). Chronic kidney disease can cause different levels of illness as it indicates the abnormal kidney structure or function(6). The risk factors for developing chronic kidney disease may include age, gender, family history, hypertension, anemia or obesity(7). Common symptoms of chronic kidney disease are edema, pain, fatigue, nausea, restlessness and shortness of breath(8). Other than dialysis, chronic kidney disease can be controlled at early stage by controlling other health issues like diabetes and blood pressure(9).

End-stage renal disease (ESRD) refers to renal failure treated by kidney transplant or dialysis. Chronic kidney disease complications include metabolic acidosis. In dialysis patients, metabolic acidosis manifests as low serum bicarbonate levels and is associated with high death ratio(10). According to the National Kidney Foundation, kidney disease is classified into five stages based on the severity of the condition. In the case of CKD, these stages are defined as follows: Stage 1, normal or high GFR (GFR > 90 mL/min); Stage 2, mild CKD (GFR = 60-89 mL/min); Stage 3A, moderate CKD (GFR = 45-59 mL/min); Stage 3B, moderate CKD (GFR = 30-44 mL/min); Stage 4, severe CKD (GFR = 15-29 mL/min); and Stage 5 is end stage of CKD(11). In developing countries, the prevalence of chronic kidney disease is 11%-13%(12). Epidemiologic investigations have revealed a weak link of serum bicarbonate with poor renal outcomes, and death. The kidneys continuously lose the ability to release hydrogen ions and orchestrate smelling salts as renal function declines. Consequently, patients with lower eGFRs are more prone to having reduced bicarbonate levels, with approximately 19% of individuals in CKD stages 4 and 5 exhibiting serum bicarbonate levels below 22 mmol/L(13).

Bicarbonate levels in the blood are significant prognostic markers for all patients, even those with typical qualities. Regardless of kidney failure movement and mortality, a low serum bicarbonate level raises the chance of developing diabetes. The GFR is the principal factor impacting serum bicarbonate levels, however there are additionally different elements that assume a significant part. Stage 3 and 4 CKD patients are likely to have low serum bicarbonate if they have diabetes, smoke, have low hemoglobin, or have low serum egg white levels(14).

METHODOLOGY

It was a retrospective study. Data was collected from the Department of Nephrology, Sheikh Zayed Hospital, Lahore, Punjab. Total of 150 samples of chronic kidney disease patients of stage 3 and stage 4 was collected. (CKD) Chronic kidney disease patients of stage 3 and stage 4 were included.

A Performa were used to collect patient data of chronic kidney disease patients. Aseptic phlebotomy procedures were used to obtain intravenous blood samples from chronic kidney disease patients. The methods and instruments we used for analysis were; Microlab 300 and Cobas C 311. Both Cobas C 311 and Microlab 300 works on the principles of spectrophotometry, particularly the Beer-Lambert Law. As stated by this law, the level of light absorbed by a sample corresponds directly to the concentration of the substance it contains. In addition to spectrophotometry, Cobas C 311 also follows the principles of potentiometry and ion selective electrode (ISE).

Data were entered and analyzed by using excel for statistical analysis. Tables and Bar charts were used to display the data.

RESULTS

We identified 150 patient diagnosed along with chronic kidney disease (CKD) stage 3 and stage 4 from the department of nephrology in Shaikh Zayed Hospital Lahore. There were 76 individuals with stage 4 CKD and 74 patients with stage 3 CKD. 34 individuals with stage 2 and 40 patients with stage 3 CKD were included. Similarly, stage 4 chronic kidney disease (CKD) includes the 34 male and 42 female patients.

Table 1 Gender based distribution of CKD stage 3 and stage 4

Gender	CKD Stage 3	CKD Stage 4	Total Number of patient
Male	40	34	74
Female	34	42	76
Total	74	76	150

The data indicates that among the patients with chronic renal disease stage 3, there were 40 male and 34 female patients. Among the male patients, 45% (n=18) had normal serum bicarbonate levels, while 55% (n=22) had low serum bicarbonate levels. Comparable to male patients, 68% (n=23) of female patients had low serum bicarbonate levels, whereas 32% (n=11) of female patients had normal serum bicarbonate levels.

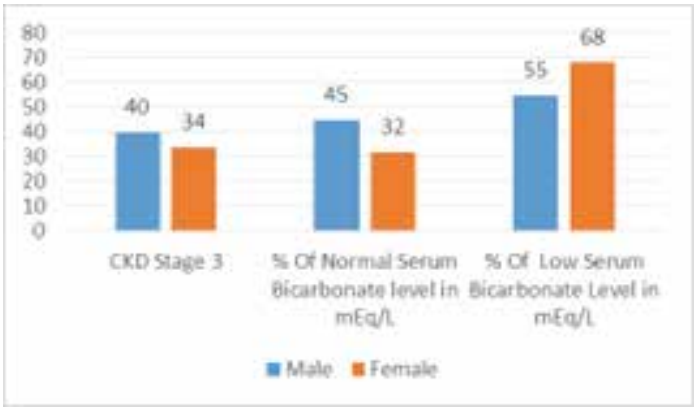

Figure 1 Gender based association of serum bicarbonate in CKD stage 3

Results demonstrates that there were 40 male and 34 female individuals with stage 3 chronic renal disease; of them, 22 male with an average age of 55 and 23 female with an average age of 53 were diagnosed with metabolic acidosis.

Table 2 Gender based progression of metabolic acidosis in CKD stage 3

Gender	CKD Stage 3	Average of age in year	Metabolic Acidosis
Male	40	55	22
Female	34	53	23

Patients with stage 4 chronic renal disease included 34 men and 42 female, with 15% (n=5) of the male being diagnosed with normal blood bicarbonate level and 85% (n=29) of the male being diagnosed with low level of serum bicarbonate. Similar to the male patient, 86% (n=36) of the female patient had low serum bicarbonate levels, while 14% (n=6) of the female patient had normal serum bicarbonate levels.

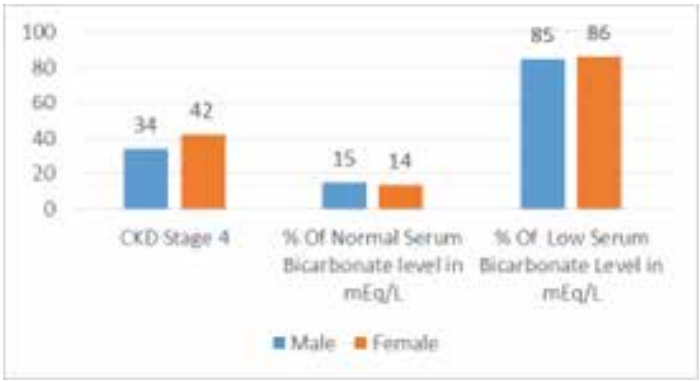

Figure No.2 Gender based association of serum bicarbonate in CKD stage 4

There were 34 male and 42 female patients with stage 4 chronic kidney disease, out of whom 29 patients who are male and, on average, 52 were diagnosed with metabolic acidosis and 36 average age of 51 for female patients.

Table No.3 Gender based progression of metabolic acidosis in CKD stage 4

Gender	Count of patient	Average of age in year	Metabolic Acidosis	Non-Metabolic Acidosis
Male	34	52	29	5
Female	42	51	36	6

Comparing the association between the amount of serum bicarbonate and the advancement of metabolic acidosis in stages 3 and 4 of chronic kidney disease (CKD), 40 male and 34 female patients along with stage 3 chronic renal disease were included. The average level of serum bicarbonate in males and females was 22 mEq/L, and 55% and 68%, respectively, of both genders were found to be progressing into metabolic acidosis.

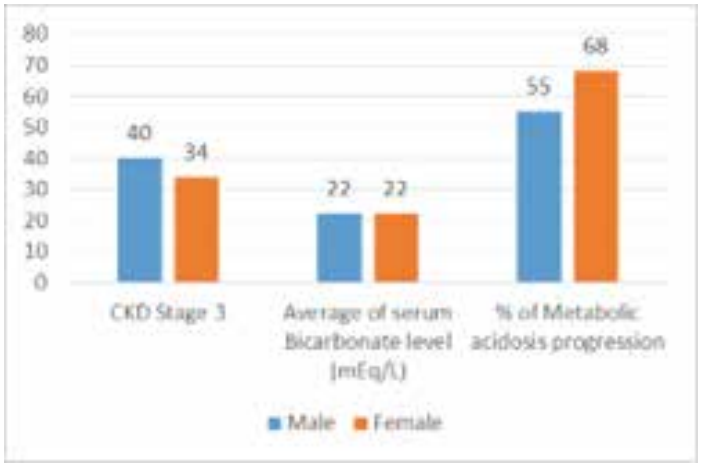

Figure 3 Gender Base Average of Serum Bicarbonate Level and Metabolic Acidosis Progression in CKD Stage 3

Chronic kidney disease stage 4 were includes the 34 male and 42 female patients. The average of serum bicarbonate level in male and female were remain 19 mEq/L and 18 mEq/L accordingly and the progression of metabolic acidosis in male and female were found 85% and 86% respectively.

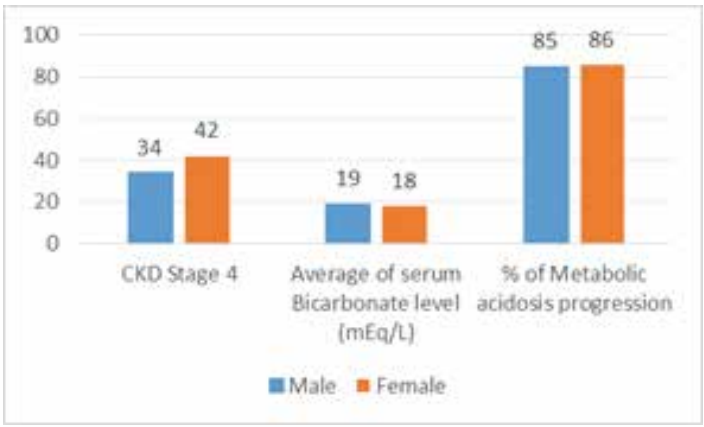

Figure No.4 Gender Base Average of Serum Bicarbonate Level and Metabolic Acidosis Progression in CKD Stage 4

DISCUSSION

Kidneys maintain the body's homeostasis by removing acid and regulating water, salt, and mineral levels. They are responsible for maintaining the levels of various substances in the body. Patients among chronic kidney disease (CKD) mostly experience metabolic acidosis, due to this condition, the blood level of bicarbonate is low. The mortality rate among patients receiving dialysis has been associated with this condition.

Hoorn, E wout J et al. research has been done on how sodium bicarbonate affects CKD patients' systolic blood pressure. The study included 60 participants (SD 10), whose systolic blood pressure was 136 (SD 17) mm Hg, glomerular filtration rate (eGFR) was 38 (SD 10) milliliters/minute, and serum bicarbonate level was 22 (SD 4). A meta-analysis found that sodium bicarbonate supplementation had no significant effect on systolic blood pressure in individuals with CKD stages G1-5. In addition, sodium bicarbonate recipients did not significantly increase their use of antihypertensive medication or diuretics, while sodium bicarbonate recipients decreased their use of antihypertensive medication(15). Mirela Dobre MD, et al. studied the risk of heart failure in chronic kidney disease patients. 3586 patients were involved, out of them, the patients who have had higher bicarbonate levels develop heart failure(18).

Hyo Jin Kim studied the impact of metabolic acidosis on CKD development in Korean individuals. There were four groups of patients based on their serum bicarbonate levels: (With total carbon dioxide concentrations of 22 to 26, 26.1 to 29.9, and 30 mmol/l, respectively) Low and Lower Normal and Higher Normal, and High. An individual with metabolic acidosis has a serum bicarbonate level below 22 mmol/l. Renal events can be defined as either a twofold increase in serum creatinine levels, a diagnosis of end stage renal disease, a 50% decrease in glomerular filtration rate (GFR) from baseline values, or the occurrence of other significant changes in renal function. The findings demonstrated that, in comparison to the group with lower normal bicarbonate levels, the group with low bicarbonate levels exhibited a considerably quicker fall in (GFR). Furthermore, among Korean patients CKD who were not yet receiving dialysis, a higher incidence of kidney failure events and a fast decline in kidney function found both fervently connected with metabolic acidosis(19).

Michal L. Melamed et al. studied on the multicenter randomized, placebo-controlled, randomized trial of sodium bicarbonate in CKD Stages 3 and stage 4. They have concluded that in these patients, sodium bicarbonate therapy is beneficial. There were 149 patients included with CKD stages 3 and stage 4 at three centers in Cleveland, OH, and the Bronx, NY, between July 2011 and April 2016. The mean serum bicarbonate level and estimated glomerular filtration rate were both 24.0 x 2.2 mEq/L and 36.3 x 11.2 mL/min/1.73 m, respectively, furthermore did not differ among intervention also placebo groups. The intervention group had consistently higher mean serum bicarbonate levels than the placebo group throughout all stages of the follow-up (P 0.001). There were no significant differences found in these two groups in levels of glomerular filtration rate, blood pressure, or levels of muscle gene expression(20).

Our results are comparable to these researches as In chronic kidney disease (CKD) stage 3, results indicated that 45% of male patients and 32% of female patients had normal serum bicarbonate levels ranging from 22 to 29 mEq/L, while the level was less than 22 mEq/L in 55% of males and 68% of females. According to the results from chronic kidney disease (CKD) stage 4, 15% of male and 14% of female patients had normal serum bicarbonate levels ranging from 22 to 29 mEq/L, and 85% of male and 86% of female patients had a serum bicarbonate level < 22 mEq/L.

CONCLUSION

In conclusion, According to study, individuals with CKD, especially those in late stages, frequently have metabolic acidosis, which is characterized by low blood bicarbonate levels. This condition has been associated with higher mortality rates and greater risk of kidney disease progression. The risk of developing CKD generally increases with age. Older adults are more likely to have Diabetes and hypertension are two illnesses that are major contributors to CKD.

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Authors Contributions:

Taha Sahar and Alia Bibi: Substantial contributions to the conception and design of the work.

Asad Ali and M.Faiz Rasool: Design of the work and the acquisition. Drafting the work.

Rizwan Hussain: Final approval of the version to be published.

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Original Article

Open Access

Frequency of Anti-Thyroid Peroxidase (Anti-TPO) in Diabetes Mellitus Type 1 Patients

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ABSTRACT

Background and Objectives: : The association between autoimmune thyroiditis and diabetes mellitus type 1 is of great significance, as both are autoimmune disorders. The presence of one autoimmune disorder increases the risk of developing another autoimmune disorder. To determine the frequency of anti-thyroid peroxidase (anti-TPO) antibodies in individuals diagnosed with diabetes mellitus type 1. On the basis of gender, age and among the diagnosed patients of hypothyroidism and hyperthyroidism with diabetes mellitus type 1.

METHODOLOGY: A retrospective study was conducted in University of Lahore Teaching Hospital, Lahore, Punjab. The study was conducted during the 3 months from May to July, 2023. The research involved examining of 135 diabetes type 1 patients, with an average age of 27.44 years, comprising 60 males (44.44%) and 75 females (55.56%) with different age groups. Cobas C-311 and Enzyme-linked Immunosorbent assay (ELISA) were used to analyze glycosylated hemoglobin (HbA1c) and anti-thyroid peroxidase antibodies (anti-TPO) respectively. A self-designed Performa was used to collect the patient data. Data were entered and analyzed by using excel and displayed by using Tables and Bar Charts.

RESULTS: Anti-TPO antibodies were detected in 25 patients (18.52%) out of the 135 participants, although they were absent in 110 patients (81.48%). Notably, females (76%) were more likely to have anti-TPO antibodies than men (24%), especially in those between the ages of 10 and 25 (64%). Only one of the 135 people had anti-TPO antibodies, despite the fact that five of them had hypothyroidism. Three of the 135 patients were diagnosed cases of hyperthyroidism, and all three were anti-TPO negative.

CONCLUSION: The conclusion of this study is that anti-TPO antibodies are very common in diabetes mellitus type 1 patients and gender and age have a significant impact on the formation of anti-TPO antibodies.

KEYWORDS: Anti-Thyroid peroxidase antibodies (anti-TPO), glycosylated hemoglobin (HbA1c), Hyperthyroidism, Hypothyroidism, Autoimmune thyroiditis.

INTRODUCTION

Diabetes affects the body's capacity to turn food into energy and is a chronic disorder. Blood sugar is used as an energy by the release of a hormone called insulin from the pancreas. The alpha and beta cells within the islets of Langerhans produce glucagon and insulin, respectively. Insulin is released when blood glucose levels are high, facilitating the body's utilization of glucose(1). Due to the body's elimination of pancreatic beta cells, diabetes mellitus type 1 is a chronic autoimmune illness that causes inadequate insulin production. The blood sugar levels rise as a result of this(2). Research into the autoimmune causes of diabetes mellitus type 1, sometimes referred to as "Juvenile diabetes," began in the 1970s. However, study on the involvement of pancreas in diabetes mellitus type 1 began in 1927 and the first direct evidence that the disease is an insulin- deficient disease was observed in 1951(3). The development of diabetes mellitus type 1 is influenced by both genetic and environmental factors. Genetic components include subtypes of human leukocyte antigen (HLA) on chromosome 6 and a family history of diabetes. Ambient factors can also influence the occurrence of the disease. It may include microorganisms present in the person's

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surroundings such as rubella and enterovirus (4). Clinical symptoms of the disease appear within 2 weeks after the onset of the disease which include excessive urination, excessive thirst and weight loss(5). Diabetes mellitus type 1 had a 9.5% global prevalence and a 15 per 100,000 population incidence in 2020(6). In 2022, the prevalence of diabetes in Pakistan is 26.7% and number of cases are increasing day by day(7).

Thyroid gland is a butterfly shaped, soft and reddish parenchymal organ which is located in the neck just anterior to the trachea weighing between 15 and 20 grams(8). Thyroid hormones T3 and T4, produced by the thyroid gland, are essential for normal growth, mental development, regulation of sexual maturation, increasing oxygen consumption, and influencing a wide range of metabolic processes within the body(9). Abnormality in structure and function of thyroid gland can cause a number of different diseases which include hypothyroidism, hyperthyroidism, Graves' disease and autoimmune thyroiditis. The development of anti-thyroid antibodies causes Hashimoto's thyroiditis, also known as autoimmune thyroiditis, a chronic illness that impairs the thyroid's ability to produce hormones(10). Environmental variables and various genetic factors may lead to autoimmune thyroiditis such as excessive iodine consumption, selenium insufficiency, exposure to pollutants like cigarette smoke, and some viral disorders like chronic hepatitis C. Thyroiditis might also possibly be brought on by exposure to some medicines(11). Thyroid peroxidase antibodies were first recognized in 1964 and the level of these antibodies increase in thyroiditis(12). The generation of thyroid hormones, notably T3 and T4, depends on thyroid peroxidase. However, thyroid peroxidase-blocking antibodies reduce the ability of the body to produce these hormones(13).

Thyroid autoantibodies are more likely to develop in people with diabetes mellitus type 1, particularly when they have certain risk factors. These risk factors may include elements like age, gender, weight, and the length of the person's diabetes(14). The production of thyroid peroxidase antibodies (TPO), which may increase or decrease the body's level of thyroid hormones, is significantly influenced by hyperglycemia. In diabetes mellitus type 1 patients, physicians recommend the anti TPO test to identify the thyroid disorders(15).

METHODOLOGY

It was a retrospective study. Data was collected from the University of Lahore Teaching Hospital, Lahore, Punjab. Total 135 samples of diabetes mellitus type 1 were collected from the University of Lahore Teaching Hospital, Lahore, Punjab. Patients who were diagnosed with diabetes mellitus type 1 by clinicians were included.

A Performa were used to collect patient data of diabetes mellitus type 1 patients. Aseptic phlebotomy procedures were used to obtain intravenous blood samples from diabetes type 1 patients. The methods and instruments we used for analysis were; Enzyme Linked Immunosorbent Assay (ELISA) and Cobas C 311.

Enzyme-linked immunoassay operates on the principle that the interaction between antigens and antibodies in a patient's sample reveals the presence and quantity of antibodies. By combining antibodies with a designated enzyme (such as horseradish peroxidase or alkaline phosphatase enzyme) and a chromogen, specific color is generated as a result of the binding between antibodies and specific antigens. Cobas C 311 works on the principles of spectrophotometry, particularly the Beer-Lambert Law. As stated by this law, the level of light absorbed by a sample corresponds directly to the concentration of the substance it contains. In addition to spectrophotometry, Cobas C 311 also follows the principles of potentiometry and ion selective electrode (ISE).

Data were entered and analyzed by using excel for statistical analysis. Tables and Bar charts were used to display the data.

RESULTS

The research was carried out in the University of Lahore Teaching Hospital, Lahore, Punjab. A group of 135 individuals diagnosed with diabetes mellitus type 1, including 60 males (44.44%) and 75 females (55.56%), were examined to detect the existence of anti-thyroid peroxidase (anti-TPO) antibodies.

Table 1 Gender Based Distribution of Diabetes Mellitus Type 1 Patients

Total	Males (%)	Females (%)
135	60 (44.44%)	75 (55.56%)

Anti-thyroid peroxidase antibodies (anti-TPO) were found in 18.52% (or 25 patients) of the 135 people with diabetes mellitus type 1 whereas they were absent in 81.48% (or 110 patients) of the patients.

Table 2 Frequency of Anti-thyroid peroxidase Antibodies

Total	Anti-TPO positive patients	Anti-TPO negative patients
135	25 (18.52%)	110 (81.48%)

Results revealed that anti-thyroid peroxidase antibodies (anti-TPO) were tested in a group of 25 patients, and it was found that 6 patients (24% of the group) were male and 19 patients (76% of the group) were female.

Table 3 Prevalence of Anti-thyroid peroxidase Antibodies in Hypothyroidism

Disease Category	Anti-TPO positive	Anti-TPO negative	Total
Hypothyroidism	1 (20%)	4 (80%)	5
Non-Hypothyroidism	24 (18.46%)	106 (81.54%)	130
Total	25 (18.52%)	110 (81.48%)	135

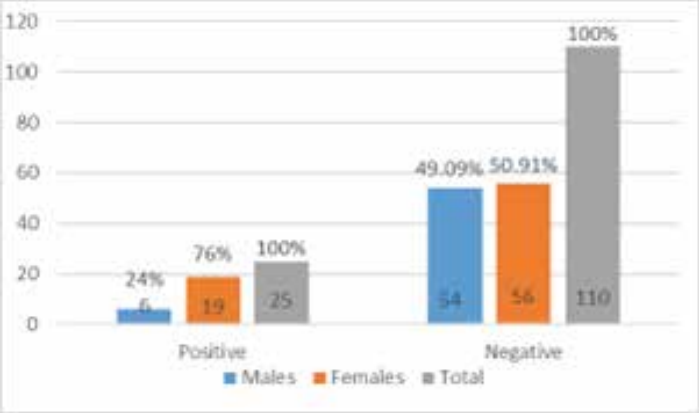

Figure 1 Gender based Prevalence of Anti-thyroid peroxidase Antibodies

Among the group of 25 patients who were found to have positive results for anti-thyroid peroxidase antibodies (anti-TPO), a total of 16 patients (64%) were between the ages of 10 and 25 years, including 2 males and 14 females. Furthermore, within the study, 8 patients (32%) fell into the 26-40 age range, comprising of 4 males and 4 females. Additionally, there was one female patient (4%) who belonged to the 41-60 age group.

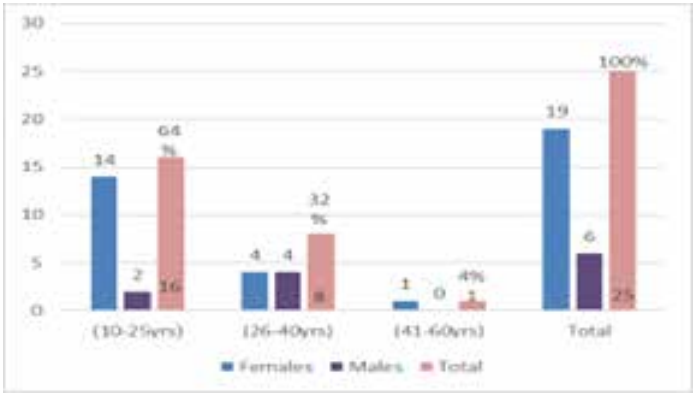

Figure 2 Prevalence of Anti-thyroid peroxidase Antibodies on the basis of Age

Among 135 diagnosed patients of diabetes mellitus type 1, 5 patients (3.70% of patients) had known hypothyroidism, out of which 1 patient was anti- TPO positive and 4 patients were anti-TPO negative. Among 135 diagnosed patients of diabetes mellitus type 1, 3 patients (2.22% of patients) had the known hyperthyroidism, and all the 3 patients were ant-TPO negative.

Table 4 Prevalence of Anti-thyroid peroxidase Antibodies in Hyperthyroidism

Disease Category	Anti-TPO positive	Anti-TPO negative	Total
Hyperthyroidism	0 (0%)	3 (100%)	3
Non-hyperthyroidism	25 (18.94%	107 (18.06%)	132
Total	25 (18.52%)	110 (81.48%)	135

DISCUSSION

An autoimmune condition called diabetes mellitus type 1 is particularly associated with insulin deficiency and high glucose levels in the body. The body's other cells and organs get damaged when glucose levels are high. Elevated levels of glucose cause other autoimmune disorders like autoimmune thyroiditis and pernicious anemia.

A research study was conducted at the University of Lahore Teaching Hospital, Lahore to examine the presence of anti-TPO antibodies in individuals diagnosed with diabetes mellitus type 1 and evaluate the prevalence of these antibodies among both males and females. The study produced significant results, indicating that 18.52% of the total 135 patients tested positive for anti-TPO antibodies. Notably, our findings align with previous studies conducted over a considerable duration.

Balram Sharma et al. in 2019 studied the prevalence of different autoimmune disorders and autoantibodies in 150 patients of diabetes mellitus type 1. Anti-TPO was tested positive in 20.7% patients and hypothyroidism was diagnosed in 14.1% patients. Both anti-TPO antibodies and hypothyroidism were more prevalent in females than in males (16). Hiralal Konar et al. in 2018 studied the frequency of thyroid disorders among pregnant women with diabetes mellitus was investigated by A total of 64 pregnant women diagnosed with both gestational diabetes mellitus (GDM) and pregestational diabetes mellitus (PGDM) were included in the study. 40% females had thyroid disorder and hypothyroidism was the most prevalent (37.5%) thyroid disease among them(17).

Alien Dantas Costa Riquetto et al. conducted a study in 2015 to evaluate the prevalence of thyroid diseases in a sample of 233 patients diagnosed with diabetes

mellitus type 1. The findings indicated that 21% of the patients had autoimmune thyroiditis, and 30.6% had anti-TPO antibodies. It was observed that females were more likely than males to possess anti-TPO antibodies, with a prevalence of 71.4% in females and 28.6% in males(18).

Kostas Kakleas et al., in 2009 revealed that among the 144 patients diagnosed with diabetes mellitus type 1, 17.4% had anti-thyroid peroxidase (anti-TPO) antibodies. The research findings highlighted a higher prevalence of these antibodies in females than in males. Additionally, the study identified several influential factors such as age, gender, and duration of diabetes that significantly impacted the development of anti-TPO antibodies(19). Kordonouri O. et al., examined the frequency of anti-thyroid peroxidase (anti-TPO) and other thyroid antibodies in children and teenagers with diabetes mellitus type 1. The examination of thyroid antibodies comprised 216 individuals in total. Anti-TPO antibodies were found in 10% of the patients (22 individuals), which is a substantial occurrence, according to the research. Notably, females were more commonly found to have greater anti-TPO titers than men(20).

Our study is comparable to these studies as the results revealed that the 25 patients (18.52% patients) of total 135 patients of diabetes mellitus type 1 had anti-TPO antibodies. Female patients (76% of patients) had anti-TPO antibodies more frequently than male patients (24% of patients). The majority of the patients (64% of patients) who tested positive for anti-TPO were between the ages of 10 and 25 years. One of the five individuals with diagnosed hypothyroidism also tested positive for anti-TPO antibodies. Three patients were the confirmed cases of hyperthyroidism who were negative for anti-TPO antibodies.

CONCLUSION

The occurrence of anti-thyroid peroxidase (anti-TPO) antibodies is closely linked to diabetes mellitus type 1. It is noteworthy that both age and gender play significant roles in the development of anti-TPO antibodies among individuals with diabetes. Based on our findings, it is advisable to include anti-TPO testing as a part of routine monitoring to enable early detection of thyroid disorders in patients with diabetes mellitus type 1.

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Alia Bibi and Muhammad Kamran: Substantial contribution to the conception, design of the work.

Jawaria Alvi: Survey and design of the work

Muhammad Musawar Mushtaq: Data collection

Alia Bibi: SPSS computing tool and drafting for approval of the final version to be published

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Original Article

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Association of Dry Eye with Adult Seborrheic Dermatitis and Seborrheic Blepharitis According to Tear Break-up Time

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ABSTRACT

Background and Objectives: Now a days, many people complain of eye irritation, dryness and itching, specially those who have dandruff in their head. This dandruff can be the cause of dry eye. In the skin diseases, seborrheic dermatitis and seborrheic blepharitis there are chances of dry eye whose symptoms cannot be relieved until we treat these diseases because the cause of this dry eye is dehydrated skin. If these skin diseases are left untreated they can cause further damage to eye such as corneal erosions. Purpose of this study was to find out the frequency of dry eye in 30 people (male and female) who were suffering from the seborrheic dermatitis and seborrheic blepharitis.

METHODOLOGY: A cross-sectional study was conducted at Madinah Teaching Hospital, Faisalabad, which included 30 patients, already suffering from Seborrheic Dermatitis and Seborrheic Blepharitis, aged 20-40 years. Tear Break-up time test was performed using Slit-Lamp examination under Cobalt Blue filter with Fluorescien dye. The data was analyzed using SPSS software version 20.

RESULTS: : In the study, out of 30 patients, 23.3% were male and 76.7% were female. In case of SB, 83.3% females had dry eye and all males 100% had dry eye. While in case of SD, 91% females and 100% males had dry eye. And the results showed that dry eye was more marked in right eye as compared to left eye with 19 out of 30 patients having symptoms more prominent in their right eye.

CONCLUSION: There is a strong association between dry eye, SD and SB. TBUT was seen to be low in right eye as compared to left eye. Out of 30 patients, 23 patients had dry eye. And the results showed that dry eye was more marked in the patients of SD than SB.

KEYWORDS: TBUT, Seborrheic dermatitis, Seborrheic Blepharitis, Dry eye.

INTRODUCTION

Seborrheic dermatitis (SD) is a very common chronic dermatosis characterized by redness and scaling and occurring in the regions where the sebaceous glands are most active such as the face and scalp, the pre-sternal area, and in the body folds. It has two types, infantile and adult. Infantile is usually common during first three months of life while adult type is prevalent between 20 to 50 years or older (1).

It is a skin condition in which very high amount of sebum is produced usually affecting the areas of scalp, face and trunk that are richly supplied with the follicles of sebaceous glands that can lead to crusty, yellow-brown flakes (1).

Seborrheic eczematid is the mildest form of the disease (eczematid=eczema-like, dermatitis like) in which there is mild redness, scaling and seborrhea and often pruritis. The exact etiology is still unknown but it is thought to be linked with inflammation of sebaceous glands due to aerobic bacteria and fungus like Malassezia furfur. It is usually seen among the patients with Parkinson's disease, facial paralysis and HIV patients (2).

Seborrheic dermatitis has gradual onset that can get worse or aggravate in winter season, indoor environment and sunlight however some patients improve their symptoms when exposed to sunlight. The course of disease may end from years to decades (1).

Its skin symptom includes pruritis that is also associated with dry skin that increases with the age thus seen in older adults. Patient with associated pruritis often

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comes with redness, bumps, blisters on itchy skin that can even bleed in severe conditions. Repeated episodes of SD especially on the scalp may cause alopecia in severe cases due to secondary infection (1). Seborrheic blepharitis is the type of anterior blepharitis that is caused by the dandruff of the scalp and eye brows that causes stickiness of eye lashes and greasy lid margins with hyperemic surface. Soft scales and flakes of dandruff are found on the anterior lid margin and lashes (3).

People of all ages are affected by it. It is more often a dermatological condition that presents with many symptoms that are similar to other skin problems like eczema and seborrheic dermatitis especially when it becomes more oily and greasy. The causative agent of seborrheic blepharitis is a type of fungi called Malassezia furfur that is one of the normal flora of skin. Its inflammatory reaction to the skin can cause this type of blepharitis (4).

Now, evaporative dry eye is the disease that is found in the patients of both above discussed skin disorders. Dry eye results when there is inadequacy of tear volume or function that can lead to instability of tear film and damage to ocular surface(4).

There are 3 layers of tear film:

1. Outermost is the Lipid layer that is secreted by meibomian glands. Its thickness is 0.1 um.
2. Aqueous layer that is secreted by the lacrimal glands. Its thickness is 7 um.
3. Inner most is the mucous layer that is secreted by the goblet cells of conjunctiva. Its thickness is 0.2 um (3).
4. The lipid part of tear film is increased in seborrheic conditions and dry eye symptoms are very common due to excessive oily secretions (5).
5. LIPID layer of tear film binds or seals the tear film thus any disturbance in this outer most layer can cause evaporative dry eye.

The test that was employed to test the diagnosed patients for dye eye was TBUT that stands for Tear Break-up time test. TBUT is defined as the time that is counted from the patient's last eye blink until the appearance of first dry spot in the patient's tear film that was stained with fluorescein dye. This test is most commonly used in the clinical practice to assess evaporative dry eye disease among the patients. In this method, slit-lamp along with cobalt-blue filter is used on fluorescein stained eyes of the patients to check the stability of their tear film (7).

TBUT is the time taken by the first dry spot to appear in the tear film after a complete blink of the patient.

- Normal value is 10 to 15 seconds.
- Marginal value is 5 to 10 seconds.
- Less than 5 seconds is considered to be an indicator of severe dry eye or poor tear film (12).
- TBUT can be significantly low or abnormal in mucin and lipid deficiency which are two of the main layers of tear film contributing towards dry-eye.There are several causes or factor that can lead to low TBUT. These include limbal dermoid, corneal scars, pterygium and leprosy (6).

It can also be low in case of contact-lens users who use C.L solutions mainly containing a preservative called Benzalkonium chloride. Hypertensive patients on topical Beta blockers can also have decreased Break-up time. Moreover, the Smokers are also at the risk of reduced TBUT because they are exposed to cigarette smoke that can alter the tear film regularity.

If there is the appearance of dry spot on the same point or location always then it is due to irregular corneal surface mainly due to defect in the basement membrane of corneal epithelium. It has no association with dry eye or any instability in tear film (3).

Thus, we diagnosed the dry eye symptoms among the patients of Adult Seborrheic dermatitis and Seborrheic blepharitis using Tear Break-up time test.

METHODOLOGY

This Descriptive Study was carried out on 30 diagnosed patients of Seborrheic Dermatitis taken from Dermatology department and 30 diagnosed patients of Seborrheic Blepharitis taken from Ophthalmology department in Madinah Teaching Hospital (MTH), Faisalabad. The study was conducted from November, 2017 to May, 2018.

Purposive sampling was used to collect data on 30 patients. Purposive sampling is a type of non-probability sampling which is used for a specific purpose and a specific group of people or sample is chosen by keeping in mind the objectives of study(8). It is also known as judgmental, subjective or selective sampling (11).

Inclusion Criteria of the study:

- Age-group : 20-40 years
- Gender : both male and female
- Patients with Seborrheic dermatitis as diagnosed by the consultant dermatologist.

Patients with Seborrheic blepharitis as diagnosed by the consultant ophthalmologist.

Consent was taken after explaining the whole procedure to the patients and they were assured that the involved test was minimally invasive and harmless.

We took the relevant ocular and medical history from the patient, and performed anterior eye examination with torch light to exclude any anterior eye pathology. We recorded the visual acuity of the patients; finally we measured Tear Break-up time with slit-lamp under cobalt blue filter after the administration of fluorescein dye and recorded 3 readings per eye by using stop-watch and their mean reading was calculated.

A performa was filled that was made to record the Tear Breakup time values of the patients.

A drop of 2% fluorescein dye is instilled into the testing eye of the patient and the patient is seated comfortably in front of the slit-lamp. Table height of slit-lamp is adjusted according to patient's height, patient is asked to place his/her chin on the chin rest and forehead against the forehead band.

The slit-lamp was made to work at wide beam along with the cobalt blue filter so that the patient's eye that was stained with fluorescein dye can be viewed easily. The patient was instructed to blink several times then stop blinking during the test. The patient's cornea was viewed under the wide beam and cobalt blue filter and the time was noted until there appeared first dry patch in the tear film. The time was counted with the help of stop watch. This times that was measured in seconds is the Tear Break-up time for the respective patient. At the minimum, 3 readings were noted and their mean or average was taken to calculate TBUT.

The patients who were having SD also had flakes of dandruff on their eye lashes with associated itching which showed that there is relationship between these two conditions.

Normal value of Tear Breakup time: 10-40 seconds.

However if TBUT is less than 10 seconds then is indicative of dry eye (6).

Fluorescein strips are the strips that are infused with a green colored (under white light) 1-2% fluorescein dye. These strips prior to use were made wet with a drop of saline or any anesthetic agent and then allowed to touch the inferior lid margin of the patient's eyelid. The dye got spread within 10-30 seconds. Then the patient who was seated in front of slit-lamp was tested for TBUT test, to assess the stability of tear film.

The portions of the eye that were stained with fluorescein dye appeared blue under cobalt-blue filter that was adjusted in slit-lamp (10).

RESULTS

Table-1 below shows the frequency distribution according to age of patients .The number of subjects in our study were n=30. Out of these 73.3% were in first age group (20-25), 6.7% were in 2nd group (26-30), 13.3% were in 3rd age group(31-35)and 6.7% were in 4th age group that is 36-40 years.

Table-1: Frequency distribution of age

Age Groups

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	20-25	22	73.3	73.3	73.3
	26-30	2	6.7	6.7	80.0
	31-35	4	13.3	13.3	93.3
	36-40	2	6.7	6.7	100.0
	Total	30	100.0	100.0	

The table below shows the frequency distribution according to gender of the patients. Out of 30 patients reported, 23.3% were male and 76.7% were female.

Table-2: Frequency distribution of gender

Gender

		Frequency	%	Valid Percent	Cumulative Percent
Valid	Male	7	23.3	23.3	23.3
	Female	23	76.7	76.7	100.0
	Total	30	100.0	100.0	

The piechart-1 shows the percentage of dry eye in right eye among different age groups of patients having seborrheic blepharitis and seborrheic dermatitis. It is clearly evident here that dry among the patients of both SB and SD is frequent at the age of 20-25.

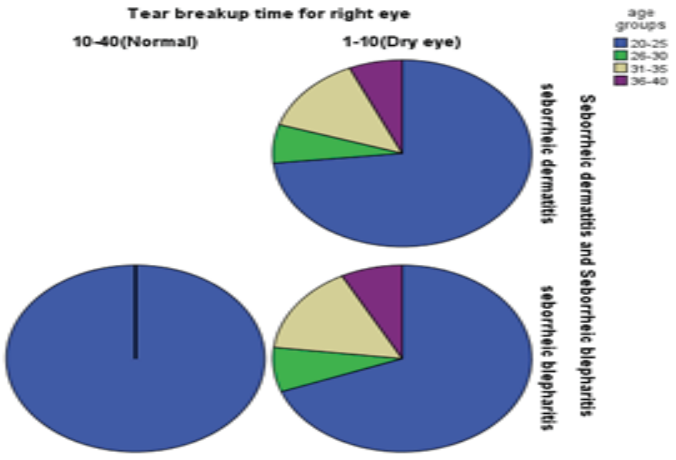

Chart-1 Incidence of dry eye in right eye according to age groups and diseases

The pie chart-2 below shows the percentage of dry eye in left eye among different age groups of patients having seborrheic blepharitis and seborrheic dermatitis. It is clearly evident here that dry among the patients of both SB and SD is frequent at the age of 20-25.

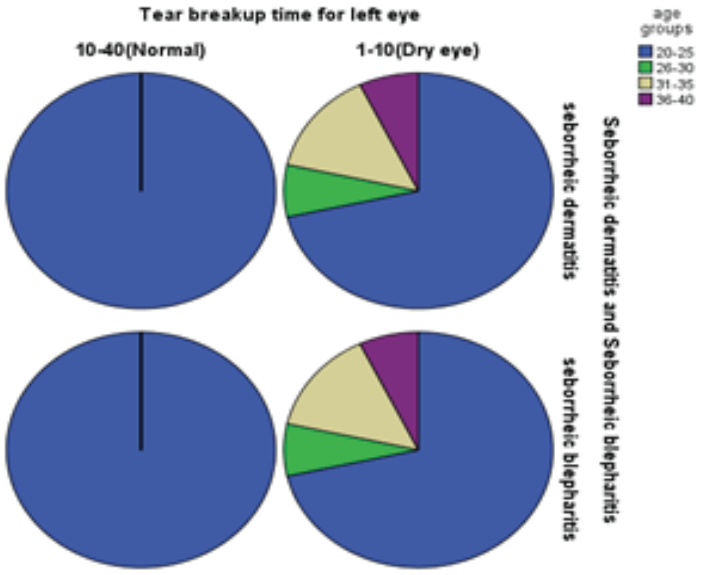

Chart-2 Incidence of dry eye in left eye according to age groups and diseases.

The main dry eye symptoms that these patients complaint of were:

- Itching
- Dryness
- Stinging/Burning
- Watering
- Photophobia

19 out of 30 patient's complaint of these symptoms that was more prominent in right eye than left eye which constitutes about 63.3% of our sample size.

Table-3 Incidence of dry eye among the tested patients.

Disease:	SB(n=15)	SD(n=15)
Dry eye	Right: 13	Right: 15
	Left: 10	Left: 14

It shows us that 13 out of 15 patients of SB were having dry eye in right eye and 10 were having dry eye in left eye. In patients of adult SD all 15 had dry eye in right eye whereas 14 had dry eye in left eye.

DISCUSSION

It has been explained thoroughly from our study that there is a strong association of dry eye with Seborrheic Dermatitis and Seborrheic Blepharitis.

Previously a research was conducted on the associated conditions of SB which also showed that dry eye affects 25-45% of patients with mebomian gland dysfunction and Seborrheic blepharitis, which is due to irregularity in the lipid layer of tear film and can lead to evaporation of tears or dry eye. The dry eye symptoms of SB patients include itching, burning and photophobia. The same study also revealed that there are some dermatological conditions that are linked with SB which includes Seborrheic Dermatitis mainly and showed that SD is found to occur in 95% patients of SB. Therefore this study proved that there is strong relation between SB and SD (8).

In our study, 16 out of 30 patients were having both SB and SD at the same time which makes about 53.3% of our sample. Therefore our study also showed a significant relationship between SB and SD. The main dry eye symptoms that our diagnosed patients complaint of were watering, itching, dryness and photophobia which are similar to the symptoms reported among the patients of SB in the above study .About 93.3% of our study sample had dry eye which strongly agrees with the statement in the above research showing the relationship of dry eye with SB and also proving SD as one of its skin association.

According to another research that was done on Seborrheic Blepharitis showed that out of 178 patients of SD only 2 didn't have SB.171 of these patients presented with the main symptoms of dry eye which were epiphora, photophobia, irritation, secretions and blurred vision. These patients also complaint of redness, itching, burning, fatigue after prolonged work and blurring of vision due to secretions (4).

Probability value for our study was ($P<0.05$). According to which the results for right eye were significant (0.002) but the results for left eye were not significant (1.00). 19 out of 30 patient's dry eye symptoms were more prominent in right eye than left eye which constitutes about 63.3% of our sample size.

Our study also supported this research as it also showed that the dry eye symptoms are common among the patients of SB and SD. Our study also showed that almost 93.3% of patients diagnosed with SB and SD were having dry eye symptoms. These symptoms also include photophobia, tearing, burning and itching.

As our study is novel so very few articles were found related to our research topic. Our aim was to check that whether the patients with seborrheic dermatitis and seborrheic blepharitis are having dry eye or not because many patients take the extensive treatment for dry eye but their symptoms are not relieved as the main cause behind the dry eye is not treated. Patients are usually

unaware of this association, so our goal was to create awareness among the sufferers and it will also add up to the knowledge in medical field.

However there are certain limitations of our study. Majority of the patients above the age of 40 years had systemic diseases mainly hypertension and diabetes so it was in our exclusion criteria. We also excluded the patients of ocular pathology and cataract from our study as senile lenticular changes are more common in the individuals above 40 years so the age group that we included was 20 to 40. Moreover adult seborrheic dermatitis is also prevalent in the patients of this age group. Our sample was also small as Seborrheic dermatitis and Seborrheic blephartitis is reported largely in winter season but our research was conducted in spring-summer season.

Contact lens users and patients with flourescein hypersensitivity were also excluded from our study. Hence it was quite challenging to collect the sample of such filtered patients; moreover the time duration for our study was also short.

CONCLUSION

This study was done to find out the association between dry eye and adult Seborrheic dermatitis and Seborrheic Blepharitis by using Tear break-up time test. The findings of the study concluded that there is strong association between dry eye, SB and adult SD however dry eye is more common among the patients who reported with certain ocular symptoms like itching, burning, watering and photophobia. So, our results suggested that TBUT of all the 30 tested patients is found to be lower in right eye as compared to left eye. These patients were also having ocular problems prominent in right eye. Moreover, the incidence of dry eye is more in female patients with its peak occurrence at the age of 20-25 years. On comparing the results of TBUT test for both SD and SB in both eyes of the tested patients, it was found that dry eye is seen in 29 out of 30 eyes in case of adult SD patients(n=15) while in case of Seborrheic Blepharitis (n=15) dry eye is seen in 23 out of 30 eyes. It gives us proof that dry eye is more frequent in the patients of Adult SD as compared to SB. Hence the results of our study goes in favor of our hypothesis that dry eye is seen markedly in the right eye of these patients of SD and SB because their right eye showed ocular symptoms at the percentage of 63.3%.

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Original Article

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Association between Polycystic Ovarian Syndrome and Endometrial Thickness on Ultrasonography in the infertile females of Lahore

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ABSTRACT

Background and Objectives: PCOS is a health problem that effect a wide range of women of childbearing age and causing infertility all over the world. At any age, PCOS can be distressing to women, especially during the reproductive years. To find the Association between polycystic ovarian disease and endometrial thickness on ultrasonography in the infertile females of Lahore.

METHODOLOGY: A total of 142 Pelvic Ultrasounds of female patients were included in the study. Their age range from 18 years to 60 years. All of these cases of PCOS were reported during study. This study was carried out in Radiology Department of Services Hospital and Ultrasound Clinic Green Town, Lahore .A Convenient sampling technique was adopted.

RESULTS: Data analysis showed that the mean age of 142 patients was 31.49 and the S.Dwas 9.363. Out of total number of 142 patients, 39(27.5%) were suffering from PCOS and 103 (72.5%) with no PCOS. Out of 142 patients 44 had <0.7mm Endometrial Thickness in which 15 had PCOS and 98 patients had > 0.7mm Endometrial Thickness in which 24 were with PCOS.

CONCLUSION: PCOS is an emerging disease and causing infertility in Pakistan. We could not find any association between PCOS and Endometrial thickness.

KEYWORDS: PCOS, Endometrial thickness, Pelvic ultrasound.

INTRODUCTION

Polycystic ovarian syndrome is the most common endocrine disease occurring in women during their fertile age consequences of reproductive , metabolic ,pysiological features. Symptoms including the menstrual cycle abnormality, an ovulation, excessive hair growth, acne and polycystic ovarian morphology 2 Female reproductive tract consists of these parts vagina, uterus with Fallopian tubes and ovaries. The uterus is an hollow muscular organ with thickened walls located in the true pelvis with urinary bladder which is present anteriorly to the uterus and to the rectum posteriorly.3.4 The major parts in which the uterus is divided are Body and Cervix .There are two structures called Fallopian tubes which are tube , have their ostia opening into the cavity of the upper part of the body of the uterus.The uterus has a very sig¬nificant function in reproduction involving transport of sperms, implantation of embryo, provide nour¬ishment to developing fetus, labor and delivery of the baby.5,6

The organs of reproduction including the uterus, fallopian tubes and upper 4/5th of vagina are shaped when still in utero.7,8 Ovary is a paired intraperitoneal endocrine organ normally found in the lower right and left quadrants of the abdomen. The ovaries play an important role inthe production of hormones as well as reproduction.9Ultrasound is one of the most common modality to evaluate the ovaries.10

The size of a normal ovary is 2.0 cm in width, 3.5 cm in length and 1.0 cm in thickness; this is the size of a golf ball. The volume of the ovary changes as females ages. It is found that 69% of changes in ovarian volume may be solely due to age. At two years old, the volume of the ovary averages of 0.7 ml. At 20 years of age, the volume will at peak of 7.7 ml. After this, the volume will decrease slowly until menopause, where the average volume is 2.8 ml.11 There are over three million new cases of polycystic ovarian syndrome

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(PCOS) in the United States alone. PCOS has a wide range of symptoms but typically presents with oligomenorrhea, acne, hirsutism, and infertility.12 Despite these criteria, PCOS may show differences in clinical features, based on the degree of severity of androgen levels, gonadotrophins, and insulin resistance.It has also been suggested that ethnicity as well as religious and cultural background of PCOS patients is an important contributory factor towards heterogeneity of PCOS.13Among these, anovulation infertility is one of the most alarming associated morbidities, as it currently affects approximately 48.5 million women aged 20–44 years.14

The syndrome's etiology is still unidentified, but it is possibly multifactorial, may be due to an alteration of the primitive hypothalamic regulation and of the ovarian and/or adrenal steroidogenesis. The diagnosis of PCOS is created on the clinical, hormonal and ultrasound patterns. In accordance with Rotterdam Criteria, drawn in 2003, PCOS diagnosis can be made only after the exclusion of other reasons of hyperandrogenism and amenorrhea, and in the presence of at least 2 of the following criteria ,1. Oligo- and/or anovulation with menstrual irregularities ,2.Elevated levels of circulating androgens or clinical manifestation of hyperandrogenism,3. Transvaginal pelvic ultrasound evidence of micro polycystic ovary. Due to the pulsatility of LH, only one blood parameter is not enough for the PCOS diagnosis, and there is no common agreement on which androgen blood's level should be considered for a exact diagnosis. . Since menarche, or after a short period, menstrual cycles show an irregular rhythm. Menstrual dysfunction in women affected by PCOS may present in different ways, but the probably most common way is anovulation with unpredictable bleedings . Androgens excess is responsible for hirsutism, oily skin, acne and, in the ovary, for the thickening of the tunica albuginea.At the same time an overweight pattern, up to obesity can be associated to the syndrome. PCOS is one of the most common endocrine causes of female infertility. 15The National Institutes of Health (NIH) criteria 1990 included hyperandrogenism, oligo-ovulation, and exclusion of other disorders mimicking PCOS, as the diagnostic criteria. However, 20 - 25% of regularly ovulating women have PCOS on ultrasound examination. The abnormal ovarian morphology is consistent with PCOS but not essential for diagnosis. Moreover, recent reports indicate that ovarian morphology is no longer an indispensable diagnostic criterion of PCOS.16 The endocrine society, however, recommended that PCOS can be diagnosed if the adult women presents with two of the following features i.e., excess production of androgens, an ovulation and pearl-sized cysts found in the ovaries.17There is considerable heterogeneity of symptoms and signs among women with PCOS and for an individual these may change with time .18

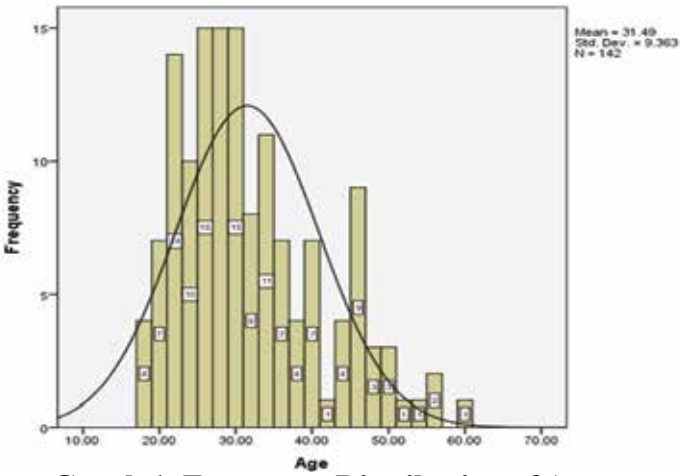
Infertility is very common social,economical and medical problem . There are various causes of infertility such as PCOS, endometrial thickness and adnexal masses. Endometrial thickness play a vital role in infertility .

METHODOLOGY

It was an analytical study to evaluate the association between PCOS and Endometrial thickness. Sample size was 142 ,all the gynecological ultrasounds were included during the 7 months of data collection. Data was collected from Services Hospital Lahore and Ultrasound Clinic Green Town Lahore.Convenient samplingtechnique was used. The inclusion criteria was infertile females above 18 years .The exclusion criteria was male infertility. Evaluation of PCOS and Endometrial Thickness was recorded using Ultrasound machine.

RESULTS

Data analysis showed that the mean age of the patients was 31.49 and the S.D was 9.363. Out of total number of 142 patients, 39(27.5%) were suffering from PCOS and 103 (72.5%) were without PCOS. Out of 142 patients 44 had <0.7mm Endometrial Thickness in which 15 had PCOS and 98 patients had > 0.7mm Endometrial Thickness in which 24 were with PCOS .1 (0.7%) had bulky uterus ,1 (0.7) had dermoid cyst , 29(20.4) had dominant follicle ,3(2.1) had haemorrhagic cyst ,1(0.7) had multiple fibroid ,20(14.1) had no other disease, 26(18.3) had ovarian cyst ,22(15.5) had uterine fibroid.



Graph 1. Frequency Distribution of Age .

This graph showed that total 142 female patients were participated in the research.Their age range from 18 years to 60 years.The mean age of the patients was 31.49 and the S.D was 9.363

Table 1. Uterus Location

Uterus location

	Frequency	Percent
Anteverted	128	90.1
Retroverted	14	9.9
Total	142	100.0

This table shows that 142 patients participated .Out of 142 patient 128 (90.1) were having Anteverted uterus and 14 (9.9) with Retroverted Uterus .

Table 2. Cross tabulation between ET Groups and PCOS

Cross tabulation between ET Groups and PCOS

			PCOS		Total
			NO	YES	
ET Groups	<0.7	Count	21	7	28
		% within ET Groups	75.0%	25.0%	100.0%
	≥0.7	Count	84	30	114
		% within ET Groups	73.7%	26.3%	100.0%
Total		Count	105	37	142
		% within ET Groups	73.9%	26.1%	100.0%

This table shows that out of 142 patients 7 were having Endometrial Thickness <0.7 and 30 with≥0.7 Endometrial Thickness. There was no statistical association found in PCOs and endometrial thickness as the p-value = 0.370 > 0.05.

DISCUSSION

Our study was designed to determine the comparison between Polycystic Ovarian syndrome and Endometrial Thickness on Ultrasonography in the Infertile Females of Lahore. Ultrasound clearly images and measure the whole uterus and the ovaries.Data was collected according to age,history and duration ofsymptoms and ultrasonographicfindings. Data of 142 patients was collectedfrom Services Hospital Lahore and Ultrasound Clinic Green Town Lahore. NoppakornPrakansamut et al (2014) assessed the endometrial thickness and other clinical characteristics associated with endometrial hyperplasia. Women with PCOS and abnormal menstrual pattern were enrolled into this cross-sectional study. Endometrial thicknesses were evaluated using transvaginal sonography. Out of 52 PCOS patients with abnormal menstrual pattern, nine (17.3%)had endometrial hyperplasia. There was no significant difference in mean endometrial thickness between those who had abnormal and normal endometrium (8.19 2.58 mm and 7.76 4.03 mm, respectively). Nineteen point two percent (19.2%) of patients with PCOS and abnormal menstrual pattern had endometrial hyperplasia .Endometrial thickness was not different between those with abnormal and normal endometrium.There is no association between Endometrial Thickness and PCOS.19

Another study was done by Bina Shah MD et al(June 2010), to asses endometrial thickness ,uterine and ovarian ultrasonographic features in adolescents with polycystic ovarian syndrome. Their aim was to evaluate uterine and ovarian ultrasonographic features including endometrial thickness (ET) in adolescent females with PCOS.They performed a retrospective chart review of young females (n = 51) ranging in age from 10 to 18 years with the diagnosis of PCOS. Clinical, biochemical and pelvic sonography data were reviewed. Sonographic data included uterine parameters of ET. Uterine features revealed that the endometrial stripe was enlarged (>7 mm) in 16/51 (31.4%) of girls, all with homogeneous appearance. The uterine length was lower than normal in 22/51 (43.1%) of girls, normal in 21/51 (41.2%), and higher than normal in 8/51 (15.7%). Uterine volume was normal in 31/51 (60.7%) and higher in 20/51 (39.3%) of girls. Out of total number of 142 patients,39(27.5%) were suffering from PCOS and 103 (72.5%) with no PCOS. Out of 142 patients 44 had <0.7mm Endometrial Thickness in which 15 had PCOS and 98 patients had > 0.7mm Endometrial Thickness in which 24 were with PCOS.20

This Cross Sectional study was done Saima Farooq et al (November 2015 to May 2016), determine the frequency of endometrial hyperplasia in polycystic ovarian syndrome patients having raised endometrial thickness at tertiary care Hospital. Study was conducted during Six months from November 2015 to May 2016 at obstetrics and gynecology department of Dow University Hospital Karachi .Total 90 patients were studied; their mean age was 28.6+4.56 years, with mean duration of infertility as 5.15+1.4 years. Endometrial hyperplasia among patients of polycystic ovarian syndrome was 31.1%. Age >29 years, infertility >5 years, diabetes and smoking were significantly associated with endometrial hyperplasia, (P=0.001). In the polycystic ovarian experiencing women with raised endometrial thickness, the endometrial hyperplasia was 31.1%. Elevated age, prolonged duration of infertility, diabetes and smoking may be risk factors of endometrial hyperplasia. There is no significant asso

ciation between PCOS and Endometrial Thickness.21 Another study was done by Farooq SMY et al (March 2021), to determine the Sonographic co-relation between Adnexal Masses and Endometrial Thickness in Infertile Females. This Cross-sectional analytical study was conducted at Gilani Ultrasound Center, Lahore, Jamiat Hospital and Green town clinic, The University of Lahore. Study duration was 9 months. Sample size was 150 patients. Sampling technique used was convenient sampling. AllInfertile Females with adnexal mass, age of 18-45 were included in study. Out of 150 patients the mean age was 32±6.33,minimum age was 18 and maximum age was 45. The mean endometrial thickness was 0.78mmwith standard deviation 0.29, minimum endometrial thickness was .10 cm, maximumendometrial thickness was 1.69 cm. The chi-square test was used between adnexalmassand endometrialthickness shows that there is significant association because them. But according to our study there is no association between PCOS and Endometrial thickness.22

CONCLUSION

PCOS is an emerging disease and causing infertility in Pakistan. We could not find any association between PCOS and Endometrial thickness.

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Original Article

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Growth Parameters in Children with Type I Diabetes Mellitus: A Cross-Sectional Study

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ABSTRACT

Background and Objectives: A comprehensive understanding of the physiological processes leading to regular growth during childhood and adolescence is necessary to enable physiological growth during this critical stage of development and the achievement of a suitable final height, especially of those changes that arise in these populations at high risk of growth impairment. To determine the mean of growth parameters of children presenting with type I diabetes mellitus in a tertiary care hospital.

METHODOLOGY: A total of 568 children aged 1-18 years of either gender presenting with T1D were included. Patients with celiac disease (on EGD), hypothyroidism (TSH>5mIU) and eating disorders were excluded. Then children underwent anthropometric measurements like height in centimeters by using measuring tape and weight in kilograms on weighing machine.

RESULTS: The mean age in this study was 9.58 ± 2.88 years, with a range of 1 to 18 years. Among the patients, 296 (52.11%) were between the ages of 1 and 9. Diabetes mellitus lasted 6.33 ± 2.04 years on average. With a male to female ratio of 1.7:1, 358 (63.03%) and 210 (36.97%) of these 568 patients were male. Patients in my study had an average height of 111.09 ± 21.47 cm. The weight was 30.31 ± 5.65 kg on average.

CONCLUSION: This study concluded that the mean of growth parameters of children presenting with type I diabetes mellitus is quite low.

KEYWORDS: Type-I diabetes mellitus, height, weight

INTRODUCTION

Diabetes mellitus (DM) comes in three primary forms: Type I diabetes, also known as insulin-dependent diabetes mellitus or juvenile diabetes; Type II diabetes, also known as non-insulin-dependent diabetic mellitus or adult-onset diabetes; and gestational diabetes, which happens when pregnant women without a history of diabetes acquire elevated blood glucose levels (1).Diabetes mellitus affects 10–14% of people worldwide.2. High blood glucose in the setting of insulin resistance and relative insulin shortage is a hallmark of diabetes mellitus type 2, formerly known as noninsulin-dependent diabetes mellitus (NIDDM) or adult-onset diabetes. This contrasts with diabetes mellitus type 1, where the pancreatic islet cells are destroyed, resulting in a complete lack of insulin. (2).

According to US death certificates from 2010, diabetes mellitus was the sixth most common cause of death (3). According to a 2012 study by Ramachandran and colleagues, about 7.2 million persons in Pakistan had diabetes mellitus, with a prevalence of 7.7% in rural areas and 10.6% in urban areas. Proper care of type 1 diabetes (T1D), a chronic condition that typically manifests in childhood, can prevent both short-term and long-term problems. Growth is still inadequate in children with type 1 diabetes despite improvements in medical care; this is probably due to persistent metabolic disruption associated with traditional microvascular diabetic problems (4).

The age at which T1D first manifests, its length, and metabolic control all affect a child's growth. It has been shown that children exhibit a smaller stature in adulthood, and a loss in height has been noted throughout the course of the disease (5).

The attainment of a suitable final height and physiological growth during this crucial stage of development require a thorough understanding of the physio

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logical processes that lead to regular growth during childhood and adolescence, particularly those changes that occur in these populations at high risk of growth impairment.

According to reports, T1D has a detrimental impact on linear growth when it comes to poor metabolic regulation and the length of the condition. Although therapy has been optimized, it is unknown if a slight growth deficit still exists (6).

According to one study, the mean height of T1D children (n=125) was lower than that of healthy children (n=125), measuring 128.3±24.3 cm versus 133.6±24.7 cm. This difference was not statistically significant (p>0.05), and the mean weight of T1D children was lower than that of healthy children, measuring 29.2±15.3 kg versus 31.3±15.4 kg (p>0.05) (6).

Finding the average growth characteristics of children with T1D who were admitted to a tertiary care hospital was the motivation behind this investigation. According to published research, the mean height and weight difference between children with T1D and healthy children was minimal. However, the difference was negligible. Furthermore, the literature had no additional studies or local data. Therefore, the purpose of this study was to evaluate the growth indicators in children with diabetes. Based on the study's findings, some useful suggestions for enhancing the development of diabetic children can then be given to these specific individuals (7).

Objectives:

The objective of the study was:

"To determine the mean of growth parameters of children presenting with type I diabetes mellitus in a tertiary care hospital."

METHODOLOGY

Study Design: Descriptive, cross-sectional.

Setting: Unit III, Department of Pediatric Medicine, Allied Hospital, Faisalabad.

Duration Of Study: 10th February 2020 to 9th August 2020 (7).

Sample Size: Sample size of 568 children; with 95% confidence level, 0.02 absolute precision taking mean height as 128.3±24.3cm in T1D children.

Sample Technique: Non-probability, consecutive sampling (8)

Sample Selection:

a. Inclusion Criteria:

- Children of age 1-18 years of either gender presenting with T1D (as per operational definition).

b. Exclusion Criteria:

- Children with celiac disease (on EGD), hypothyroidism (TSH>5mIU) and eating disorders (on medical record) (9).

Data Collection Procedure:

568 children fulfilling the inclusion criteria were recruited from OPD of the Department of Pediatrics, Allied Hospital, Faisalabad. Informed consent was obtained from parents. Demographic details like name, age and sex were also obtained (9). Then children underwent anthropometric measurements like height in centimeters by using measuring tape and weight in kilograms on a weighing machine (as per operational definition). All this information (age, gender, place of living, duration of DM, control of diabetes (yes/no), education of parents (illiterate/primary/middle/matric & above), socioeconomic status of parents (poor/middle/upper), height and weight) was recorded on proforma (attached) (9).

Statistical Analysis:

The collected data was entered and analyzed using SPSS version 21.0 (10). Mean and SD were calculated for quantitative variables like age, duration of DM height and weight. Frequency and percentage were calculated for categorical variables like gender of child, place of living (rural/urban), control of diabetes (yes/no), education of parents (illiterate/primary/middle/matric & above), socioeconomic status of parents (poor/middle/upper) (11).

Data was stratified for effect modifier like age, gender, duration of DM, place of living (rural/urban), control of diabetes (yes/no), education of parents (illiterate/primary/middle/matric & above), socioeconomic status of parents (poor/middle/upper) and independent sample t-test was used. P-value≤0.05 was considered as significant (12).

RESULTS

Age range in this study was from 1 to 18 years with mean age of 9.58 ± 2.88 years. Majority of the patients i.e. 296 (52.11%) were between 1 to 9 years of age as shown in Table I. Mean duration of diabetes mellitus was 6.33 ± 2.04 years (Table II) (13).

Out of these 568 patients, 358 (63.03%) were male and 210 (36.97%) were females with male to female ratio of 1.7:1 (Figure I) (14).

Distribution of patients according to place of living and diabetes mellitus status is shown in Table III & IV respectively. Distribution of patients according to education of parents and socioeconomic status is shown in Table V & VI respectively.

In my study, mean height of patients was 111.09 ± 21.47 cm. Mean weight was 30.31 ± 5.65 kg (Table VII) (13).

Stratification of mean height with respect to age, gender, duration of DM, place of living, control of

diabetes, education of parents and socioeconomic status of parents is shown in Table VIII. Table IX has shown the stratification of mean weight with respect to age, gender, duration of DM, place of living, control of diabetes, education of parents and socioeconomic status of parents (14).

Table-I: Distribution of patients according to Age (n=568).

Age (in years)	No. of Patients	%age
1-9	296	52.11
10-18	272	47.89
Total	**568**	**100.0**

Mean ± SD = 9.58 ± 2.88 years

Table-II: Distribution of patients according to duration of diabetes mellitus (n=568).

Duration of diabetes (years)	No. of Patients	%age
≤5 years	200	35.21
>5 years	368	64.79

Mean ± SD = 6.33 ± 2.04 years

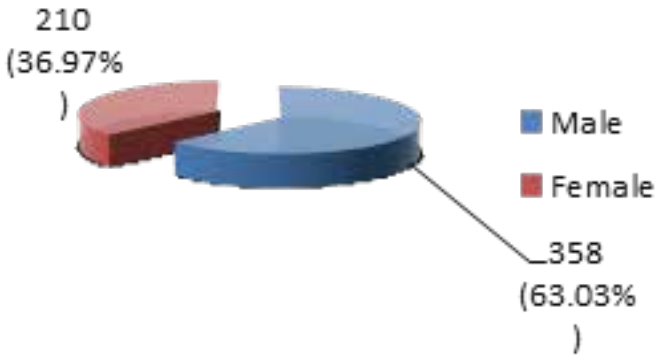

Figure I: Distribution of patients according to Gender (n=568).

Table-III: Distribution of patients according to control of diabetes (n=568).

Control of diabetes	No. of Patients	%age
Yes	389	44.71
No	179	55.29
Total	568	100.0

Table-IV: Distribution of patients according to place of living (n=568).

Place of Living	No. of Patients	%age
Rural	244	44.71
Urban	324	55.29
Total	568	100.0

Table-V: Distribution of patients according to education of parents (n=568).

Education of parents	No. of Patients	%age
Illiterate	96	16.90
Primary	72	12.68
Middle	229	40.32
Matric & above	171	30.11

Table-VI: Distribution of patients according to socioeconomic status of parents (n=568).

socioeconomic status of parents	No. of Patients	%age
Poor	111	19.54
Middle	209	36.80
Upper	248	43.66

Table-VII: Mean of growth parameters of children presenting with type I diabetes mellitus (n=568).

Growth parameters	Mean ± SD
Height (cm)	111.09 ± 21.47
Weight (kg)	30.31 ± 5.65

Table VIII: Stratification of height with respect to age, gender, duration of DM, place of living, control of diabetes, education of parents and socioeconomic status of parents.

Variables		Height (cm) Mean ± SD	P-value
Age (years)	**1-9**	94.90 ± 15.04	**0.0001**
	10-18	128.71 ± 10.98	

Gender	**Male**	118.18 ± 18.23	**0.0001**
	Female	99.0 ± 21.22	
Duration (years)	**≤5**	92.27 ± 15.66	**0.0001**
	>5	121.32 ± 16.78	
Controlled	**Yes**	111.62 ± 20.04	**0.385**
	No	109.93 ± 24.31	
Place of living	**Rural**	113.39 ± 20.44	**0.026**
	Urban	109.35 ± 22.09	
Education	**illiterate**	123.44 ± 16.36	**0.072**
	Primary	121.38 ± 2.95	
	Middle	104.52 ± 22.52	
	Matric & above	108.63 ± 22.57	
Socioeconomic status	**Poor**	104.29 ± 23.66	**0.009**
	Middle	115.01 ± 19.99	
	Upper	110.83 ± 20.95	

Table IX: Stratification of weight with respect to age, gender, duration of DM, place of living, control of diabetes, education of parents and socioeconomic status of parents.

Variables		**Weight (kg)** Mean ± SD	**P-value**
Age (years)	**1-9**	26.88 ± 5.01	**0.0001**
	10-18	34.04 ± 3.55	
Gender	**Male**	32.35 ± 4.94	**0.0001**
	Female	26.83 ± 5.05	
Duration (years)	**≤5**	27.0 ± 5.74	**0.0001**
	>5	32.10 ± 4.71	
Controlled	**Yes**	30.60 ± 4.92	**0.066**
	No	29.66 ± 6.94	
Place of living	**Rural**	30.97 ± 6.10	**0.014**
	Urban	29.80 ± 5.23	
Education	**illiterate**	33.25 ± 4.14	**0.873**
	Primary	35.32 ± 2.83	
	Middle	28.66 ± 6.02	
	Matric & above	28.75 ± 4.80	
Socioeconomic status	**Poor**	28.03 ± 5.92	**0.0001**
	Middle	31.36 ± 5.72	
	Upper	30.44 ± 5.16	

DISCUSSION

The chronic condition known as type 1 diabetes mellitus (T1DM) has well-established short- and long-term effects.One hundred The so-called Mauriac syndrome, which severely impairs growth and development, is one of the long-term effects. This entity is now rare due to significant advancements in diabetes care. In fact, certain research conducted in the past ten years have reported beneficial growth features in children with diabetes. However, other nations worldwide, including Austria, Brazil, the Czech Republic, Germany, and Sudan, have recorded growth slowing during the epidemic. (2)

The purpose of this study was to ascertain the average growth parameters of kids who were diagnosed with type I diabetes. The study's participants ranged in age from 1 to 18, with a mean age of 9.58 ± 2.88 years. Most patients, or 296 (52.11%), were in the 1–9 age range. The male to female ratio of these 568 patients was 1.7:1, with 358 (63.03%) being male and 210 (36.97%) being female. The average height of the patients in my study was 111.09 ± 21.47 cm. A mean weight of 30.31 ± 5.65 kg was recorded. According to one study, T1D children's mean height (n=125) was lower than that of healthy children (n=125), measuring 128.3±24.3 cm versus 133.6±24.7 cm. This difference was not statistically significant (p>0.05), and their mean weight was less as compared to healthy children i.e. 29.2±15.3kg vs. 31.3±15.4kg, although insignificant (p>0.05) (14).

In subsequent years, more than 30 studies on the growth of children with type 1 diabetes have produced contradictory findings. In 2002, DiLiberti et al. conducted a meta-analysis of the pertinent data and came to the conclusion that the children with diabetes were taller when they were diagnosed. They attributed this finding to the parents' greater stature (14). But according to Poyrazoglu et al.109, there was no discernible overall height decrease and the diabetic children's final heights between 1970 and 1987 were in line with their desired heights. Our knowledge of T1DM and the standard of its management have greatly improved since the early 1990s.

Bognetti et al. discovered that in children and teenagers diagnosed between 1989 and 1992, height SDS considerably decreased even within the first three years of the condition. In a similar vein, Donaghue et al.103 discovered that T1DM patients identified between 1974 and 1991 had lost height SDS by the fifth year of their illness (15).

Brown et al. and other authors showed that children with T1DM diagnosed between the ages of five and ten were taller at the outset of the disease than their healthy peers, but they did not detect any appreciable differences in patients with earlier or later onset. The mean height standard deviation (SDS) of 22,651 German and Austrian children with type 1 diabetes upon diagnosis was considerably greater than the average for the healthy population, according to a recent study by Bonfing et al. (16).

Several studies have examined the growth pattern in children prior to the start of type 1 diabetes as a risk factor for the disease's development considering these findings (17). Increased early growth may be linked to disease risk in European populations, as evidenced by a retrospective study by the EURODIAB Study Group that found that T1DM patients had significantly higher height standard deviations (SDS), weight SDS, and body mass index (BMI) SDS than healthy children, with the largest differences occurring between the ages of one and two. Furthermore, several recent investigations have verified that a quick increase in height, weight, and BMI during early childhood appears to be connected to the emergence of islet autoimmunity and the later onset of type 1 diabetes in children (15).

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Bizzarri et al., on the other hand, examined 104 prepubertal children and verified that they were taller when they were diagnosed with type 1 diabetes; however, they did not discover any association between height (or BMI) and the age at which the condition began. The authors propose that the growing insulinopenia during the prediabetic era may have enhanced IGFBP-3 proteolysis, which in turn may have raised IGF-I availability, as a potential mechanism to explain the increased height of children at the outset of T1DM. The authors of the same study indicated that height velocity following a diagnosis of type 1 diabetes was directly connected with pancreatic beta cell residual activity, as measured by C-peptide levels, and that metabolic control, as expressed by HbA1c levels, influenced the growth pattern. Numerous studies have demonstrated that children with type 1 diabetes exhibit decreased height, SDS, and growth.

One well-known and comprehensible cause of stunting is the limited access to food that children in low socioeconomic circumstances experience. Patricia Silva discovered similar results in a study conducted in Ethiopia, which similarly has a high stunting incidence (47%) (18). Author discovered a correlation between stunting and a low socioeconomic status.

Another study conducted in Uganda by Kikakunda

found a correlation between stunting and both the parent's educational attainment and the family's low socioeconomic standing. These findings are comparable to those of this investigation (17-20).

CONCLUSION

The mean growth characteristics of children with type I diabetes mellitus are quite poor, according to the study's findings. Therefore, we advise parents of children with type 1 diabetes to teach their children about healthy eating to improve the growth characteristics.

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Nida Amin: Drafting the work. Final approval of the version to be published.

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Original Article

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Sonographic Features of Urinary Tract Infection in Both Gender Of Various Age Groups

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ABSTRACT

Background and Objectives: One of the most prevalent illnesses that people might get is urinary tract infections. primarily elderly people and women. Age and gender are two of the risk factors for acute UTIs, and clinical criteria are the main basis for diagnosis. However, ultrasonography is frequently required as part of the therapy workup to assess complex infections, chronic presentations, and contributing or causative variables. Clinical therapy, including aggressive and emergent therapies, is guided by a proper understanding of the most pertinent sonographic characteristics in urinary tract infections, which also give pertinent differential diagnosis.

METHODOLOGY: The current study is a mere descriptive research which has been reviewed and approved by the ethical committee of the University of Lahore, Pakistan. Data was collected from Shalimar Hospital Lahore. Under this group, 136 adults had positive UTI laboratory findings and had abdominal ultrasound. Patients with abnormal urinary tract disease or immunocompromised illness were not included. All data were done in Excel while data analyses were done in SPSS version 21.

RESULTS: This study collected data from 136 patients, with a minimum age of 14 years and a maximum age of 44 years. Of these, 48 (35.3%) were female and 88 (64.7%) were male. All patients had normal Blood perfusion of the right and left kidney. Urinary bladder echoes found in37 (27.2%)in which 08 patients of 14 to 21(40%) years had Urinary bladder echoes, 24 patients of 22 to 29 (25.5%) years had urinary bladder echoes, 3 patients of 30 to 37 (17.6%) years had urinary bladder echoes, 02 patients of 38 to 44(40%) years had urinary bladder echoes.

CONCLUSION: Age and gender contribute to UTI occurrence with male individuals being more susceptible to the condition. Sep 6 2011 Bladder echoes are noticed in 14-21 years and 38-44 years and pyelonephritis in adults. USG is pragmatic in the formation of UTI images.

KEYWORDS: Hematuria, ultrasonography, renal Doppler, Urinary tract infection

INTRODUCTION

Infections in the human population frequently occur in the urinary tract. Pediatric urinary tract infections (UTIs) are known to induce acute morbidity and chronic medical disorders, including hypertension and renal insufficiency in adulthood, in contrast to the largely benign course of UTIs in the adult population (1). Therefore, to effectively treat children with UTI, it is essential to have a thorough awareness of the pathophysiology of UTI, risk factors, diagnostic test indications, and the proper applications of antimicrobial medicines.

The most frequent bacterial infection in children is a UTI, and within the first six to twelve months after illness, up to 30% of babies and kids have it again. UTI symptoms in very young newborns are significantly different from those in older infants and children (2).

When a patient has symptoms of pyelonephritis, ultrasonography (US) may be used as a first-line diagnostic technique to examine the urinary system. Interstitial nephritis in adulthood is unfortunately not well represented by standard grey-scale figures (3). Consequently, most patients with clinically suspected pyelonephritis have negative US results. According to one prospective study, just 24% of patients in the US had abnormalities; other studies showed as low as 20% (4). Ultrasonography (USG) is an important modality for

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imaging of the urinary tract. The study was undertaken with the objectives of determining the urinary tract disorders affecting the urinary tract and correlating the USG findings (5). Urinary tract diseases are the common cases, where 30% of cases do not show any symptoms (6). Before the discovery of ultrasound scans physicians were mainly dependent on history, physical examination etc. However accurate diagnosis was not 100% (7). However ultrasound scans may be helpful in the evaluation of different diseases related to the urinary tract. Ultrasound (US) allows visualization of renal parenchyma in real-time with the multiplanar ability and also has advantages over IVU in the assessment of the lower urinary tract, including a measure of volume after micturition and size and projection of the prostate in males (8). The early and accurate diagnosis of etiological factors is crucial for early and effective management. The ability of ultrasound to evaluate the renal parenchyma as well as the urinary tract in a single investigation also provides insight functional urinary system which may help the physician in better treatment and management of their patients (8).

METHODOLOGY

This descriptive study was conducted at Shalimar Hospital Lahore after approval of the ethical review board of the faculty of allied health sciences, at the University of Lahore (9). Based on diagnosis inclusion criteria all adult patients of both genders visited to perform abdominal ultrasound and had positive lab reports for urinary tract infection. Patients present with any known pathologies related to urinary tract infection and immunosuppressed (10). Data were collected with the help of a convenient sampling technique according to the age, gender and sonographic findings of patients. The total sample size was 136. After collection data were managed in a Microsoft Excel sheet and were analyzed SPSS version 21 was used for data analysis (11).

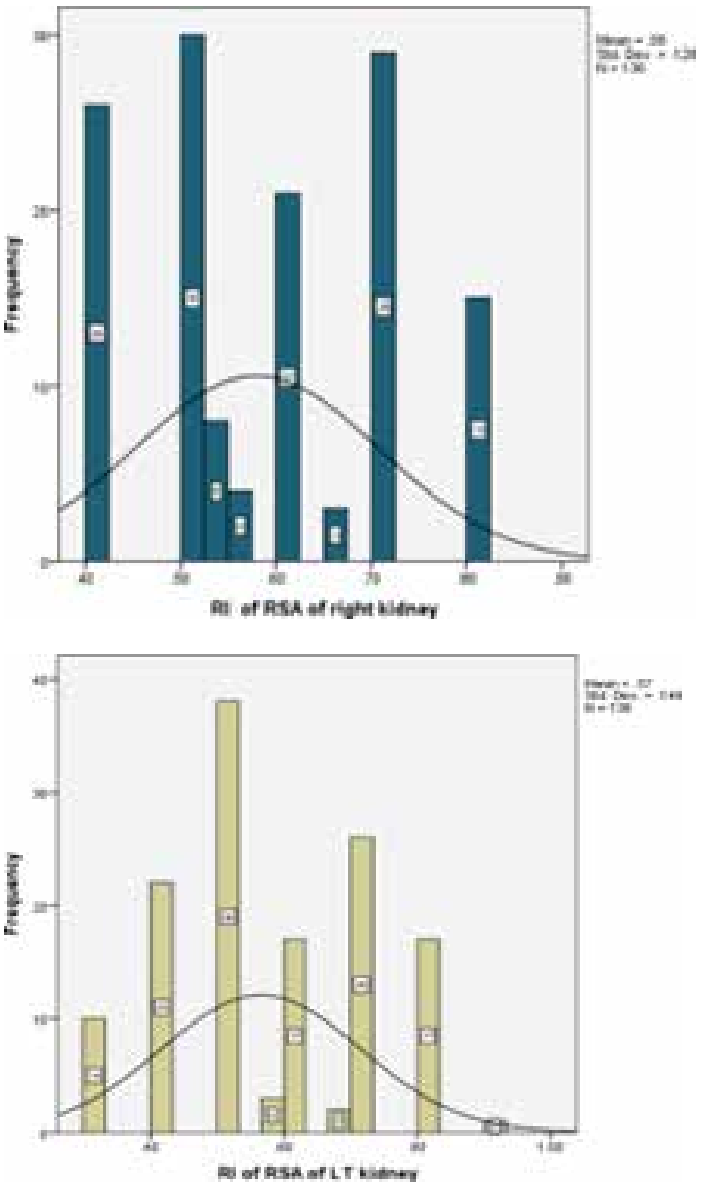
RESULTS

This study collected data from 136 patients, with a minimum age of 14 years and a maximum age of 44 years. Of these, 48 (35.3%) were female and 88 (64.7%) were male.

All patients had normal Blood perfusion of the right and left kidney (12). Urinary bladder echoes found in37 (27.2%)in which 08 patients of 14 to 21(40%) years had Urinary bladder echoes, 24 patients of 22 to 29 (25.5%) years had urinary bladder echoes, 3 patients of 30 to 37 (17.6%) years had urinary bladder echoes, 02 patients of 38 to 44(40%) years had urinary bladder echoes (8).

Table 1: Cross-tabulation between age group and urinary bladder echoes

Age group			Urinary bladder echoes		Total
			No	Yes	
Age	14-21	Count	12	8	20
Group		% within AG	60.0%	40.0%	100.0%
	22-29	Count	70	24	94
		% within AG	74.5%	25.5%	100.0%
	30-37	Count	14	3	17
		% within AG	82.4%	17.6%	100.0%
	38-44	Count	3	2	5
		% within AG	60.0%	40.0%	100.0%
Total		Count	99	37	136
		% within AG	72.8%	27.2%	100.0%



Graph No 1
a) RI of right renal artery
b) RI of left renal artery

Table 2: Cross tabulation shows the site of calculi and gender, in which mid ureter is the more prevalent site of calculus.

		Gender		Total
		F	M	
Site of calculi Level of ureter	DISTAL	4	8	12
	MID	16	20	36
	NO	22	46	68
	PROXIMAL	6	14	20
Total		48	88	136

Table 3: cross-tabulation shown between cystitis and gender, 18 females had cystitis and 33 males had cystitis.

		Gender		Total
		F	M	
Bladder Wall Thickness	Cystitis	18	33	51
	Normal	30	55	85
Total		48	88	136

DISCUSSION

Ultrasonography (USG) is an important modality for imaging of the urinary tract. The study was undertaken with the objectives of determining the urinary tract disorders affecting the urinary tract and correlating the USG findings (13). Urinary tract diseases are the common cases, where 30% of cases do not show any symptoms. 9 Before the discovery of ultrasound scans physicians were mainly dependent on history, physical examination etc. However accurate diagnosis was not 100% (13). However ultrasound scans may be helpful in the evaluation of different diseases related to the urinary tract. Ultrasound (US) provides advantages over intravenous ultrasound (IVU) in the evaluation of the lower urinary tract, including the measurement of volume after micturition and the size and projection of the male prostate. It also enables the multiplanar viewing of the renal parenchyma in real-time (13).

The early and accurate diagnosis of etiological factors is crucial for early and effective management. The ability of ultrasound to evaluate the renal parenchyma as well as the urinary tract in a single investigation also provides insight functional urinary system which may help the physician in better treatment and management of their patients (14).

The goal of the current investigation was to identify sonographic characteristics of UTIs in both sexes and across a range of age groups. The variables—age, gender, renal pathology type, and sonographic appearance—were taken into consideration when gathering data. This study comprised data from 136 patients, with a minimum age of 14 years and a maximum age of 44 years. Of them, 48 patients (35.3%) were female, and 88 patients (64.7%) were male. The RT and LT kidney blood perfusions were normal in every patient (15).

Wilches et al determine whether particulate echoes found on urinary tract ultrasound correlate with urinary tract infection. In the results seventy per cent of the patients with UTI were older than 65- 56.5% of patients with a finding of particulate echoes in the bladder on ultrasound had urinary tract infection and 34% had a urinary tract infection but did not show particulate echoes(15). Particulate echoes within the bladder are frequent in ultrasound reports and they should be correlated with urinalysis results to rule out a urinary tract infection. However, in the literature, this finding is not considered as an indication of infection (16). In their case series, particulate urine had low specificity and intermediate sensitivity, indicating that this finding is not a diagnostic criterion for UTI. As compared to our study, out of 136 patients, 37 patients (27.2%) had urinary bladder echoes; 08 patients of 14 to 21 years (40%), 24 patients of 22 to 29 years (25.5%), 3 patients of 30 to 37 years (17.6%) and 02 patients of 38 to 44 years (40%) had urinary bladder echoes. According to gender in our study out of 48 females, 14 patients (29.2%) and in 88 males, 23 patients (26.1%) had Urinary bladder echoes. Sundar S et al in 2017 conducted a descriptive study in which 100 children aged 1 month-12 years with documented urinary tract infection (UTI) were included. Forty-three children underwent both DMSA and follow-up VCUG (15). Ultrasonograms picked up acute pyelonephritis (APN) in 7.1% of children with UTI while 31.1% had pyelonephritis on DMSA. The overall incidence of VUR was 16.3%. The sensitivity of USG for VUR detection was only 14.2%. The sensitivity of USG as a screening test for APNs is 7%. All children less than five years old with UTI must undergo DMSA and VCUG. Ultrasonography is less sensitive in detecting VUR and acute pyelonephritis. 11 Compared to our study, out of 136 patients 16 patients (11.8%) had complained of Pyelonephritis-Right, in which 03 patients of 14 to 21 years (15%), 12 patients of 22 to 29 years (12.8%), 01 patient of 30-37 years (5.9%) & no patients of 38 to 44 years had Pyelonephritis- right. According to

gender in our study out of 48 females, 03 patients (6.3%) and in 88 males, 13 patients (14.8%) had Pyelonephritis – Right. 10 patients (7.4%) had Pyelonephritis –Liftin 3 patients of 14 to 21 years (15%), 7 patients of 22 to 29 years (12.8%), no patients of 30-to 37 years & 38-to 44 years had left-sided pyelonephritis. According to gender in our study out of 48 females, 05 patients (10.4%) and in 88 males, 5 patients (5.7%) had right-sided pyelonephritis(15).

In another study by Cheng et al they studied that Urine cultures were performed on 157 patients (79 in the ALN group and 78 in the APN group). Of these 157 patients, 65 (30 in the ALN group and 35 in the APN group) had no apparent organism that could be isolated from urine culture, and 92 had positive urine cultures. Among these 92 patients, Escherichia coli was the most common urinary pathogen. In result of my study shows out of 138 patients 67 patients were with lab findings that support pyelonephritis and in 71 patients there were no lab findings (17).

Our study was designed to compare sonographic findings and routine urine examinations in patients with acute pyelonephritis. On the basis of diagnostic performance and comparison of sonographic findings and routine urine test and detection ultrasonography is a reliable method for assessing patients with acute pyelonephritis (18).

A comparison between normal urine exams and sonographic findings in patients with acute pyelonephritis was attempted in the current investigation. Variables such as age, gender, clinical history, greyscale and Doppler ultrasonography results, and laboratory results were taken into consideration when gathering data. To reveal their abdomen, the patient will be requested to lie down. These individuals will have both Doppler and greyscale renal ultrasonography. In group 1, the patient arrived for an abdominal ultrasound. Urine samples will be sent to the lab for routine urine investigations if any abnormal kidney findings have been noted (19).

Data of 138 patients we collected 77 were males and 61 were females. Out of 138 patients, 75 (54.3%) patients had a clinical history of pyelonephritis, 67 patients had lab findings that supported pyelonephritis and 71 patients had no lab findings. Out of a total number of 138 patients 67 (48.6%) patients had right kidney pyelonephritis and 65 (47.1%) had left kidney acute pyelonephritis. The maximum age of patients was 77 years and the minimum was 18 years (20).

Cheng et al. examined urine cultures taken from 157 patients in a different research (79 in the ALN group and 78 in the APN group). Of these 157 individuals, 92 had positive urine cultures, while 65 (30 in the ALN group and 35 in the APN group) had no discernible organism that could be isolated from urine culture. Escherichia coli was the most prevalent urinary pathogen among these 92 patients. Out of 138 patients, 67 had lab results supporting pyelonephritis, while 71 patients had no lab results, according to the results of my study.

According to a 2005 study by Ramakrishnan K et al., 98% of young and middle-aged women who arrived at an emergency room with fever, pyuria, and other upper urinary tract infection symptoms had acute pyelonephritis. 16 percent had different diagnoses when there was no fever. However, gastrointestinal or pulmonary symptoms are the most common in 20% of older individuals with acute pyelonephritis, and up to one-third of these people do not have a fever. In patients with indwelling bladder catheters, fever and leukocytosis are not very useful in identifying acute pyelonephritis, particularly when infections are brought on by gram-positive cocci or Candida. Pelvic inflammatory disease, cholecystitis, appendicitis, lower lobe pneumonia, perforated viscus, and the prodrome of herpes zoster are among the conditions that can be used to differentiate acute pyelonephritis. Gram stain examination of urine can help determine the beginning antibiotic therapy in some complex diseases. The antibody-coated bacteria assay is an additional choice that could aid in the localization of asymptomatic upper UTIs. as a result of my research into people' medical histories.

In a study conducted by Ramakrishnan K et in 2005 in which they studied young and middle-aged women presenting to an emergency department with fever, pyuria, and other features of upper UTI, 98 per cent had acute pyelonephritis. In the absence of fever, 16 per cent were given alternative diagnoses. However, up to one-third of elderly patients with acute pyelonephritis have no fever; in 20 per cent of elderly patients, the predominant symptoms are gastrointestinal or pulmonary. Imaging is required if complication is suspected in UTI to assess the nature and extent of the lesions and to detect underlying causes. The current imaging modality of choice in clinical practice is computed tomography. Because of associated radiation and potential nephrotoxicity, ultrasound is an alternative that has been proven to be equally accurate in the detection of underlying causes of UTI been proven to be equally accurate in the detection of underlying causes of UTI. Overall, ultrasonography is a great tool for diagnosing complex UTI causes, thus it could be the preferred imaging

method for evaluating and monitoring these patients, many of whom are very young, in order to reduce radiation exposure.

CONCLUSION

Urinary tract infections are significantly influenced by the age and gender of the patient. Males are more susceptible to UTIs than females. Pyelonephritis is more common in adulthood, and patients between the ages of 14 and 21 and 38 and 44 are more likely to have bladder echoes than others. One crucial technique for visualizing urinary tract infections is ultrasound (USG).

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Original Article

Open Access

Nurses knowledge and attitude about palliative care in a private sector hospital Lahore, Pakistan

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ABSTRACT

Background and Objectives: The most important members of any nation are its nurses. With the growing number of patients in the latter stages of life, palliative care has become vital in nursing care. One of the most frequent obstacles to providing high-quality palliative care is nurses' ignorance of and unfavourable attitudes toward it. The purpose of the study is to assess the knowledge and attitude among nurses regarding palliative care in Pakistan.

METHODOLOGY: This is a descriptive cross sectional study with sample size 92 staff nurses, included 4.3 % male and 95.7% female. Data was collected by self-administered questionnaire, comprised on three parts: Demographic characteristics of nurses, the Palliative Care Quiz for Nursing (PCQN), and the Frommelt Attitudes Towards Care of the Dying (FATCOD). SPSS version 25 was used for data analysis.

RESULTS: Regarding Knowledge assessment (PCQN), less than half (35.88%) of the study participant had scored above the mean cut off point (8.717, SD = 7.98) and one fourth of the participant (29.3%) had scores exceeding a cut off score 15, representing adequate knowledge about palliative care. The rate of correct answers was ranged from 69.6% to 15.2%. Regarding nurses' attitude, the total FATCOD score were ranged from 36–105 (mean = 76.03, median = 80, SD = 13.06), but only 40 (43.5%) had a score greater than75% for FATCOD scales.

CONCLUSION: The study investigated evidence that nurses have a positive attitude about caring for patients and concluded that more resources and attention should be allocated to training and assisting nurses who provide palliative care to patients.

KEYWORDS: Palliative care, attitude, Life, knowledge.

INTRODUCTION

Nurses are crucial in helping patients who are nearing the end of their lives as well as during the beginning of their final days. It is believed to be one of the most taxing jobs in nursing (1-3). Through early detection, accurate assessment, and treatment of pain and other issues, whether physical, psychological, or spiritual, palliative care helps patients (adults and children) and their families deal with the challenges of a life-threatening illness and prevents and alleviates suffering (WHO, 2020). Providing intensive care to patients who may live for years has been the focus of palliative care in recent years.

One of the most important factors that determines the quality of palliative care delivery is the knowledge, attitudes, beliefs, and experiences of the medical staff. These factors affect not only their approach but also how they behave during evaluation and treatment (2). Most of the palliative care is given by nurses to patients who are terminally ill and in need of excellent nursing care, as well as those who are chronically ill. To enhance patients' quality of life, nurses must possess a thorough understanding of palliative care (3). Over 56.8 million people are expected to need medical care annually throughout the world. Furthermore, palliative care was only provided to 14% of the global population annually. Nearly 40 million people require palliative care(4).

Low level palliative care knowledge prevents nurses from properly assessing patients' needs and being able to build reports with patients who are chronically ill and their families Adequate palliative care is frequently hampered by a negative attitude toward the profes-

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sion, which hinders nurses' ability to appropriately assess patients' needs and create rapport with patients who are chronically sick and their families (3-7). Every medical practitioner who treats patients needs to be skilled and knowledgeable in palliative care. Every faculty should be subject to regulations and employ a unique method for educating its nurses and other healthcare professionals on palliative care (5).

The goal of palliative care, regardless of illness, is to improve the quality of life for the patient and their family. As death approaches, palliative care's role becomes more significant and its emphasis changes to aggressive symptom control and psychological support, even if it is not based on the prognosis like hospice care is (6-11).

There is evidence that nurses who work in specialized palliative care settings are more at ease and less nervous about providing care for patients during less stage of life. Additionally, specialized palliative care nurses are set to be more at ease treating pain and addressing psychological difficulties with patients and their families around end of a life care (12-19)

METHODOLOGY

Study Design: Descriptive cross sectional study design.

Settings: Ali Fatima Hospital Lahore, Pakistan.

Duration of Study: 6 months from Nov, to May 2023

Target population: Nurses.

Sample Size: 92

Sampling Technique: Non probability

Sample Selection

o Inclusion Criteria: Registered nurses > 01-year experience.

o Exclusion Criteria: nurses' student was exclude because they have different population for working nurses.

Data Collection Tool:

Self-administered questionnaire, on knowledge PCQN and on attitude FATCOD. SPSS software version 19 will be used and descriptive statistics will be calculated.

PCQN (palliative care quiz for nursing)

PCQN statistically analysis on SPSS version 21. FATCOD statistical analysis was used to determine the mean, standard deviation, and median as estimates of central tendency and dispersion. Thirty items total, fifteen of which have statements with positive wording and fifteen of which have statements with negative wording with a response option: disagreement, disagreement, ambiguity, agreement, and strong agreement.

RESULTS

There were 92 nurses in the sample overall (response rate = 100%). Responses ranged in age from 20 to 39, with a mean age of 27.23 ± SD=2.96. Ninety-seven percent of the participants were female nurses, and only 4.3% were male nurses. Less than half (35.88%) of research participants scored higher than the mean cutoff point (8.717, SD = 7.98) on the PCQN, and one-fourth (29.3%) of participants scored higher than the cutoff score of 15, which indicates acceptable understanding of palliative care. The percentage of right responses varied between 69.6% and 15.2%. Although the overall FATCOD score for nurses' attitudes ranged from 36 to 105 (mean = 76.03, median = 80, SD = 13.06), only 40 (43.5%) of them scored higher than 75%. Most of the responders hold a positive and supportive attitude towards ends of life care.

Table 1. Demographic characteristics of nurses

Variable	Frequency	Percentage
Gender of respondent		
• Male	4	4.3
• female	88	95.7
Age in years (mean = 27.42, SD = 2.96)		
• 20–30	85	92.4
• 31–40	7	7.6
• Nursing qualification		
• Diploma or less	28	30.4
• Bachelor	55	59.8
• Master	9	9.8
Department of work		
• medicine ward	29	31.5
• surgical ward	13	14.1
• intensive care unit	22	23.9
• emergency ward	16	17.4
• critical care unit	12	13.0
Nursing profession experience duration years (mean = 3.95, SD = 1.76)		
• <5	75	81.5
• 5–10	15	16.3
• 11-15	1	1.1
• >15	1	1.1
Training toward palliative care		
• Yes	57	62.0
• No	35	38.0
Period of training course		
• 1 week and less	58	63.0
• More than one week	34	37.0

This study was evaluated using data from 92 nurses who took part, yielding a 100% response rate. The mean age of the respondents is 27.23 ± 2.96 years, with a range of 20 to 39 years.

Male nurses made up just 4.3% of the participating nurses. Women made up 95.7% of the participants, and all of them had experience working at Lahore's private hospitals. Just 57% of the respondents attended palliative care lectures or training, but one in five (5%) had experience providing palliative care services. About 34% of respondents received training in nursing schools for more than a week, and roughly 63% of respondents heard lectures or received training on palliative care in less than a week. (Table 1).

Age, gender, education level, clinical work units, nursing work experience, training location, and respondents' perceptions of PC-related materials and brochures did not significantly correlate.

Table 2. Distribution of nurses' knowledge about palliative care on PCQN scale.

PCQN overall score (Mean = 10.947, SD = 2.59062)	Frequency (%)
• 0–5	41(44.6)
• 6–10	13(14.1)
• 11–15	11(12.0)
• 15+	27(29.3)

Of the study participants, fewer than half (35.88%) had scores higher than the mean cutoff mark (8.717, SD = 7.98). According to this survey, 29.3% of participants obtained scores higher than the cutoff of 15, which indicates that they know enough about palliative care. The percentage of right responses varied between 69.6% and 15.2%. The themes of psychosocial and spiritual care, as well as the management of pain and other symptoms, had the greatest and lowest mean item scores, respectively. The management of pain and other symptom's theme, item number 4, which said that adjuvant therapies are crucial in management, also had the greatest and lowest correct answers. (Table 2).

Table 3. Frequency distribution of nurses' attitude towards end of life care on FATCOD scale.

FATCOD cutoff overall score (mean-76.03,SD=13.06)
Score>76.03=40(43.5)
Score<76.03=52(56.5)

Only 40 (43.5%) got a score higher than 75% on the FATCOD scales, according to the study's findings, which showed that the overall FATCOD score ranges from 36 to 105 (mean = 76.03, median = 80, SD = 13.06). Most respondents have a supportive and upbeat view on end-of-life care. The data analysis of nurses' attitudes regarding end-of-life care revealed the extent to which nurses agreed with specific claims. The idea that non-family caregivers should continue to be involved as the patient approaches death was endorsed by most participants (78.7%). Most nurses also thought that families should keep their dying member's surroundings as normal as possible (93%) and that providing care for the dying person is a valuable experience (89.9%). They also thought that non-family caregivers may assist patients prepare for death (92.8) (Table 3)

DISCUSSION

Our sample size for the recent study, which was carried out in a private hospital in Lahore, was 92 nurses (response rate = 100%). The mean age of the respondents is 27.23 ± SD=2.96 years, with a range of 20 to 39 years. Male nurses made up just 4.3% of the participating nurses. Women made up 95.7% of the participants.

Less than half (35.88%) of research participants who took the PCQN scored higher than the mean cutoff threshold (8.717, SD = 7.98). According to this survey, 29.3% of participants obtained scores higher than the cutoff of 15, which indicates that they know enough about palliative care. The percentage of right responses varied between 69.6% and 15.2%.

Nurses' attitudes regarding the FATCOD score range Only 40 (43.5%) got a score higher than 75% on the FATCOD scales, according to the study's findings, which showed that the overall FATCOD score ranges from 36 to 105 (mean = 76.03, median = 80, SD = 13.06). Most respondents have a supportive and upbeat view on end-of life care. An prior study that yielded the same results supports the findings. Answers to 76% of the questions measuring knowledge about palliative care and hospice were accurate. Nurses' palliative attitudes were categorized using both positive and negative opinions. While "negative discernment" was not directly linked to ability, "positive discernment" was closely linked to talent. Positive perception and competence did not correspond with palliative knowledge. However, there was a negative correlation between palliative knowledge and positive perception (8). Another survey found that 60.6% of ICU nurses had a negative attitude toward palliative care, whereas 65.8% had a reasonable awareness of it. Information about medical caregivers' attitudes toward PC and their involvement in palliative considerations showed truly striking differences. There were statistically significant variations in nurses' attitudes about palliative care (PC), sociodemographic characteristics, years of nursing experience, and receptiveness to palliative care. The review revealed that attendees had a negative attitude about palliative consideration and that their information about it was fair (9)

Results show that nurses are not well-versed in Most of them are positive, though (20). The majority of the 260 respondents, or 76.2 percent, had poor implementation of their knowledge aspect of practice, and nearly half of the respondents reported that the diagnosis of patients was typically performed at the terminal stage. These findings are consistent with the same study, in which participants had poor knowledge and a fair attitude. Consequently, spiritual and medical problems were taken very seriously when working with patients who were near death. The nurses had favourable sentiments of PC despite their lack of practice knowledge. It is suggested that the public wellness

ness plan should give PC the attention it deserves and should be integrated into the public educational plan of attendant training (21).

In addition, a study found that many adults have inaccurate knowledge of palliative care and unfavourable beliefs about it, which is consistent with earlier research. However, we built on this earlier work by examining how self-assessed awareness of palliative care was associated with accurate versus unfavourable beliefs versus stating "don't know." The current data serve as a baseline for examining how knowledge and opinions have evolved over time. Interventions ultimately need to do more than just increase knowledge and attitudes because these factors alone frequently aren't enough to encourage behaviour change. In an ideal world, people would become familiar with palliative care initiatives before ever needing to decide on their course of treatment (22-23).

According to the results of another survey, 63% of the nurses understood PC well. Comparable results were found in a few previous studies, such as Budkaew and Chumworathayi (2013), who reported that 56% of medical attendants in their review had excellent PC knowledge. Although 63% isn't a particularly remarkable rate, there are several possible causes. First, 687.7% of the nurses in this survey have a bachelor's degree in nursing, according to the study (13). The study's conclusions showed that knowledge and education are positively correlated. Second, 77.4% had prior experience working with patients who were terminally ill, and most worked in various palliative care settings. This would have aided in the acquisition of information and self-assurance in providing care for people who are near death (24)

Sixty-three percent of the nurses had high understanding of palliative care, and seventeen percent had fair knowledge. 46% of respondents had a favourable opinion of palliative care, compared to 24% who were ambivalent. As the need for this specialized area of nursing increases, more research is needed to understand nurses' attitudes and understanding about palliative care. It is imperative that nursing curricula include a thorough explanation of palliative care. To give patients and their families the finest care possible during this important stage(25-30)

CONCLUSION

The study produced evidence that nurses working in private sector hospitals in Lahore have a positive attitude about caring for patients who are dying and very little knowledge of palliative care. Additionally, it showed that nurses in palliative care units undertake palliative care seminars to increase nurses' understanding of PC. Our results also indicated that nurses' attitudes on end-of-life care are positively improved by reading PC-related materials and caring for more terminally ill patients. These imply that the fundamentally organized aspect of nursing palliative care.

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Original Article

Open Access

Correlation of antimicrobial consumption and resistance among covid patients admitted to ICU in Lahore, Pakistan

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ABSTRACT

Background and Objectives: Antimicrobial resistance is a global problem and the leading cause of death and morbidity among patients admitted to medical intensive care units. In addition to correlating antibiotic consumption and antibiotic resistance with ICU demographic data, the study aims to ascertain whether clinical indications result in the recommendation of particular antibacterials for different patients admitted to the critical care unit. Another objective of the study is to determine whether the use of antibiotics and microbial infections is associated with the recovery or death of the patient who was brought to the medical critical care unit.

METHODOLOGY: The study was conducted in a tertiary care hospital in Lahore. The study subjects were 100 people who were admitted in ICU. All the samples were collected after the permission of the hospital administration and consent from the patients were also taken before taking the samples. According to clinical doubt, lab samples were collected and tested for responsible organism and for their antibacterial susceptibility.

RESULTS: E. coli (32%) and Klebsiella pneumoniae (17%) were the most prevalent pathogens. The most resistant strains of Klebsiella pneumoniae were to amoxycillin (12.0%) and ampicillin (13.3%). Most E. coli was resistant to both ciprofloxacin (16.8%) and ampicillin (19.8%). The most frequent diagnoses were CKD and UTI (21.4%), with E. coli accounting for 50% of these cases. In the intensive care unit, about 17 different kinds of antibiotics were utilized. Of all the antibiotics, quinolones, carbapenem, aminoglycosides, and fluoroquinolones were the most used. Liver failure and brain injuries result in the least amount of healing, whereas pyelonephritis causes the most.

CONCLUSION: Present study provided a useful data on clinical implication of antibiotic use in ICU patients especially with comorbidities. These data indicated that critical care patients in ICUs are disproportionately vulnerable to antimicrobial resistance, according to the data.

KEYWORDS: Antimicrobial resistance pattern, co morbidity, Intensive care unit, antibiotic susceptibility.

INTRODUCTION

The discovery of the many antibiotics represents a significant global and medical accomplishment. Their application has significantly decreased morbidity and mortality. Unfortunately, because of their extensive use, multi-drug infections have emerged, and the most effective antimicrobials have become less effective. Antimicrobial resistance is a worldwide issue that threatens the effectiveness of treating a variety of illnesses, impacts many hospitalized patients in the ward, and most likely poses a major risk to patients admitted to the intensive care unit (1).

As the last resort for patients whose treatment has failed owing to AMR, many intensive care units have turned become sinks for multidrug-resistant (MDR) infections (1). Nevertheless, the development, advancement, and emergence of antibiotic resistance pose a threat to the effectiveness of these antibiotic preventive regimens.

(1). Due to the use of several medications, prolonged hospital stays, costly antibiotics, and more lab testing, antimicrobial resistance also becomes a financial burden. Antimicrobial resistance was predicted to cost $55 billion annually in the United States alone (2). Governments, healthcare providers, experts, and the public are all responsible for taking steps to control the AMR problem. Limiting factors for AMR include

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examination, mindfulness, information, and forward-looking data (3).

Gram-negative bacteria like K. pneumonia are responsible for 15% of infections in patients admitted to intensive care units (2). Infection is common in patients hospitalized to intensive care units, and the mortality rate ranges from 25% to 80% (3). A patient who is admitted to critical care is more likely to develop drug resistance. Antimicrobial resistance in critical care unit patients is caused by a number of circumstances. Approximately 50% of ICU patients had a hospital-acquired infection, according to prospective research conducted in 1265 ICUs across 75 countries (4). Acinetobacter is becoming more widely acknowledged as a significant contributor to hospital-acquired infections (5). The successful use of intrusive equipment, the use of medications, and the initiation of empirical antibiotic treatment without culture and antimicrobial susceptibility testing are some of the variables that result in a reduction in immunity and several nosocomial infections(6).

METHODOLOGY

The study was carried out in a Lahore tertiary care facility. Two hundred and fifty samples were collected from the infected persons suffering from sepsis, pneumonia, Covid-19, infection of urine, and infection within blood, admitted to ICU of tertiary care hospital, Lahore. The samples included urine (44), Sputum (55), bedsores swab (34), CVP Tip (02), Blood Culture (20), Pus Swab (02), Tracheal Aspirate (52), Drain (01), Pleural Fluid (01) and Broncho-alveolar Lavage (39). Every sample was collected under sterile conditions. All samples were inoculated on different agar according to the nature of the specimen(2). After streaking the samples, samples were placed incubator for 18-24 hours at 37°C.

At first, growth characteristics of isolated bacteria were observed on agar plates and gram staining was carried out(3). For the identification of clinical isolates two criteria were used. First one was the macroscopic and second was the microscopic identification(4). Furthermore, biochemical test and API were used for the identification of the clinical isolates at species level(5).

Following the organism's isolation and identification, the Kirby Bauer disk diffusion assay was used to screen for antibiotic susceptibility. The assay was easy to use, standardized, and appropriate for determining antimicrobial activity (6). For this, standard commercial antibiotic disks were utilized. Using a sterile cotton swab, the test organism's inoculum was generated in accordance with 0.5 McFarland standards and inoculated three-dimensionally into a muller hinton agar (MH) agar plate (HiMedia®).

DISCUSSION

Of the 250 individuals that were enrolled in the trial, 40% were female and 60% were male. ICU data were dispersed based on the patients' age group, gender (male or female), the beginning of infection symptoms, and the co-morbidities these critically sick patients were dealing with. According to the study, most of the bacterial cultures were taken from patients who had kidney failure, followed by those who had liver failure, heart disease, cystitis, and other illnesses. The most frequent pathogens were E. coli (32%), followed by Salmonella (1%), Klebsiella pneumoniae (17%), and Klebsiella oxytoca (1%).

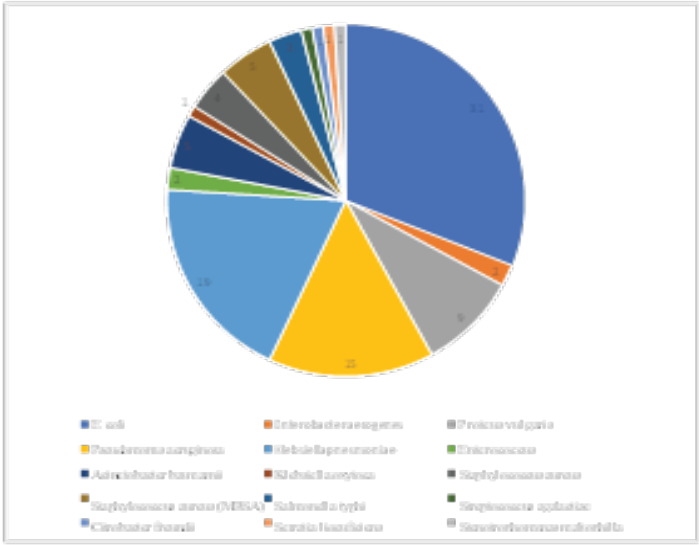

Figure 1: Distribution of clinical isolates among patients admitted in ICU

When the zone of inhibition surrounding any of the extended-spectrum disks manifested a discernible extension towards the antibiotic disk, the isolate was deemed sensitive in accordance with CLSI recommendations. The majority of GNI were least susceptible to ceftriaxone and cefepime (1.1%) and 0.005%, respectively, and most sensitive to imipenem and meropenem (11.9%). Other GNI showed the least sensitivity to imipenem and meropenem (6.25%) and the highest sensitivity to amikacin and gentamicin (12.5%). Most GPIs were susceptible to ciprofloxacin (11.1%), gentamycin (11.1%), and linezolid (11.1%).

Most of the GNI were resistant to ampicillin (19.8%) and ciprofloxacin (16.8%) and least resistant to amikacin (1.09%) and imipenem (1.09%). Other GNI were most resistant to ampicillin (13.3%) and amoxycillin (12.0%) and least resistant to colistin and ceftazidime.

Table 1(a): Antibiotics Susceptibility of GN isolates.

Antibiotic	Code	Concentration (µg)	Zone values		Sensitive and Resistance percentage	
			Resistance(mm)	Susceptibility (mm)	Sensitive	Resistance
Linezolid	LZD	30	<=20	>=23	15.6	5.93
Azithromycin	AZM	15	<=15	>=28	1.42	6.24
Colistin	CT	10	<=10	>=11	1.43	1.78
Gentamycin	CN	10	<=12	>=15	7.68	12.8
Ciprofloxacin	CIP	5	<=19	>=23	9.08	14.8
Fusidic acid	FD	10	<=28	>=30	3.12	1.92
Vancomycin	VA	30	<=16	>=18	12.4	3.86
Penicillin	P	10	<=28	>=30	2.27	8.02
Amikacin	AK	30	<=14	>=29	14.7	16.8
Cefoxitin	FOX	30	<=14	>=22	9.12	4.12
Clindamycin	DA	2	<=14	>=22	5.91	1.40
Doxycycline	DO	30	<=12	>=16	2.96	1.22
Erythromycin	E	15	<=15	>=21	1.39	11.4
Ceftazidime	CAZ	30	<=12	>=16	1.80	1.01
Ceftriaxone	CRO	30	<=19	>=23	1.81	2.45
Ampicillin	AMP	10	<=13	>=17	6.31	1.93
Cefoxitin	FOX	30	<=21	>=22	1.80	4.18
Oxacillin	OX	1	<=17	>=18	3.18	14.8
TMP/SMX	SXT	10	<=10	>=16	2.40	9.18
Levofloxacin	LEV	5	<=12	>=16	2.80	6.54

Table 1(b): Antibiotics Pattern of Gram-Positive Isolates

Antibiotic	Code	Concentration (µg)	Zone values		Sensitive and Resistance percentage	
			Resistance(mm)	Susceptibility(mm)	Sensitive	Resistance
Amikacin	AK	30	<=14	>=17	11.6%	4.32%
Ceftriaxone	CRO	30	<=19	>=23	6.13%	9.68%
Ciprofloxacin	CIP	5	<=15	>=21	7.31%	9.16%
Colistin	CT	10	<=10	>=11	10.6%	2.55%
Gentamicin	CN	10	<=12	>=15	9.42%	5.37%
Imipenem	IPM	10	<=15	>=23	10.5%	2.58%
Meropenem	MEM	10	<=13	>=23	9.75%	2.84%
Nitrofurantoin	NIT	300	<=14	>=17	1.80%	2.02%
Piperacillin	PIP	20	<=17	>=21	8.23%	2.45%
Amoxycillin	AMC	30	<=13	>=18	1.50%	17.3%
Ampicillin	AMP	10	<=13	>=17	3.16%	18.1%
TMP, SMX	SXT	10	<=10	>=16	3.60%	8.35%
Fosfomycin	FOS	50	<=12	>=16	1.20%	3.90%
Sulbactam	SCF	105	<=15	>=21	7.41%	2.32%
Levofloxacin	LEV	5	<=13	>=17	5.23%	5.84%
Tazobactam	TZP	110	<=17	>=21	1.53%	1.09%
Tabromycin	TOB	10	<=12	>=15	2.06%	1.21%
Cefixime	CFM	5	<=15	>=19	2.06%	2.95%

The patient diagnosis was made through the proper channel. The most common diagnosis was CKD, along with UTI (21.4%), which was caused mainly by E. coli (50%), followed by the Klebsiella pneumoniae (20%). The second most diagnosed patient was sepsis and hematuria (19.1%), caused mainly by E. coli (52.9%), followed by Klebsiella pneumoniae and Proteus species 11.8% 11.7%, respectively. The least common diagnosis was BSI (1.11%), caused mainly by Klebsiella pneumoniae (100%). The BSI followed by the lung abscesses (1.07%) caused mainly by the Klebsiella pneumoniae. (100%).

Different medications are administered to various patient types with various conditions in the medical intensive care unit. Carbapenem and cephalosporin were the most often recommended medications for UTIs, or sepsis with hematuria, whereas fosfomycin was the least frequently prescribed medication (3.70%). Aminoglycosides (16.0%) were the most often recommended medication in CKD, while glycopeptides (4.0%) were the least. Carbapenem was the most used medication in pancreatitis cancer and ascites (53.7%), whereas glycopeptide was the least used (7.70%). Quinolones were the most often recommended medication for pyelonephritis, whereas fosfomycin was the least. Teicoplanin (10.0%) was the least common antibiotic prescribed for CLD, whereas fluoroquinolone (55.0%) was the most common. The most common medication used for septicemia and pneumonia was carbapenem (50.0%), whereas aminoglycoside (16.5%) was the least common.

Table 2: Clinical isolates from various Samples

Diagnosis of Patients	Percentage	Isolates	Percentage
Acute coronary Syndrome	2.20%	*Klebsiella pneumoniae* *Pseudomonas aeruginosa*	50% 50%
UTI, Sepsis, Hematuria	19.1%	*E. coli* *Streptococcus* *Klebsiella pneumoniae* *Enterococcus* *Enterobacter* *Citrobacter* *Proteus*	52.9% 5.88% 11.8% 5.89% 5.88% 5.88% 11.7%
Abscesses, Endocarditis	12.8%	*Staphylococcus aureus*	100%
1Diabetic Wound	6.50%	*Pseudomonas aeruginosa* *Staphylococcus aureus* *MRSA* *Enterobacter* *Proteus*	16.7% 16.6% 33.3% 16.7% 16.7%
Cystitis, hematuria,	3.30%	*Proteus* *E coli*	66.4% 33.6%
CKD, UTI	21.4%	*Pseudomonas aeruginosa* *MRSA* *E. coli* *Citrobacter freundii* *Acinetobacter* *Klebsiella pneumoniae* *Proteus*	5.0% 10% 50% 5.0% 5.0% 20% 5.0%
Septicemia, Pneumoniae	6.48%	*Proteus* *Klebsiella pneumoniae* *Acinetobacter baumanni* *Pseudomonas aeruginosa*	20% 40% 20% 20%
Diagnosis of Patients	**Percentage**	**Isolates**	**Percentage**
Cellulitis, Burn Patient	1.08%	*Pseudomonas aeruginosa*	100%
Food Poisoning	1.11%	*Salmonella*	100%
CLD	4.30%	*E. coli* *MRSA*	60% 40%
Heart Stroke, DM	1.17%	*Pseudomonas aeruginosa*	100%

Regarding diagnosis, almost 60% of patients had pneumonia and COVID-19, followed by aspiration, diabetes, ischemic heart disease, chronic obstructive pulmonary disease, and hypertension. Meningoencephalitis, sepsis, and UTI were also diagnosed, along with various co-morbidities. These days, the leading causes of illness and death are COVID-19 and pneumonia. Three patients died from sepsis, one patient died from a UTI, and 23 patients died from pneumonia.

This study includes Covid-19 individuals with PCR confirmation. Data from 100 patients was gathered, 52 of them were male and 48 of whom were female. Most patients with greater co-morbidities and complications were over 45. Patients experienced a variety of symptoms upon admission to the hospital. SOB, fever, cough, sore throat, vomiting, loose stool, and body aches are the most typical symptoms experienced by critically ill patients. The symptoms of patients with various co-morbidities were more complex.

Throughout their hospital stay, the patients' recuperation was documented. By visiting the intensive care unit, the patient's recuperation and demise were documented. Most deaths are from head injuries (80%) and CLD (60%), including cellulitis, burn patients, pancreatic cancer, ascites (55%), and pancreatic cancer (46%). The cases of pyelonephritis rigors (5%) and cystitis, hematuria (6%), both resulted in a slight mortality. In contrast, most of the recovery happens in cases of cystitis with hematuria (94%) and pyelonephritis and rigors (95%). The lowest recovery rates were 20% for head injuries and 40% for CLD cases.

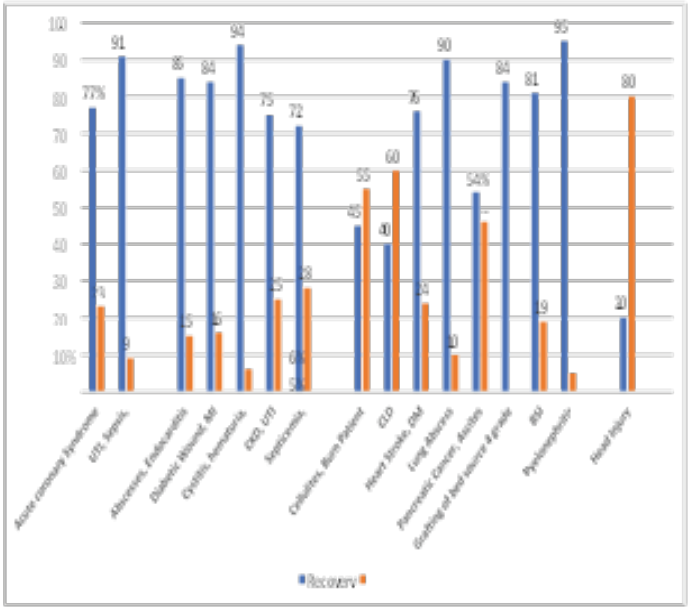

Figure 2: Mortality and recovery of the patients

DISCUSSION

The most often recommended medications for hospitalized patients, particularly those in critical care, are antibiotics. Using the right antibiotics in critical care units with few prescriptions is crucial for infection control, length of hospital stay, cost reduction, and acceptable quality of care. Patients who needed treatment and monitoring after being admitted to the intensive care unit of a tertiary care hospital were the subjects of this study. The purpose of this study was to examine the pattern of antibiotic usage and identify the factor contributing to the rise in antibiotic resistance in connection to antibiotic use.

E. Coli, the most prevalent bacterium in the intensive care unit, exhibited ciprofloxacin (16.8%) and ampicillin resistance (19.8%). In that instance, imipenem and meropenem were the most successful antibiotics. Most of the E. coli (11.9%) exhibited strong sensitivity to imipenem and meropenem. Both GPIs and GNIs are often treated with imipenem and meropenem. According to a different investigation on ICU uropathogens, E. coli was extremely vulnerable to imipenem, meropenem, and nitrofurantoin (6). The most prevalent bacterium, according to a study of medication sensitivity and bacteriology profiles on patients in intensive care units in tertiary care hospitals in Ahmadabad, was Acinetobacter spp. [30.9%], followed by Klebsiella spp. (29.8%) and Pseudomonas aeruginosa (22.9%) (7).

Pseudomonas was the most often found organism in the medical intensive care unit, followed by Klebsiella pneumonia, according to a study on microbial infections and antibiotic resistance patterns in patients admitted to the medical ICU at a tertiary care hospital (6).

Most of the gram-positive bacteria were resistant to vancomycin (15.2%) and penicillin (15.4). The gram-positive bacteria were treated with ciprofloxacin, gentamicin, and linezolid. Most of the gram-negative bacteria exhibited two or more antibiotic resistance, which is concerning because it may soon result in high rates of death and morbidity. The control of gram-negative bacteria will also be impacted by this. A study conducted in London found a similar outcome (7). Pseudomonas spp. (29.1%) and Acinetobacter spp. (27.5%) were the most prevalent organisms in another study of patients in intensive care units (8).

These results are consistent with ours since we found that E. coli was the most prevalent bacterium (31%), followed by Klebsiella pneumoniae (19%) and Pseudomonas aeruginosa (15%). Stenotrophomonas maltophilla, Citrobacter freundii, Serratia liqeuficiens, and Streptococcus agalactiae have the lowest (1%).

CONCLUSION

Overall, this study indicates that antibacterial medication use is extremely high. Our figures will be somewhat impacted because this study was limited in the number of participants it included. To handle this

issue, however, particular antimicrobial policies of hospitals and intensive care units are required.

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Original Article

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Exploring the Optical Behavior of Light Through Periodic Slits in Thick Silver Films: A Stimulation Based Approach in Vision Sciences

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ABSTRACT

Background and Objectives: The interaction of light with metallic nanostructures has opened new frontiers in photonics and optoelectronics. Silver, with its unique optical properties and minimal loss in the visible spectrum, enables phenomena like surface plasmon polaritons (SPPs) and extraordinary optical transmission (EOT). These effects offer significant potential for advancing applications in sensing, imaging, and nanophotonics. This study aims to investigate the optical behavior of light through periodic arrays of slits in thick silver films, focusing on the influence of geometric parameters and surface plasmonic effects on transmission efficiency and electric field enhancement.

METHODOLOGY: Finite element method (FEM)-based numerical simulations were conducted using COMSOL Multiphysics. Silver films with slit widths ranging from 10 nm to 100 nm were modeled under transverse magnetic (TM) polarized light. Parameters such as electric field enhancement, power flow, and slit periodicity were analyzed across wavelengths from 430 nm to 720 nm.

RESULTS: Simulations revealed that slit periodicity and geometry significantly impact transmission efficiency, with optimal configurations resulting in enhanced electric fields due to SPP excitation. At periodicities matching the SPP wavelength, transmission was reduced, highlighting the role of constructive and destructive interference. Peak power flow occurred at shorter wavelengths, aligning with enhanced plasmonic activity.

CONCLUSION: The study demonstrates that by tailoring the geometry of periodic slits in silver films, it is possible to control light-matter interactions for advanced applications in nanophotonics, sensing, and energy harvesting. The findings contribute to a deeper understanding of plasmonic phenomena and their practical implications.

KEYWORDS: Surface plasmon polaritons, localized surface plasmon resonance, silver nano slits, finite element method, nanophotonics, extraordinary optical transmission.

INTRODUCTION

The interaction of light with materials, particularly at the nanoscale, forms the foundation of many modern optical and photonic technologies. Among these materials, silver stands out as a preferred choice due to its remarkable optical and electrical properties, including its ability to support low-loss surface plasmon resonances in the visible and near-infrared spectrum. These characteristics have made silver a cornerstone in the study of plasmonics and nanophotonics, where understanding light behavior at subwavelength scales is critical. This paper delves into how light interacts with periodic arrays of slits in thick silver films and the resulting extraordinary optical effects.

Periodic slit arrays in metallic films generate phenomena such as extraordinary optical transmission (EOT). This occurs when light passes through subwavelength apertures more efficiently than predicted by classical theory. The excitation of surface plasmon polaritons (SPPs), collective oscillations of electrons at the metal-dielectric interface, plays a vital role in EOT. These oscillations not only enhance the electric field near the surface but also allow light to travel through nanoscale apertures, making it possible to manipulate optical properties at dimensions smaller than the wavelength of light (1).

A significant feature of EOT is its sensitivity to geometric parameters like slit width, periodicity, and film thickness. By carefully designing these parame

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ters, the transmission of light can be enhanced or suppressed. For instance, the periodicity of the slits can align with the SPP wavelength to produce constructive or destructive interference, controlling the intensity and directionality of transmitted light. This interplay between light and nanostructures enables the creation of advanced optical devices such as filters, waveguides, and sensors (2).

Silver's exceptional properties make it ideal for exploring these phenomena. Compared to other metals, silver exhibits the lowest optical losses in the visible range, which is crucial for applications requiring high efficiency and precision. Its high conductivity and plasmonic response allow for strong field enhancements and better energy localization, essential for sensing, imaging, and energy harvesting applications (3).

The advent of advanced computational tools has significantly enhanced the ability to study and optimize these effects. Finite element modeling, for example, allows for precise simulations of light behavior in complex geometries (4) This study leverages COMSOL Multiphysics, a leading simulation tool, to explore the influence of geometric parameters on the optical properties of periodic silver slits. The focus is on transverse magnetic (TM) polarization, which is particularly effective in exciting SPPs and achieving extraordinary optical transmission (5).

By investigating the transmission efficiency, electric field enhancement, and power flow in various configurations, this research contributes to the broader understanding of light-matter interactions at the nanoscale (8). The findings not only provide insights into the fundamental physics of plasmonics but also highlight practical applications in photonics, including sensors, waveguides, and other integrated optical devices (13-15). As the demand for miniaturized and efficient optical components grows, studies like this one pave the way for innovations that bridge fundamental research and technological advancements (6).

METHODOLOGY

This study employed numerical simulations to investigate the optical properties of light passing through periodic arrays of silver slits. The finite element method (FEM), implemented in COMSOL Multiphysics, was used to model and analyze the interactions of electromagnetic waves with the slit structures. Silver films with slit widths ranging from 10 nm to 100 nm were considered, with periodicities varied to evaluate their effect on light transmission. The dielectric properties of silver were modeled based on established data from Johnson and Christy to ensure accuracy in simulating its optical behavior.

A monochromatic plane wave, propagating in the –z direction, was used to illuminate the silver film. The surrounding medium was air, and boundary conditions were defined to accurately simulate wave interactions at the interfaces (9). The study specifically focused on transverse magnetic (TM) modes, which are known for their significant field enhancements and their ability to excite surface plasmon polaritons (SPPs). TM polarization was chosen to investigate its influence on transmission efficiency and field enhancement within the periodic slit arrays (7).

The analysis encompassed key parameters such as electric field enhancement, magnetic field distribution, and power flow across wavelengths ranging from 430 nm to 720 nm. The electric field's background magnitude was set at 1 V/m to standardize the simulations (10). To validate the results, numerical outcomes were compared with analytical solutions and existing experimental data from the literature. This approach ensured the reliability of the simulation model and its findings.

By employing FEM and leveraging the advanced capabilities of COMSOL Multiphysics, the study systematically explored how variations in slit geometry and periodicity influence the transmission characteristics of light through thick silver films (16-18). The results provide valuable insights into optimizing nanoscale structures for applications in photonics and optoelectronics (19).

RESULTS

Simulations demonstrated significant electric field enhancement near the slit edges. This enhancement was attributed to the excitation of surface plasmon polaritons (SPPs), which concentrated electromagnetic energy within the subwavelength apertures. Maximum enhancement occurred at specific slit widths and periodicities, aligning with the effective wavelength of the guided mode. These findings suggest that geometric tuning of the slits can optimize light confinement and enhance device performance (12).

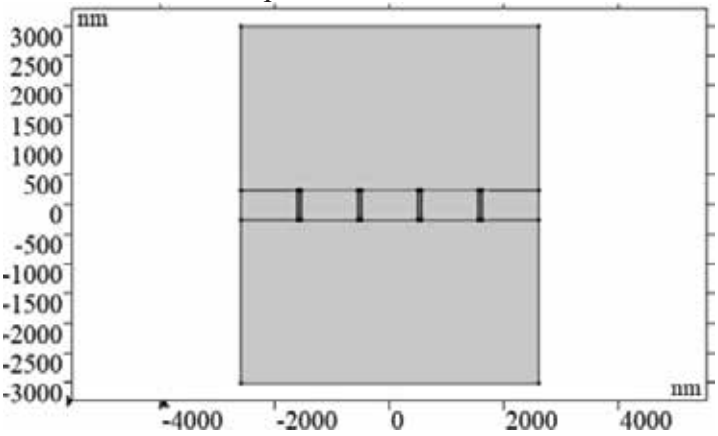
The transmission efficiency exhibited a quasi-periodic dependence on slit periodicity and film thickness. When the periodicity equaled integer multiples of the SPP wavelength, destructive interference reduced transmission to near-zero (20). Conversely, optimal transmission was observed at half the effective wavelength of the guided mode. These results align with theoretical models, demonstrating the potential for precise control of light transmission through nanoscale engineering.

Localized surface plasmon resonance (LSPR) effects were evident in the silver nano slits, characterized by enhanced electromagnetic fields confined to subwavelength scales. LSPR sensitivity to environmental changes underscores its potential for biosensing and chemical detection applications. By leveraging these resonances, the study highlights opportunities for real-time, label-free detection technologies.

Periodic Array of Slits

A periodic array of slits gives to a regular arrangement of elongated openings, narrow or gaps in a material or area. These slits are normally arranged in a repeating pattern which has equal spacing among them. The array can be one-dimensional, where the slits are aligned in a straight line, or two-dimensional, where the slits form a grid-like pattern. In nanophotonics and plasmonics, periodic arrays of subwavelength slits or apertures in metallic films can be used to create surface plasmon resonances, enabling the confinement and manipulation of electromagnetic fields at the nanoscale.

The purpose of creating a periodic array of slits is to manipulate the interaction of light or other electromagnetic waves with the structure. The periodicity determines the behavior of light when passes through nanoslit. These arrays can display intriguing optical characteristics and offer the chance to regulate light transmission, reflection, and absorption.



Periodic Array of Slit

To accomplish certain optical effects like improved transmission, selective filtering, or plasmonic resonances, the slits size, shape, and spacing can be adjusted.

Periodicity

determines the behaviour of light when it passes through the nanoslits. Periodic arrays of slits find applications in various fields Including optics, photonics, and nanotechnology. They are used in areas such as sub wavelength imaging, surface-enhanced spectroscopy, metasurfaces, optical sensors, and integrated photonic devices. The interaction of light with the slits can lead to phenomena like diffraction, surface plasmon polaritons, and enhanced electromagnetic field confinement.

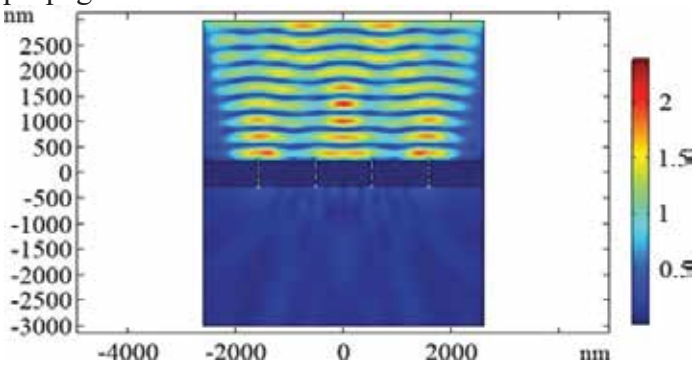
Parameters for Periodic Array of Silver Slits

The parameters that used for periodic array of silver slits are given in table Parameters for Periodic Array of Silver Slits.

Name	Expression	Value
Width	5200	1500
Height	6000	3000
Slit width	50	50
h_slit	500	500
Lambda	633	633

Under E (TM) Illumination, the Cutoff for Sub-Wavelength Slits

Under E (TM) illumination, the cutoff for a sub-wavelength silver slits array refers to the minimum width of the slits at which the transmission of the TM-polarized electromagnetic wave is significantly reduced or completely blocked. In other words, it is the threshold width below which the slits can no longer support the propagation of the TM mode.

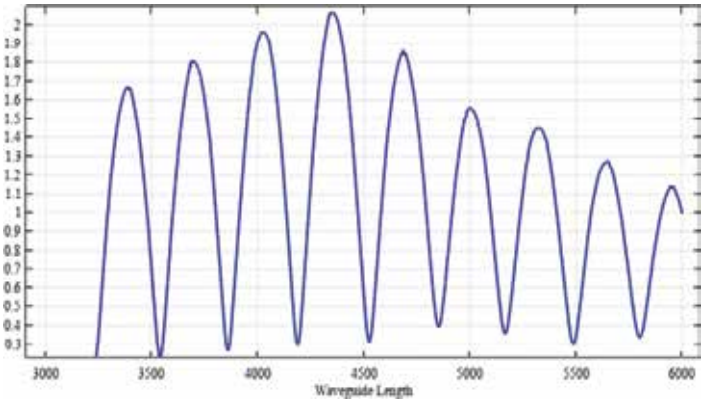


TM Mode for Silver Slits

The cutoff for sub-wavelength slits is influenced by several factors, including the

incident wavelength, the refractive index of the surrounding medium, and the properties of the silver film. As the slit width decreases and approaches the sub-wavelength regime, the interaction between the incident wave and the slits becomes more pronounced.

When the width of the slits is larger than the incident wavelength, the TM mode can propagate through the slits with relatively low losses. However, as the width of the slits decreases and approaches the sub-wavelength scale, the confinement of the electric field within the slits becomes stronger, leading to increased scattering and absorption losses. At a certain critical width, the TM mode cannot effectively propagate through the slits, resulting in a cutoff in transmission.



Electric Field

The cutoff behavior can be studied using computational methods such as numerical simulations, including finite-difference time-domain (FDTD) or finite element methods (FEM). These simulations can provide insights into the relationship between the slit width, incident wavelength, and transmission characteristics of the sub-wavelength silver slits array under E (TM) illumination.

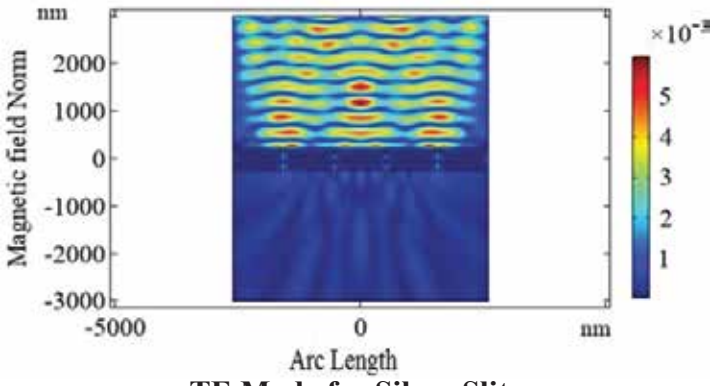
By understanding the cutoff behavior, researchers can optimize the design and dimensions of sub-wavelength silver slits arrays for specific applications such as plasmonic sensing, enhanced light-matter interactions, or sub-wavelength imaging. The cutoff width can serve as a critical parameter in tailoring the optical properties of such structures and achieving desired functionalities based on the specific requirements of the application.

The cutoff for a sub-wavelength silver slits array under E (TM) illumination refers to the minimum size or maximum spacing at which significant transmission of TM polarized electromagnetic waves can occur. Understanding and controlling the cutoff is important for designing and optimizing plasmonic devices and structures for applications in nanophotonics, sensing, and integrated optics.

(TE) Light Transmission through Sub-Wavelength Slits

When considering (TE) light transmission by a sub-wavelength silver slits array, the interaction between the transverse electric (TE) mode and the nanostructured silver film becomes the focus of investigation. This scenario presents unique optical phenomena that arise from the interplay between the incident light and the sub-wavelength features of the slits array.

The transmission of (TE) light through an array of sub-wavelength silver slits is effected by numerous factors, containing the width and periodicity of the slits, the incident wavelength, and the properties of the silver film. As the incident light interacts with the slits, several optical effects such as diffraction, plasmonics, and resonances come into play

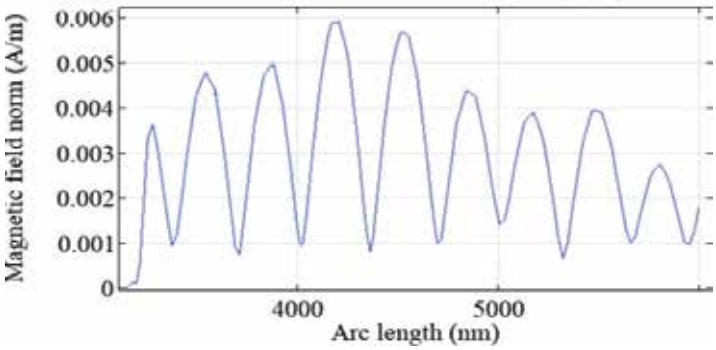


TE Mode for Silver Slits

Diffraction effects play a significant role in the transmission of (TE) light through the slits. When the width of the slits is smaller than the wavelength of the incident light, the diffracted light waves propagate through the slits and contribute to the transmission. The diffraction pattern is influenced by the size and spacing of the slits, leading to interference and scattering effects that impact the transmission spectrum. The results of this study show that the response of the nanoslit can be tailored by optimizing the parameters, including the refractive index of the surrounding medium, permittivity and permeability of the materials and subwavelength parameters of the nanoslit (20).

The presence of silver as the material for the slits introduces plasmonic effects into the system. The surface plasmons of the silver film can be excited by the incident (TE) light, leading to enhanced transmission or absorption at specific wavelengths.

The interface between the incident light and plasmons results in localized electromagnetic field enhancements within the slits, influencing the overall transmission characteristics. Resonant phenomena also occur in sub-wavelength silver slits arrays, where specific slit geometries and incident wavelengths can lead to resonant modes within the structure. These resonances can lead to transmission peaks or dips in the spectrum, and their positions are influenced by the slit dimensions, the surrounding medium, and the plasmonic properties of the silver film. By tuning the slit parameters, it is possible to engineer the resonant modes and tailor the transmission properties for desired applications.



Magnetic Field

The research of (TE) sub-wavelength of light transmission of silver slits arrays often combines experimental and numerical approaches. Experimental techniques such as spectroscopy, microscopy, and near-field measurements can be utilized to characterize the transmission spectrum, study the field distribution, and validate the performance of the array. Numerical simulations using methods like finite-difference time-domain (FDTD) or finite element analysis (FEA) provide a deeper understanding of the underlying physics, enabling the exploration of parameter variations and optimization of the slits array design.

The investigation of (TE) light transmission through sub-wavelength silver slits arrays has significant implications for various applications, including plasmonic sensing, sub- wavelength imaging, and optical filtering. By manipulating the slit dimensions, the periodicity, and the plasmonic properties of the silver film, it is possible to achieve tailored transmission properties that suit the specific requirements of these applications.

In this simulation, strong transmission of light was observed. Enhancement in electric field was also observed. We can measure the enhancement in electric field by color bar. In this case of TM mode, when the incident wave come from the top and travel downwards it will hit the interface. Due to difference in permittivity, reflection and transmission of light occurs. Because both of these propagations are in opposite direction, due to interference phenomena, standing waves were formed. These standing waves were formed in only upward and downward sides of the slit but not inside the slabs. Because the electrons move over the surface, edges block the movement of electron and do not allow to going inside the slabs. So these edges oppose the smooth movement of electrons. That's why charges of opposite polarity will accumulate at the edges as result dipoles are formed. So when the incident light beams will pass, charges accommodate and field moves in outside directions (four directions are left, right, top and bottom) only.

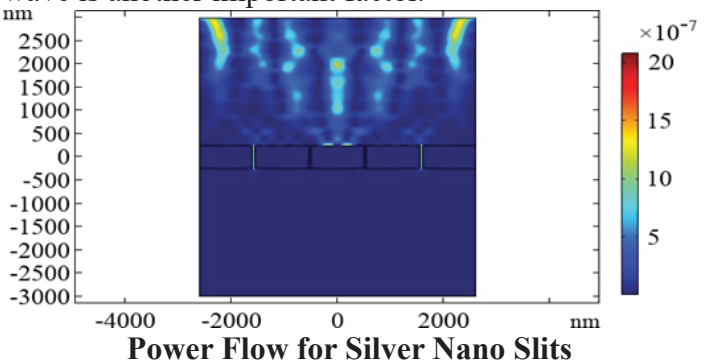
The result of this research of (TE) light transmission through sub-wavelength silver slits arrays involves analyzing the interplay between, plasmonics diffraction, and resonances. By carefully designing the slits array and optimizing the slit parameters,

researchers can control and enhance the transmission properties for applications in nanophotonic, sensing, and imaging. The combination of experimental techniques and numerical simulations provides valuable insights into the underlying physics and aids in the development of advanced devices and systems.

Power Flow through Silver Nano Slit

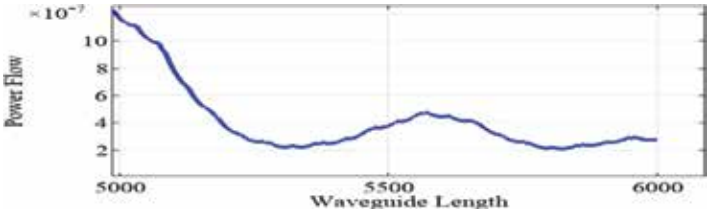
The transport of electromagnetic energy through a silver nano slit array is referred to as the power flow. In the context of silver nano slit arrays, the power flow is influenced by several factors including the incident wavelength, the width and periodicity of the slits, the surroundings and silver film characteristics. When light interacts with a silver nano slit array, it undergoes transmission, reflection & absorption processes. The power flow through the structure can be analyzed by considering the transmitted power, reflected power and absorbed power.

The transmitted power represents the portion of incident power that passes through the nano slit array and emerges on the other side. It depends on factors such as the width and periodicity of the slits, the incident angle, and the polarization of the incident light. The transmission efficiency, which is the ratio of transmitted power to incident power, provides insights into the effectiveness of power transfer through the array. The incident wavelength also plays a significant role in the power flow. The polarization of the incident wave is another important factor.



Power Flow for Silver Nano Slits

By matching the wavelength to the resonant modes of the slit, the transmission efficiency can be maximized. Resonant effects, such as localized surface plasmon resonances, can enhance the transmission through the nano slit, leading to increased power flow. The power flow through the nano slit can vary depending on whether the incident wave is TE (transverse electric) or TM (transverse magnetic) polarized. The polarization determines the electric field distribution and the interaction with the slit, thereby influencing the power transmission.



Power Flow

The reflected power corresponds to the portion of incident power that is reflected back into the same medium. Reflectivity, which is the ratio of reflected power to incident power, quantifies the amount of power that is reflected by the nano slit array.The absorbed power refers to the power that is converted into heat within the structure. In silver nano slit arrays, absorption occurs due to various mechanisms, including ohmic losses in the silver film and absorption in the surrounding medium.

The absorbed power can contribute to heating effects and should be considered in applications where thermal management is crucial. These methods allow for the calculation of the electric and magnetic fields, enabling the determination of the transmitted, reflected, and absorbed powers.

Understanding the power flow through silver nano slit arrays is essential for optimizing their performance in various applications. For instance, in plasmonic sensing, maximizing the transmitted power while minimizing reflection and absorption can enhance the sensitivity and signal-to-noise ratio. In energy harvesting or photovoltaic applications, optimizing the power flow can lead to improved light absorption and energy conversion efficiency.

In conclusion, the power flow through a silver nano slit array is determined by the interplay of transmission, reflection, and absorption processes by carefully designing the slit geometry, choosing appropriate materials, and considering the incident conditions, researchers can control and optimize the power flow for specific applications in areas such as sensing, energy harvesting, and integrated photonic devices. Numerical simulations, such as finite-difference time-domain (FDTD) can be used to study the power flow through silver nano slits. Computational simulations provide valuable insights into the power distribution within the structure, aiding in the design and optimization process.

Comparison of Electric Field, Magnetic Field and Power Flow at Different Wavelengths

The value of slit width kept fixed i.e. 50 nm for different wavelengths. Values of Electric Field, Magnetic Field and Power Flow at Different Wavelengths

Wavelength	Slit size	Electric field	Magnetic field	Power flow
400	50	3.5	10×10^{-3}	40×10^{-6}
450	50	2.5	7×10^{-3}	25×10^{-7}
580	50	2.5	4×10^{-3}	30×10^{-7}
633	50	2	5×10^{-3}	20×10^{-7}
675	50	4.5	12×10^{-3}	18×10^{-6}

Demonstrates various values for the visible region's five different visible wavelengths of the power flow, electric field, and magnetic field. Finally, we examined the, magnetic field, power flow and electric field values in this model at various wavelengths. Notably, power flow exhibits its largest value at the lowest wavelength, 400 nm, whereas electric field exhibits its lowest value at 633 nm, the wavelength at which it is employed at its peak, or 675 nm. The lowest values of the magnetic field and power flow are at wavelengths of 580 nm and 675 nm, respectively.

Power flow analysis revealed peak efficiency at shorter wavelengths (around 400 nm), with efficiency diminishing at longer wavelengths. The interaction between light and subwavelength features created interference patterns that influenced energy density within the slits. The results suggest that precise control over slit geometry can enhance light harvesting and optical energy management in photovoltaic and sensing applications (11).

The study's findings were compared to previous research, validating the simulation outcomes and reinforcing the importance of slit periodicity and width in determining optical properties. The ability to modulate light transmission through structural parameters highlights the versatility of silver as a material for plasmonic and photonic applications.

CONCLUSION

This research elucidates the impact of slit geometry and periodicity on the optical properties of light interacting with thick silver films. By harnessing surface plasmon polaritons and localized surface plasmon resonance phenomena, it is possible to achieve tailored optical responses for applications in nanophotonics, sensing, and energy harvesting. The findings contribute to a deeper understanding of light-matter interactions at the nanoscale, paving the way for advancements in next-generation optical devices and technologies.

The study of light-matter interactions at the nanoscale holds significant relevance for the fields of optometry and optics. Understanding how light behaves when it interacts with periodic nanostructures, such as slits in metallic films, has direct implications for the development of advanced optical technologies. This research explores the transmission of light through silver films with periodic slit arrays, focusing on phenomena like surface plasmon polaritons (SPPs) and extraordinary optical transmission (EOT). These findings offer valuable insights into designing enhanced optical systems for vision science, imaging, and light manipulation.

For optometry, precise manipulation and control of light are crucial for advancing diagnostic tools, corrective lenses, and vision-related devices. The ability to harness plasmonic phenomena enables the development of ultra-sensitive optical sensors and imaging systems that can operate at resolutions beyond the diffraction limit. Applications include wavefront sensing in refractive surgery, high-resolution retinal imaging, and the creation of optical filters and lenses with superior light-guiding capabilities.

In optics, the ability to control light transmission and field enhancement through subwavelength structures is fundamental for the design of photonic devices. The findings of this research can inform the development of advanced optical coatings, holographic systems, and adaptive optics. By tailoring the geometry and periodicity of nanostructures, it is possible to optimize the performance of devices used in medical imaging, spectroscopy, and optical communication systems. This work also complements ongoing efforts in photonic integration, where compact, high-performance optical components are essential for technological innovation.

Recommendations

Future research should expand on the parameter space by exploring other metals and alloys with distinct plasmonic properties to compare their efficacy against silver. Investigating multi-layered structures or hybrid configurations incorporating dielectric materials could further enhance transmission efficiencies and field confinement. Additionally, experimental validation of the simulation results will be critical to bridge theoretical and practical applications. Applying these findings in real-world optical sensing, energy harvesting, and waveguiding devices could demonstrate their practical significance.

Understanding light interaction with nanostructures, such as periodic slits in metallic films, is vital for advancing optical and optometric technologies. This study examines silver slit arrays and their phenomena, including surface plasmon polaritons (SPPs) and extraordinary optical transmission (EOT), with implications for enhancing imaging, diagnostic tools, and vision correction systems.

Plasmonic phenomena can enable high-resolution imaging systems for retinal and corneal diagnostics, improve wavefront sensing in refractive surgery, and lead to contact lenses with embedded optical filtering properties. Additionally, optical coatings using plasmonic materials could reduce glare and enhance UV protection for eyewear. This work also informs advanced photonic device designs, essential for medical imaging and light manipulation in optometry.

• Develop high-resolution imaging tools using plasmonic behaviors for precise retinal diagnostics.

• Enhance wavefront sensing for real-time optical aberration measurements in surgeries.

• Create contact lenses with embedded nanoscale filters for therapeutic applications.

• Integrate advanced coatings on eyewear for glare reduction and UV protection.

• Improve ophthalmic imaging systems by incorporating nanoscale light control.

Limitations

While this study provides insights into the effects of slit geometry and periodicity, it is limited to a simulation-based approach that assumes idealized conditions, such as perfect material homogeneity and no manufacturing imperfections. In real-world scenarios, factors like material defects, surface roughness, and non-ideal boundary conditions may impact performance. Furthermore, the scope was restricted to silver as the plasmonic material, and results may vary with other materials. These limitations suggest the need for experimental studies to corroborate and refine the findings.

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Nimra Fatima: Substantial contributions to the conception and design of the work.

Umme Farwa: Design of the work and the acquisition. Drafting the work.

Muhammad Asfar Zaman: Final approval of the version to be published.

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Original Article

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GCC and RNFL Changes Following Topical Therapy in Primary Open-Angle Glaucoma

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ABSTRACT

Background and Objectives: Gradual loss of retinal ganglion cells and their axons, primarily in the retinal nerve fibre layer (RNFL), is the cause of glaucoma, a progressive optic neuropathy that is one of the leading causes of irreversible blindness globally. This study was conducted to ascertain Immediate change In Optic Nerve Head Stereometric Parameters In Primary Open-angle Glaucoma After Topical Medical Therapy.

METHODOLOGY: In this study, 120 patients diagnosed with primary open angle glaucoma were enrolled. These subjects had no other ocular or systemic illness. Patients with primary open glaucoma confirmed by glaucoma specialist were undergone for GCC (ganglion cell complex), RNFL (retinal nerve fibre layer), FLV (focal loss volume) and GLV (gross loss volume) measurement by OCT (RTVue-100;Optovue, version 6.1..0.21). After seeking glaucoma topical medical therapy by glaucoma specialist patients were revisited after one month. OCT was performed again to measure the GCC and RNFL, GLV and FLV again to observe the change in these values. The analysis of data was done by using SPSS version 22. Quantitative data was presented in terms of mean ± S.D and S.E. and qualitative data was presented in form of Pie chart. Normality assumption was checked by One Sample Kolmogorov-Smirnov test and all the variables were considered in normal distribution having p value > 0.05.

RESULTS: Out of 120 patients having primary open glaucoma. 53% were male and 46% were females. Mean age of patients was 52 years. Mean GCC was found to be improved with a difference of 0.73±1.02, $p > 0.05$ before and after the treatment. Average RNFL before the treatment was 82.98 ±9.93 and after was 83.61 ±10.0 with a difference of 0.63 ± 0.03 $p < 0.05$. FLV before the treatment was 4.19 ± 3.68 and after was 3.51 ± 2.82 with a mean difference of 0.68 ± 0.86 $p > 0.05$. average GLV before the treatment was 14.09 ± 6.92 and after was 15.08 ± 6.89 with a mean difference of 0.9 ± 0.03, $p > 0.05$.

CONCLUSION: Following topical medicinal therapy, immediate changes in ONH stereometric parameters in POAG patients provide important information about the early response to treatment and may be indicative of long-term outcomes.

KEYWORDS: Glaucoma, Optical Coherence Tomography, Gross loss volume (GLV), Focal loss volume (FLV).

INTRODUCTION

Gradual loss of retinal ganglion cells and their axons, primarily in the retinal nerve fibre layer (RNFL), is the cause of glaucoma, a progressive optic neuropathy that is one of the leading causes of irreversible blindness globally.1 Compression and displacement of the lamina cribrosa are contributing factors that inhibit axoplasmic flow and ultimately result in ganglion cell death.

Visual field loss is primarily correlated with damage to the inner retinal layers, which are the target of primary open-angle glaucoma (POAG), specifically the photo receptor layers and retinal pigment epithelium of the outer retina.2 The diagnosis requires a careful evaluation of the optic disc and neuroretinal rim measurements, which is difficult because of the impact of ocular magnification on measurement precision. Important diagnostic markers include optic nerve head (ONH) cup expansion, localised rim thinning, and rim notching.3

The three most common diagnostic modalities for glaucoma are ONH examination, visual field testing, and intraocular pressure (IOP) monitoring. Still, rely

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ing exclusively on IOP is limited because visual field problems only show up after significant ganglion cell loss. Different ONH anatomical variations in normal and glaucomatous eyes further impede ONH measurement, as do observer variability and minor early-stage changes.4,5

Various approaches for evaluating the optic nerve head have emerged to meet diagnostic challenges. One such methodology is optical coherence tomography (OCT), which is a noninvasive, high-resolution imaging instrument that provides cross-sectional pictures of the ONH. OCT provides accurate evaluation of optic nerve head characteristics, making it easier to identify minute structural alterations associated with glaucoma.6

The goals of treatment include reducing or changing risk factors, especially intraocular hypertension, which is frequently accomplished by using hypotensive drugs such as beta blockers, prostaglandin analogues, carbonic anhydrase inhibitors, alpha agonists, and cholinergic agents. OCT evaluation of optic nerve head characteristics is required to monitor response to treatment; this method is more sensitive than IOP measures alone.7,8

In conclusion, because of its silent progression and complex diagnostics, glaucoma presents major obstacles to early diagnosis and successful treatment.9 Accurate assessment and the best possible treatment stratification depend on embracing modern imaging technologies like OCT in addition to conventional diagnostic techniques. This improves clinical results and preserves visual function in affected individuals.10

METHODOLOGY

This prespective study was carried out in department of ophthalmology, Punjab rangers teaching hospital Lahore between 1st june 2023 to 30th January 2024. A total 120 patients diagnosed with primary open angle glaucoma were enrolled. These subjects had no other ocular or systemic disease except glaucoma.. This was quasi experimental study with non-probability convenience sampling. This study has been approved by local ethical committee of Punjab rangers hospital, lahore. Patients meeting inclusion criteria were enrolled. After informed consent, with demographic data and medical history collected. Visual acuity was assessed using a log Mar chart. Diagnosis of primary open-angle glaucoma was confirmed by a specialist. OCT imaging was performed, measuring GCC, RNFL, and optic nerve head parameters. After testing, printouts were obtained, noting variables such as GCC, RNFL, and optic nerve head volumes, cup/disc ratios, and rim area. Patients were then referred for glaucoma therapy. After one month, OCT measurements of macula and RNFL were repeated and change in these parameters was noted.

RESULTS

Data will be entered SPSS-20. Quantitative variables like age will be presented as mean ± SD. Qualitative variables like gender will be presented as frequency & percentages. Comparison of pre-medical topical therapy OCT parameters and post medical topical treatment OCT parameters apply independent sample t-test, P-value ≤ 0.0 Total 120 patients were added in this study out of which 64 were male and 58 were females. Mean age of included patients was 50 years with a minimum of 19 years and 82 years maximum.

Gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	man	64	53.3	53.3	53.3
	woman	56	46.7	46.7	100.0
	Total	120	100.0	100.0	

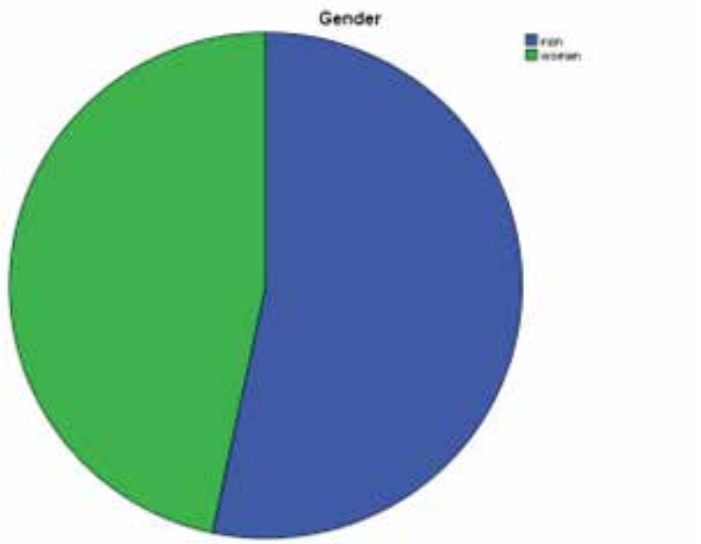

Table showing patients age:

	N	Minimum	Maximum	Mean	Std. Deviation
Age	120	19	82	50.18	14.137
Valid N (listwise)	120				

Normality assumption of test variables before and after treatment:

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
average RNFL before	.186	119	.000	.919	119	.000
average RNFL after	.184	119	.000	.922	119	.000
average GCC before	.073	119	.182	.970	119	.009
average GCC after	.072	119	.190	.976	119	.029
focal loss volume before	.171	119	.000	.854	119	.000
focal loss volume after	.120	119	.000	.887	119	.000
gross loss volume before	.102	119	.004	.973	119	.018
gross loss volume after	.095	119	.010	.973	119	.016

a. Lilliefors Significance Correction

Both the Kolmogorov-Smirnov and Shapiro-Wilk tests show very low p-values (Sig. <0.05) for average RNFL, GLV, FLV, and GCC before and after the treatment. This indicates that the data for "average RNFL, GCC, FLV and GLV before" and "data for average RNFL, GCC, FLV and GLV after" significantly deviate from a normal distribution.

Null hypothesis is rejected in both cases of average RNFL and average GCC before and after the treatment. It suggests that the data provide strong support for the existence of a significant change between before and after treatment retinal nerve fibre layer (RNFL) and ganglian cell complex (GCC) with significant p-value. Null hypothesis is retained in case of FLV and GL. It suggests that the data does not provide strong support for the existence of a significant change or effect between the median off focal loss volume and gross loss volume. So there is not significant difference in focal loss volume and gross loss volume before and after the topical medical therapy.

Descriptive Statistics of average RNFL, GCC, FLV and GLV

Report

	focal loss volume before	gross loss volume before	focal loss volume after	gross loss volume after	average RNFL before	average GCC after	average GCC before	average RNFL after
Mean	4.19529	14.09	3.51608	15.086112	82.9865	83.7141	82.9764	83.6140
Std. Deviation	3.688859	6.922	2.823328	6.8946447	9.93647	8.06329	7.60228	10.04194

Average RNFL before the treatment was 82.98 ±9.93 and after was 83.61 ±10.0 with a difference of 0.63 ± 0.03. Average GCC before the treatment was 82.97 ± 7.6 and after was 83.7 ± 8.06 with a mean difference of 0.73±1.02. Average FLV before the treatment was 4.19 ± 3.68 and after was 3.51 ± 2.82 with a mean difference of 0.68 ± 0.86. average GLV before the treatment was 14.09 ± 6.92 and after was 15.08 ± 6.89 with a mean difference of 0.9 ± 0.03.

DISCUSSION

Glaucoma stands as a formidable adversary in the realm of global ocular health, being a leading cause of irreversible vision impairment worldwide.11 Effective management of primary open-angle glaucoma (POAG) hinges significantly on the timely control of intraocular pressure (IOP), a pivotal factor in preserving visual function.12 Central to this endeavor is the strategic utilization of topical medication therapy, a cornerstone in halting or mitigating the progression of the disease.79,80 The immediate impact of such therapeutic interventions on optic nerve head (ONH) stereometric characteristics holds profound implications for clinical decision-making, underscoring the imperative of understanding these dynamics.13 The assessment of ONH stereometric parameters assumes paramount importance in discerning the acute alterations ensuing from topical medication treatment in POAG.14 Beyond mere observation, such evaluations serve as linchpins in devising efficacious diagnostic and therapeutic strategies for glaucoma.15 By furnishing insights into disease progression and treatment efficacy, these parameters furnish clinicians with indispensable tools for navigating the complexities of glaucoma management.

A comprehensive review of existing literature elucidates the current landscape and recent advancements in the assessment of ONH stereometric parameters, with a keen focus on the immediate ramifications of topical medication therapy in POAG. The imperative of prompt IOP control action in POAG management cannot be overstated, with topical medication therapy standing as a linchpin in the endeavor to stave off disease progression.16 Armed with a nuanced understanding of how such therapeutic interventions impact ONH stereometric characteristics in real time, clinicians are empowered to make more informed and effective decisions in the clinical setting

In essence, the interplay between topical medication therapy and ONH stereometric parameters represents a nexus of critical importance in the management of POAG. By unraveling the intricate dynamics at play, clinicians can chart a course towards preserving visual function and forestalling the ravages of glaucoma.17 Moreover, the integration of advanced imaging techniques lends further depth to our comprehension of glaucoma pathophysiology, heralding a new era of precision medicine in ocular healthcare. As we continue to unravel the mysteries of glaucoma, armed with ever-evolving insights and technologies, we inch closer towards a future where vision loss is no longer an inevitability, but a challenge met with knowledge, innovation, and unwavering resolve.18,10,20

The optic nerve head (ONH) serves as a crucial site for assessing damage caused by glaucoma and monitoring the progression of the disease. Various stereometric metrics of the ONH, such as the cup-to-disc ratio (CDR), rim area, disc area, and cup volume, can be quantitatively evaluated using different imaging techniques, including optical coherence tomography (OCT) and confocal scanning laser ophthalmoscopy (CSLO). Fluctuations in these metrics indicate structural changes associated with the development of glaucoma and its response to treatment.

Numerous studies have investigated the immediate changes in ONH stereometric parameters in patients with primary open-angle glaucoma (POAG) following the initiation of topical medicinal therapy. These studies primarily employ OCT or CSLO to assess structural alterations in the ONH shortly after the commencement of treatment. The rate at which a patient responds to therapy can offer valuable insights into its efficacy and may serve as an early predictor of long-term outcomes. In our study, The available data does not offer robust evidence supporting the presence of a substantial alteration or impact between the median off focal loss volume and gross loss volume. Thus, there appears to be no significant contrast in focal loss volume and gross loss volume prior to and following the administration of topical medical therapy. However for GCC and RNFL, the data strongly indicates a notable difference between the retinal nerve fiber layer (RNFL) and ganglion cell complex (GCC) before and after treatment, as evidenced by a significant p-value.

The mean RNFL measurement before treatment was 82.98 ± 9.93, while after treatment it was 83.61 ± 10.0, resulting in a difference of 0.63 ± 0.03. The average GCC measurement before treatment was 82.97 ± 7.6, which increased to 83.7 ± 8.06 after treatment, reflecting a mean difference of 0.73 ± 1.02. Before treatment, the average FLV was 4.19 ± 3.68, which decreased to 3.51 ± 2.82 after treatment, indicating a mean difference of 0.68 ± 0.86. The average GLV before treatment was 14.09 ± 6.92, which rose to 15.08 ± 6.89 after treatment, showing a mean difference of 0.9 ± 0.03

According to our study, Statistics of parameters including 'rim volme before and after, nerve head volume before and after, cup volume before and after, optic disc area ratio before and after, horizontal CD ratio before and after and vertical CD ratio before and after the medical topical therapy shows normal distribution. the paired-sample t-test results indicate that, for the parameters examined, there were no statistically significant changes in optic nerve head stereometric characteristics following topical medical therapy in primary open-angle glaucoma patient. Changes in rim volume before and after therapy were 0.065 and 0.066, showing them statistically not significant (p = 0.346). Changes in Nerve head volume before (mean 0.132) and after (0.144) the therapy were not statistically significant (p = 0.637).

The mean difference in cup volume before and after therapy was not statistically significant (p = 0.704) with mean values 0.493 and 0.504). changes in optic disc area before and after therapy were not statistically significant (p = 0.844). cup-to-disc area ratio mean value before and after was 0.590 and 0.608 showing no any significant change (p = 0.569). Horizontal Cup-to-disc ratio before (mean 0.825) and after (mean 0.833) therapy was not statistically signifinat (p = 0.781). Vertical cup-to-Disc ratio before (mean 0.759) and after (0.748) show no change (p = 0.685).

CONCLUSION

Understanding the rapid changes in ONH stereometric characteristics following the administration of topical medications holds significant therapeutic implications. Swift reductions in CDR and cup volume could potentially serve as early indicators of therapeutic response, aiding clinicians in monitoring disease progression. Moreover, identifying the most effective therapeutic agents for positively influencing ONH morphology can inform tailored treatment strategies, ultimately improving long-term outcomes for patients with POAG.

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