ORIGINAL ARTICLE

MICROBIOLOGIC SPECTRA AND THEIR ANTIBIOTIC SUSCEPTIBILITY PATTERNS IN TYPE 2 DIABETIC PATIENTS WITH URINARY TRACT INFECTIONS (UTIs) – A HOSPITAL BASED STUDY

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ABSTRACT

Objectives: To determine the microbiologic spectra and their antibiotic susceptibility patterns in type 2 diabetic patients with UTIs

Materials and Methods: This descriptive cross-sectional study was conducted in the Department of Medicine, Khyber Teaching Hospital, Peshawar from 1st July 2021 to 31st December 2021. Type 2 Diabetic patients with urinary tract infections were recruited in the study. Their urine cultures for sensitivities were carried out. The frequency of positive urine culture was stratified among age and gender to see the effect modifications. Antibiotic sensitivity and resistance patterns were stratified among male and female diabetic patients.

Results: Out of 150 patients, 125 were females and 25 were males. Twenty-seven (27) patients (24.3%) had positive urine cultures, out of whom 19 (70.4%) were females, and 8 (29.6%) were males. The most common organism found in females was E.coli (42%). Among male patients with positive urine cultures, E.coli was the most common organism isolated in 5 (62.51%). Cefixime had the highest resistance, with 21(77.8%) of 25 culture-positive patients resistant to it. All the patients with positive urine cultures were sensitive to piperacillin/tazobactam, Meropenem, Doripenem, Cefepime, Aztreonam, and Tigecycline.

Conclusion: Diabetic females are more prone to UTIs with an increased prevalence of positive urine cultures as compared to diabetic men. The most common isolate was E.coli. The highest antimicrobial resistance was reported for Cefixime. All patients were sensitive to Meropenem, Tazobactam/Piperacillin, Aztreonam, Tigecycline, Doripenem, and Cefepime.

Keywords: Antibiotic susceptibility; Diabetes mellitus; Urine culture and sensitivity

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INTRODUCTION

Diabetes mellitus is a chronic disease affecting a large population across the globe.[1] The estimated prevalence of diabetes mellitus in Pakistan is 7 to 11% and is expected to cross 15% by the year 2030.[2] UTIs are a common ailment caused by bacteria. Women are considered more susceptible to urinary tract infections, with more than a 50% chance of every woman experiencing a single UTI during her lifetime. [3, 4]

UTIs, mainly asymptomatic bacteriuria, are three times higher in the diabetic population than in the average population. This finding is probably due to the excretion of glucose in urine and neurologic dysfunction of the urinary bladder. [5,6] Lature LH et al. concluded that the prevalence of positive urine culture among diabetic patients was 11%. [7] E coli, Klebsiella, and Proteus species were isolated in 54.5%, 18%, and 18% of cases respectively.[8] Murad MC et al. concluded that the prevalence of positive urine culture was 12% among diabetic patients.[8] E coli was the most common pathogen isolated from the urine of diabetic patients in 26% and 55.1% of UTIs in Japan and India respectively. [9] He K et al. concluded that 70.47% of diabetic patients with asymptomatic UTIs were positive in mid-stream urine cultures, while 44.1% of patients with symptomatic UTIs had positive urine cultures.[10] They also concluded that the rate of a positive culture in males was lower than in females (38.2% vs. 51.2%, $p<0.05$). Male patients were found to have fewer gram-negative infections than females (53.8% vs. 89.3%, $p<0.001$) and more gram-positive infections than females (30.7% vs. 9.8%, $p<0.01$).[10]

This study will provide local statistics on the sensitivity pattern of different bacteria, which will modify future

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recommendations and help to prevent irrational empirical use of antibiotics. Our study aims to ascertain the yield of urine culture and sensitivity (C/S) reports in diabetic patients. It will enable us to determine the common organisms grown in culture reports of both male and female diabetic patients. It will also enable us to determine the common drug sensitivities of these organisms so that in the future, patients can be started on such antibiotics even if culture reports are pending or inconclusive.

MATERIAL AND METHODS

This descriptive cross-sectional study was conducted in the Department of Medicine, Khyber Teaching Hospital, Peshawar, from Jul 1, 2021, to Dec 31, 2021. Non-probability consecutive sampling technique was used. One-hundred and fifty male and female diabetic patients with urinary tract infections on urine routine examination were recruited in the study using an 11% prevalence of positive urine culture in diabetic patients. [7] This sample size was calculated using the WHO calculator for sample size calculation keeping a 95% confidence interval and 6% margin of error (sample size increases as margin of error decreases). Patients with a history of antibiotic intake in the last week and pregnant women were excluded from the study. The conditions mentioned earlier can act as confounders and introduce bias if included in the study.

After approval from the hospital research and ethical committee, all diabetic patients having urinary tract infections fulfilling the inclusion criteria were included in the study. Written informed consent was taken from all the patients after explaining the purpose and benefits of the study.

All information regarding the name, age, gender of the patient, and duration of diabetes was recorded on pre-designed proforma. Complete history and clinical examination of all patients were carried out. All baseline investigations were carried out, including fasting and random blood sugars.

All the data was stored in the Excel office and analyzed in SPSS (statistical package for social sciences) version 22. Mean and standard deviations (SD) were calculated for quantitative variables like age, fasting blood glucose level, and random blood glucose level. In contrast, percentages and frequencies were calculated for categorical variables like gender and proportion of positive urine cultures and their respective sensitivities and resistance patterns. The frequency of positive urine culture was stratified among age and gender to see the effect modifications. Post-stratification, Chi-square test, was $p<0.05$ as statistically significant.

RESULTS

Our study included 150 patients, of which 125 (83.3%) were females and 25 (16.7%) were males. The total number of patients with positive urine cultures was 27(24.3%), out of which 19 (70.4%) were females and 8 (29.6%) were males. Out of 125 females, 19(15.2%) had positive urine cultures, while 8 (32%) of 25 male patients had positive urine cultures. The highest number of culture-positive females was between 51 and 60, i.e.,9(47.4%). Most of the culture-positive males, i.e. 4 (50%), were in the 61-70 age group.

The urine culture sensitivities of patients with positive urine cultures are shown in Table 1, and antibiotic sensitivity and resistance patterns of male and female patients are demonstrated in Table 2.

DISCUSSION

Women are considered more susceptible to urinary tract infections, with more than a 50% chance of every woman experiencing a single episode of urinary tract infection in her life time.[11] The prevalence of urinary tract infections increases with age, and its rate doubles in women aged greater than 65 years as compared to the overall rate seen in the female population. [12] The reasons for the higher rate of infection in this age group vary by health status, with certain factors like catheterization increasing the chances for infections, and pathogens are most likely responsible for this.[13] Increased sexual activity is consid-

Table 1: Urine culture sensitivities of patients with positive urine cultures

Urine Culture			
	Gender (n)		Grand Total (n)
	F	M	
Citrobacter species	2		2
E. coli	8	5	13
Klebsiella	3	1	4
Morganella Morganii	1		1
Pseudomonas	3	2	5
Staph. aureus	2		2
Total	19	8	27

Table 2: Antibiotic sensitivity and resistance patterns of male and female diabetic patients

S#	ANTIBIOTICS	S		R	
			Female (n)	Male (n)	Female (n)
1	Ciprofloxacin	2	5	6	14
2	Levofloxacin	2	5	6	14
3	Cefixime	2	4	6	15
4	Amoxicillin	2	8	6	11
5	Co-Amoxiclav	7	17	1	2
6	Fosfomycin	7	17	1	2
7	Nitrofurantoin	8	15	0	4
8	Doxycycline	7	14	1	5
9	Cefuroxime	4	12	4	7
10	Ceftazidime	5	8	3	11
11	Co-trimoxazole	5	10	3	9
12	Amikacin	4	15	4	4
13	Gentamicin	4	17	4	2
14	Streptomycin	7	14	1	5
15	Ceftriaxone	7	11	1	8
16	Cefoperazone/sulbactum	8	16	0	3
17	Piperacillin/tazobactum	8	19	0	0
18	Meropenem	8	19	0	0
19	Doripenem	8	19	0	0
20	Cefepime	8	19	0	0
21	Aztreonam	8	19	0	0
22	Tigecycline	8	19	0	0

ered a significant risk factor for UTIs in younger women, and recurrence within six months is common.[14] UTIs create a massive societal and personal burden, with many medical visits in the United States being related to them.[4] In the United States alone, around 8 million annual UTIs have been documented. [5]

Our study indicates that almost one fourth of our patients had positive urine cultures, which is supported by many studies. One study reported that the prevalence of asymptomatic bacteriuria in diabetic patients is from 8-26%.[15, 16] A meta-analysis was published in 2011 reporting a 12.2% prevalence of asymptomatic bacteriuria in patients with diabetes mellitus in contrast to 4.5% in healthy individuals taken as controls. Hence, we can conclude that UTIs are more common in diabetic patients than in non-diabetics. [6, 17] This fact is also supported by an observational study conducted in the UK which found that the incidence rate of UTI was 46.9% per 1000 people with diabetes compared to 29.9% for non-diabetics. [6, 18] An American database study in 2014 found that UTI was more common in diabetic patients of both genders than non-diabetics (9.4% vs. 5.7%), respectively. [19, 20]

According to our study, 83.3% of our patients with UTIs diabetics were females, and 16.7% were males, which indicates that more females with diabetes get UTIs as compared to men with diabetes. These findings are supported by a cohort study including more than 6000 patients who were part of 10 clinical trials.[21-23] A case-control study of Washington state health suggested that pyelonephritis was 4.1 times more prevalent in pre-menopausal diabetic women than in non-diabetic women.[26, 27] Multiple explanations exist for the increased prevalence of UTIs in people with diabetes compared to non-diabetics.[24-28] High glucose concentrations inside the renal parenchyma can also promote bacterial growth and proliferation, increasing the risk of complications such as emphysematous pyelonephritis. [29, 30] Many impairments in the immune system, including innate, cellular and humoral immunity, may contribute to the pathogenesis of UTI in diabetic patients.[31-33] People with diabetes having asymptomatic bacteriuria demonstrated lower interleukin 6 and 8 levels compared to non-diabetic patients.[34] Autonomic neuropathy leading to dysfunctional voiding and urinary retention results in decreased bacterial clearance, contributing to bacterial growth. [20-22] Our study demonstrated that 83.3% of our patients with UTIs were females and 70.4% of our study's culture-positive patients were also females. These findings

are seconded by a study conducted in Saudi Arabia. [34]

The highest number of culture-positive females was found between 51-60 years of age group (47.4%), while the highest number of culture-positive males (50%) was found between 61-70 years of age group. These findings are supported by a study conducted at NRI Medical College and hospital, India.[35] Another multicenter study conducted at 12 clinical sites spread throughout major cities of Pakistan supports these findings. [25]

E.coli was the most isolated organism from our patient's urine cultures (48.1%), followed by Pseudomonas (18.5%) and Klebsiella (14.8%). A study conducted by Murad MC et al. had similar findings where E.coli was the most common organism isolated, i.e., in 54.5% of cases.[30] E.coli was also found to be the most common organism isolated, followed by Klebsiella in a study conducted in Kuwait. [31]

According to our study results, Cefixime had the highest resistance reported (77.8%), followed by ciprofloxacin and levofloxacin (74.1%). These findings are supported by a retrospective study conducted in Dublin from 1999 to 2009.[33-40] A study conducted in Turkey suggested the same, and the reason for resistance to these antimicrobials might be the high use of these antibiotics. [34] Diabetic patients are more likely to harbour resistant organisms as a cause of UTIs. It also includes fluoroquinolone-resistant pathogens.[41, 42] There are several explanations for this; use of antibiotics for un-confirmed UTIs without a urine test and only based on symptoms of dysuria or peri-urethral burning, multiple courses of antibiotics, premature stopping of antibiotics after symptomatic relief, quackery, late presentation to a certified health care professional among many others. Injudicious use of urinary catheters is also a leading cause in centers where protocols and guidelines are not followed. [36]

The cause-and-effect relationship between diabetes and its associated factors could not be studied due to its cross-sectional design. It was conducted at one center, which can lead to selection bias and affect the generalizability of the study. We also did not study the effect of confounding factors like socioeconomic class and education. Other factors like malnutrition and viral infections, e.g. HIV, which might be associated with diabetes, were not recorded. Activity, alcohol, and substance abuse consumption were also not adequately assessed.

CONCLUSION

Diabetic females are more prone to UTIs as well as an increased prevalence of positive urine cultures as compared to diabetic men. The most common isolate was E. coli, followed by Pseudomonas and Klebsiella. The highest antimicrobial resistance was reported for Cefixime, followed by ciprofloxacin and levofloxacin. Most patients were found sensitive to Cefoperazone/Sulbactam, and all patients were sensitive to Meropenem, Tazobactam/Piperacillin, Aztreonam, Tigecycline, Doripenem and Cefepime.

REFERENCES

1. Animaw W, Seyoum Y. Increasing prevalence of diabetes mellitus in a developing country and its related factors. PloS one. 2017;12(11):e0187670.
2. Forouhi NG, Wareham NJ. Epidemiology of diabetes. Med. 2019;47(1):22-7.
3. Medina M, Castillo-Pino E. An introduction to the epidemiology and burden of urinary tract infections. Ther Advan Urol. 2019:17562872
4. Tandogdu Z, Wagenlehner FM. Global epidemiology of urinary tract infections. Curr Opinion Infect Dis. 2016;29(1):73-9.
5. Abebe SM, Berhane Y, Worku A, Assefa A. Diabetes mellitus in North West Ethiopia: a community-based study. BMC Public Health. 2014 Jan 30;14:97. Doi: 10.1186/1471-2458-14-97. PMID: 24479725; PMCID: PMC3913966.
6. Nitzan O, Elias M, Chazan B, Saliba W. Urinary tract infections in patients with type 2 diabetes mellitus: a review of prevalence, diagnosis, and management. Diabetes Metab Syndr Obes. 2015 Feb 26;8:129-36. Doi: 10.2147/DMSO.S51792. PMID: 25759592; PMCID: PMC4346284.
7. Fu AZ, Iglay K, Qiu Y, Engel S, Shankar R, Brodovicz K. Risk characterization for urinary tract infections in subjects with newly diagnosed type 2 diabetes. J Diabetes Complications. 2014 Nov-Dec;28(6):805-10. doi: 10.1016/j.jdiacomp.2014.06.009. Epub 2014 Jun 17. PMID: 25161100.
8. Hammar N, Farahmand B, Gran M, Joelson S, Andersson SW. Incidence of urinary tract infection in patients with type 2 diabetes. Experience from adverse event reporting in clinical trials. Pharmacoepidemiol Drug Saf. 2010 Dec;19(12):1287-92. DOI: 10.1002/pds.2043. Epub 2010 Oct 21. PMID: 20967764.
9. Colgan R, Nicolle LE, McGlone A, Hooton TM. Asymptomatic bacteriuria in adults. Am Fam Physician. 2006 Sep 15;74(6):985-90. PMID: 17002033.
10. Nicolle LE. Asymptomatic bacteriuria. Curr Opin Infect Dis. 2014 Feb;27(1):90-6.
11. Scholes D, Hooton TM, Roberts PL, Gupta K, Stapleton AE, Stamm WE. Risk factors associated with acute pyelonephritis in healthy women. Ann Intern Med. 2005 Jan 4;142(1):20-7. DOI: 10.7326/0003-4819-142-1-200501040-00008. PMID: 15630106; PMCID: PMC3722605.
12. Chen SL, Jackson SL, Boyko EJ. Diabetes mellitus and urinary tract infection: epidemiology, pathogenesis and proposed studies in animal models. J Urol. 2009 Dec;182(6 Suppl):S51-6. doi: 10.1016/j.juro.2009.07.090. PMID: 19846134.

13. Fünfstück R, Nicolle LE, Hanefeld M, Naber KG. Urinary tract infection in patients with diabetes mellitus. Clin Nephrol. 2012 Jan;77(1):40-8. doi: 10.5414/cn107216. PMID: 22185967.

14. Wang MC, Tseng CC, Wu AB, Lin WH, Teng CH, Yan JJ, Wu JJ. Bacterial characteristics and glycemic control in diabetic patients with Escherichia coli urinary tract infection. J Microbiol Immunol Infect. 2013 Feb;46(1):24-9. doi: 10.1016/j.jmii.2011.12.024. Epub 2012 May 7. PMID: 22572000.

15. Schneeberger C, Kazemier BM, Geerlings SE. Asymptomatic bacteriuria and urinary tract infections in special patient groups: women with diabetes mellitus and pregnant women. Curr Opin Infect Dis. 2014 Feb;27(1):108-14. DOI: 10.1097/QCO.0000000000000028. PMID: 24296584.

16. Park BS, Lee SJ, Kim YW, Huh JS, Kim JI, Chang SG. Outcome of nephrectomy and kidney-preserving procedures for the treatment of emphysematous pyelonephritis. Scand J Urol Nephrol. 2006;40(4):332-8. DOI: 10.1080/00365590600794902. PMID: 16916776.

17. Delamaire M, Maugendre D, Moreno M, Le Goff MC, Allannic H, Genetet B. Impaired leucocyte functions in diabetic patients. Diabet Med. 1997 Jan;14(1):29-34. doi: 10.1002/(SICI)1096-9136(199701)14:1<29::AID-DIA300>3.0.CO;2-V. PMID: 9017350.

18. Valerius NH, Eff C, Hansen NE, Karle H, Nerup J, Søeberg B, Sørensen SF. Neutrophil and lymphocyte function in patients with diabetes mellitus. Acta Med Scand. 1982;211(6):463-7. DOI: 10.1111/j.0954-6820.1982.tb01983.x. PMID: 6981286.

19. Geerlings SE, Brouwer EC, Van Kessel KC, Gaastra W, Stolk RP, Hoepelman AI. Cytokine secretion is impaired in women with diabetes mellitus. Eur J Clin Invest. 2000 Nov;30(11):995-1001. doi: 10.1046/j.1365-2362.2000.00745.x. PMID: 11114962.

20. Park BS, Lee SJ, Kim YW, Huh JS, Kim JI, Chang SG. The outcome of nephrectomy and kidney-preserving procedures for the treatment of emphysematous pyelonephritis. Scand J Urol Nephrol. 2006;40(4):332-8. DOI: 10.1080/00365590600794902. PMID: 16916776.

21. Truzzi JC, Almeida FM, Nunes EC, Sadi MV. Residual urinary volume and urinary tract infection--when are they linked? J Urol. 2008 Jul;180(1):182-5. doi: 10.1016/j.juro.2008.03.044. Epub 2008 May 21. PMID: 18499191.

22. Hosking DJ, Bennett T, Hampton JR. Diabetic autonomic neuropathy. Diabetes. 1978 Oct;27(10):1043-55. DOI: 10.2337/diab.27.10.1043. PMID: 359387.

23. Kaplan SA, Te AE, Blaivas JG. Urodynamic findings in patients with diabetic cystopathy. J Urol. 1995 Feb;153(2):342-4. DOI: 10.1097/00005392-199502000-00013. PMID: 7815578.

24. Al-Rubeaan KA, Moharram O, Al-Naqeb D, Hassan A, Rafiullah MR. Prevalence of urinary tract infection and risk factors among Saudi patients with diabetes. World J Urol. 2013 Jun;31(3):573-8. doi: 10.1007/s00345-012-0934-x. Epub 2012 Sep 7. PMID: 22956119.

25. Sharma S, Govind B, Naidu SK, Kinjarapu S, Rasool M. Clinical and Laboratory Profile of Urinary Tract Infections in Type 2 Diabetics Aged over 60 Years. J Clin Diagn Res. 2017 Apr;11(4):OC25-OC28. Doi: 10.7860/JCDR/2017/25019.9662. Epub 2017 Apr 1. PMID: 28571186; PMCID: PMC5449832.

26. Aamir, A.H., Raja, U.Y., Asghar, A. et al. Asymptomatic urinary tract infections and associated risk factors in Pakistani Muslim type 2 diabetic patients. BMC Infect Dis 21, 388 (2021).

27. Nitzan O, Elias M, Chazan B, Saliba W. Urinary tract infections in patients with type 2 diabetes mellitus: a review of prevalence, diagnosis, and management. Diabetes Metab Syndr Obes. 2015 Feb 26;8:129-36. Doi: 10.2147/DMSO.S51792. PMID: 25759592; PMCID: PMC4346284.

28. Cohen KR, Frank J, Israel I. UTIs in the geriatric population: challenges for clinicians. US Pharm. 2011;36(6):46–54.

29. Tourret J, Bagnis CI, Denamur E. Urinary tract infections in diabetic patients. Rev Prat 2014;64(7):980-3.

30. Lature LH, Lature ML, Pyadala N. Assessment of urinary tract infections among type 2 diabetic patients in a rural teaching hospital, Sangareddy. IAIM. 2020;7(1):28-32.

31. Murad MC. Prevalence of urinary tract infections in diabetic patients. Muthanna Med J. 2018;5(1):35-9.

32. Sewify M, Nair S, Warsame S, Murad M, Alhubail A, Behbehani K, Al-Refaei F, Tiss A. Prevalence of Urinary Tract Infection and Antimicrobial Susceptibility among Diabetic Patients with Controlled and Uncontrolled Glycemia in Kuwait. J Diabetes Res. 2016;2016:6573215. DOI: 10.1155/2016/6573215. Epub 2015 Dec 30. PMID: 26844231; PMCID: PMC4710901.

33. Kumar R, Kumar R, Perswani P, Taimur M, Shah A, Shaukat F. Clinical and Microbiological Profile of Urinary Tract Infections in Diabetic versus Non-Diabetic Individuals. Cureus. 2019 Aug 22;11(8):e5464. DOI: 10.7759/cureus.5464. PMID: 31641561; PMCID: PMC6802799.

34. Cullen IM, Manecksha RP, McCullagh E, Ahmad S, O'Kelly F, Flynn RJ, McDermott T, Murphy P, Grainger R, Fennell JP, Thornhill JA. The changing pattern of antimicrobial resistance within 42,033 Escherichia coli isolates from nosocomial, community and urology patient-specific urinary tract infections, Dublin, 1999-2009. BJU Int. 2012 Apr;109(8):1198-206. DOI: 10.1111/j.1464-410X.2011.10528.x. Epub 2011 Aug 24. PMID: 21883861.

35. Arslan H, Azap OK, Ergönül O, Timurkaynak F; Urinary Tract Infection Study Group. Risk factors for ciprofloxacin resistance among Escherichia coli strain isolated from community-acquired urinary tract infections in Turkey. J Antimicrob Chemother. 2005 Nov;56(5):914-8. doi: 10.1093/jac/dki344. Epub 2005 Sep 20. PMID: 16174685.

36. Wu YH, Chen PL, Hung YP, Ko WC. Risk factors and clinical impact of levofloxacin or cefazolin nonsusceptibility or ESBL production among uropathogens in adults with community-onset urinary tract infections. J Microbiol Immunol Infect. 2014 Jun;47(3):197-203. doi: 10.1016/j.jmii.2012.09.001. Epub 2012 Oct 12. PMID: 23063776.

37. Colodner R, Rock W, Chazan B, Keller N, Guy N, Sakran W, Raz R. Risk factors for the development of extended-spectrum beta-lactamase-producing bacteria in non-hospitalized patients. Eur J Clin Microbiol Infect Dis. 2004 Mar;23(3):163-7. DOI: 10.1007/s10096-003-1084-2. Epub 2004 Feb 19. PMID: 14986159.

38. Malmartel A, Ghasarossian C. Epidemiology of urinary tract infections, bacterial species and resistances in primary care in France. Eur J Clin Microbiol Infect Dis. 2016;35(3):447-51.

39. Tourret J, Bagnis CI, Denamur E. Urinary tract infections in diabetic patients. Rev Prat 2014;64(7):980-3.

40. Lature LH, Lature ML, Pyadala N. Assessment of urinary tract infections among type 2 diabetic patients in a rural teaching hospital, Sangareddy. IAIM. 2020;7(1):28-32.

41. Murad MC. Prevalence of urinary tract infections in diabetic patients. Muthanna Med J. 2018;5(1):35-9.

42. Gupta S, Kapur S, Padmavathi D. Comparative prevalence of antimicrobial resistance in community-acquired urinary tract infection cases from representative States of northern and southern India. J Clin Diagn Res. 2014; 8(9):09-1

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AUTHOR'S CONTRIBUTION

Following authors have made substantial contributions to the manuscript as under

Badshah A:	Designed the study, data collection, manuscript writing, statistical analysis
Khan A:	Manuscript writing, reference writing
Mohammad W:	Conceived the idea, final editing
Zaman R:	Data collection
Khan Z:	Literature review, data collection
Haider I:	Critical appraisal, supervision

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.