DIABETIC NEPHROPATHY AS A RISK FACTOR ASSOCIATED WITH INFECTION OF THE URINARY TRACT, MEDICINE SERVICE OF THE HOSPITAL ULDARICO ROCCA FERNÁNDEZ, 2011 – 2015

NEFROPATÍA DIABÉTICA COMO FACTOR DE RIESGO ASOCIADO A INFECCIÓN DEL TRACTO URINARIO, SERVICIO DE MEDICINA DEL HOSPITAL ULDARICO ROCCA FERNÁNDEZ, 2011 – 2015

Maggie Martinez-Palomino[1,a], Edwin Castillo-Velarde[2,b]

ABSTRACT

Introduction: Diabetes mellitus is one of the most prevalent pathologies, affecting up to 2014 to 9% of the world population and in Peru, 4,3% of the adult population is already diabetic. These patients are more susceptible to infectious diseases, urinary tract infection are the most complicated frequently involve, these patients receive hospital treatment, decreasing their life quality. **Objective:** To determine if diabetic nephropathy is a risk factor for the prevalence of urinary tract infection in hospitalized patients at the Uldarico Rocca Fernandez Hospital. **Methods:** It is an observational, analytical study of longitudinal cut, case and control type; the information was collected through a data sheet using the medical records of patients hospitalized in the medical service of the Hospital Uldarico Rocca Fernandez in the period 2011-2015. The sample was obtained by probabilistic sampling, sample size of 360, with a proportion of cases and controls 1:1. **Results:** Diabetic nephropathy had an OR = 8.62 (95% CI 4.78 - 15.57), macroalbuminuria obtained an OR = 5.75 (95% CI 2.99-11.06), the alkaline pH had an OR = 5.42 (95% CI 3.22-9.13) and the Glycemic control obtained an OR = 5.44 (95% CI 3.44 - 8.88). **Conclusion:** Diabetic nephropathy is associated with a higher prevalence of UTI in patients hospitalized in the medical service of the Hospital Uldarico Rocca Fernandez.

Key words: Urinary tract infection; Diabetic nephropathy; Urinary pH; Degrees of proteinuria; Glycemic control; Diabetic patients. (source: MeSH NLM)

RESUMEN

Introducción: La diabetes mellitus es una de las patologías más prevalentes, afectando hasta el 2014 a un 9% de la población mundial y en el Perú el 4.3% de la población adulta ya es diabética. Estos pacientes son más susceptibles a enfermedades infecciosas, siendo la del tracto urinario la más frecuente, considerándose complicada, lo que significa que deben recibir manejo hospitalario, conllevando a disminución de la calidad de vida de los mismos. **Objetivo:** Determinar si la nefropatía diabética es un factor de riesgo para la prevalencia de infección del tracto urinario en pacientes hospitalizados en el servicio de medicina del Hospital Uldarico Rocca Fernández. **Métodos:** Es un estudio observacional, analítico de corte longitudinal, tipo caso y control; la información se recolectó mediante una ficha de datos utilizando las historias clínicas de los pacientes hospitalizados en el servicio de medicina del Hospital Uldarico Rocca Fernández en el periodo 2011-2015. La muestra se obtuvo por muestreo probabilístico, siendo el tamaño de esta de 360, con una proporción de casos y controles 1:1. **Resultados:** La nefropatía diabética obtuvo un OR=8.62 (IC95% 4.78 – 15.57), la macroalbuminuria obtuvo un OR=5.75 (IC95% 2.99 – 11.06), el pH alcalino obtuvo un OR=5.42 (IC95% 3.22 - 9.13) y el control glucémico obtuvo un OR=5.44 (IC95% 3.44 - 8.88). **Conclusión:** La nefropatía diabética se asocia a mayor prevalencia de ITU en pacientes hospitalizados en el servicio de medicina del Hospital Uldarico Rocca Fernández.

Palabras clave: Infección del tracto urinario; Nefropatía diabética; pH urinario; Grados de proteinuria; Control glucémico; Pacientes diabéticos. (fuente: DeCS BIREME)

[1] Hospital Uldarico Rocca Fernández, Lima-Perú.
[a] Medicine Intern.
[2] Hospital Nacional Guillermo Almenara Irigoyen, Lima-Perú.
[b] Specialist in Nephrology and Kidney Transplantation.

ORIGINAL PAPER

INTRODUCTION

Diabetes mellitus is one of the most prevalent pathologies, affecting 9% of the world population until 2014[1] and it is estimated that in Peru 4.3% of the adult population is already diabetic[2]. At present, diabetes wreaks havoc on several organs, among them, the kidney one of the main organs affected, producing diabetic nephropathy which is the main cause of end-stage renal disease, therefore, it is the first cause of death in patients. diabetic patients[2], estimating that by 2030 it will be the seventh leading cause of death in the world[1].

It should be considered that those people who present diagnosed with diabetes are more susceptible to infectious diseases, being those of the urinary tract the ones that presented more frequently, it could be explained because these patients are in a state of immunosuppression[3], but at the same time, many other factors contribute to the presentation of these infections, one of these being diabetic nephropathy, which in clinical practice is related to higher rates of urinary tract infections[4].

Urinary tract infection in diabetic patients is considered complicated, which means that it must receive hospital management, it leads to a decrease in the quality of life of the patient, greater economic expense for the management, leads to poor glycemic control, therefore greater white organ damage[3,5], resulting in a vicious cycle.

The factors that were taken into account are proteinuria, urinary pH, and poor glycemic control, which are parameters considered within diabetic nephropathy, and when evaluated individually it will be possible to establish which of the three is the most associated with the prevalence of urinary infection in patients diabetics and accordingly, establish what measures can be taken to be able to modify them and thus reduce the risk.

In the present work, important data on this association were contributed to both the medical and social fields, since few studies develop this topic, it seeks to encourage the investigation of those factors that could be associated with the deterioration of the health of those chronic patients, to make them known; that a better follow-up of these patients is done to reduce the risks, and in this way avoid the deterioration of their quality of life. It was also sought to promote preventive medicine in the Peruvian health sector, which in recent years has become very important in the world.

Therefore, in this research, we seek to determine whether diabetic nephropathy is a risk factor for the prevalence of urinary tract infection in hospitalized patients in the medical service of the Uldarico Rocca Fernández Hospital in the period 2011-2015.

METHODS

An observational, analytical longitudinal section, case-control type study was carried out. The study sample consisted of 320 diabetic patients of both sexes with an average age of 66 years, hospitalized in the medicine service of the Uldarico Rocca Fernández hospital during the period 2011-2015, who were divided into two groups: cases and controls about 1: 1 matched by age and sex.

Inclusion criteria:

Cases: Diabetic patients who presented urinary tract infection (UTI).

Controls: Diabetic patients who did not have a diagnosis of UTI.

Exclusion criteria:

Patients with a previous diagnosis of high blood pressure, urolithiasis and / or neurogenic bladder.

The information came from their medical records using a simple data sheet where the amount of proteinuria, urine pH, and glycemic control values were taken into account. Statistical data analysis was performed using the IBM SPSS Statitics version 22 and Microsoft Excel programs.

RESULTS

A total of 320 patients were registered, hospitalized in the medicine service of the Uldarico Rocca Fernández hospital during the period 2011-2015, the distribution of the sample according to the group cases and controls are described in Table 1, totaling 160 patients in each group in a 1: 1 ratio, where 52.5% are female and 47.5% are male.

Table 1. General characteristics of the case-control group.

VARIABLES	CASES	CONTROLS
Number	160	160
Female gender	84 (52.5%)	84 (52.5%)
Male gender	76 (47.5%)	76 (47.5%)
Age (years)	63	63
Positive UTI	160	0

ORIGINAL PAPER

The prevalence of urinary tract infection in diabetic patients who belonged to the study group is 22% compared to 78% who came for other pathologies, which is graphically evident in Figure 1.
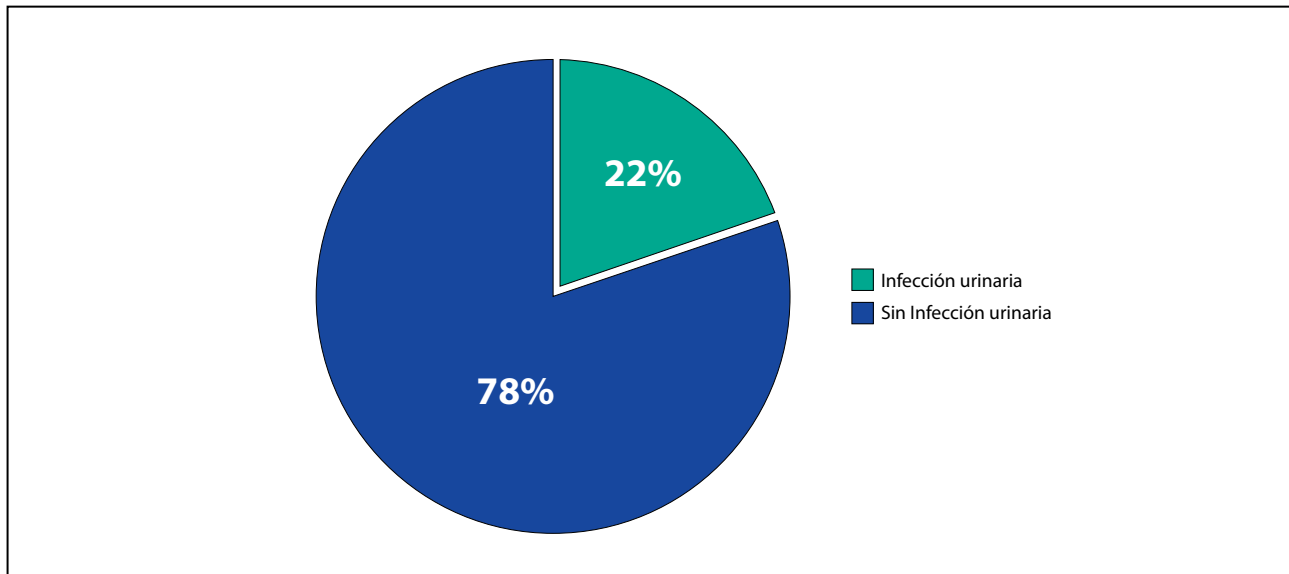
Graphic 1. It shows the prevalence of urinary infection among diabetic patients hospitalized at the Uldarico Rocca Fernández Hospital.

In the bivariate analysis, the first variable that was studied in the presence of diabetic nephropathy as a risk factor, Table 2 shows the OR value for this variable (8.62), showing that diabetic nephropathy represents 7.62 times the risk of suffering from UTI, unlike those patients who have not yet developed it. At the same time, this table shows that when presenting macroalbuminuria, the risk of suffering from UTI is 4.75 times higher than those patients with microalbuminuria.

Table 2. Association between the presence of diabetic nephropathy and ranges of proteinuria with prevalence of UTI in hospitalized patients.

VARIABLES		ITU		OR	IC 95%	P
		SÍ	NO			
Diabetic nephropaty	Sí	143	79	8.62	4.78 - 15.57	0.00
	No	17	81			
proteinuria	Macroalbuminuria	124	42	5.75	2.99 - 11.06	0.00
	Microalbuminuria	19	37			
	Controlled	36	98			

The other two variables that were studied are urinary pH and glycemic control, we can see in Table 3 that when presenting alkaline pH in the urine, the risk of presenting UTI increases by 4.42 times in contrast to patients who maintain acidic pH in the urine. At the same time, it was shown that poor glycemic control represents 4.44 times the risk of presenting UTI in diabetic patients.

ORIGINAL PAPER

Table 3. Association between urinary pH and glycemic control with the prevalence of UTI in hospitalized patients.

VARIABLES		ITU			IC 95%	P
		SÍ	NO	OR		
Urinary PH	Alkaline	134	78	5.42	3.22 - 9.13	0.00
	Acid	26	82			
Glycemic control	Controlled	124	62	5.44	3.34 - 8.88	0.00
	Not controlled	36	98			

Finally, in the multivariate analysis, which is shown in Table 4, it was determined that the factor that is most closely related to the presentation of UTI in patients diabetics is poor glycemic control, with an OR = 5.58, statistically significantly (p-value = 0.00).

Table 4. Logistic regression analysis between risk factors and the presence of urinary tract infection in hospitalized diabetic patients.

URINARY TRACT INFECTION[a]	B	STANDARD ERROR	WALD	GL	SIG.	EXP(B)	95% CONFIDENCE INTERVAL FOR EXP (B)	
							LOWER LIMIT	UPPER LIMIT
Sí Interceptación	-2,722	0,373	53,220	1	0	-	-	-
[Nefro=1]	1,297	0,451	8,281	1	0,004	3,66	1,512	8,855
[Nefro=2]	0[b]	-	-	0	-	-	-	-
[Prot=0]	0[b]	-	-	0	-	-	-	-
[Prot=1]	1,3	0,394	10,887	1	0,001	3,671	1,696	7,948
[Prot=2]	0[b]	-	-	0	-	-	-	-
[pH=1]	0,154	0,410	0,142	1	0,707	1,167	0,522	2,606
[pH=2]	0[b]	-	-	0	-	-	-	-
[ControlGlu=2]	1,719	0,294	34,175	1	0	5,58	3,136	9,93
[ControlGlu=3]	0[b]	-	-	0	-	-	-	-

The reference category is: No.a
This parameter is set to zero because it is redundant.

ORIGINAL PAPER

DISCUSSION

The present study, and concerning some previous studies, sought to determine the degree of association between diabetic nephropathy and the presence of urinary tract infection, it was observed that diabetic nephropathy has a risk of 7.62 times more of presenting UTI than of those patients who did not develop diabetic nephropathy (OR = 8.62, 95% CI = 4.78 - 15.57).

Similar results were reported by Oma Nitzan, Mazen Elias, Viviana Chazan, and collaborators, in their study "Urinary tract infections in patients with type 2 diabetes mellitus: a review of prevalence, diagnosis, and management" 4, they found a RR = 1.42 for this variable. Although they are not the same measures of association, both results are congruent, indicating that developing diabetic nephropathy represented a greater risk for UTI, probably since kidney damage produces proteinuria, alkaline pH and is an indirect indicator of poor glycemic control. When analyzing the 95% CI, it was obtained that this result was statistically significant.

Concerning the range of proteinuria, it was observed that macroalbuminuria had 4.75 times the risk of having presented UTI compared to those who only presented microalbuminuria (OR = 5.75, 95% CI = 2.99 - 11.06). No research papers have been found that have studied this relationship exactly but Al-Rubeaan KA, Moharram O, Al-Naqib D, Hassan A, Rafiullah MR in their study "Prevalence of urinary tract infection and risk factors among Saudi patients with diabetes" 10 found that microalbuminuria had a RR = 1.4 in contrast to patients without proteinuria, they showed that the appearance of protein in the urine signified a greater risk for UTI and when the amount of protein in urine increased the risk is greater. When analyzing the 95% CI and the p-value, it is obtained that this result was statistically significant.

Also, regarding urinary pH, it was determined that alkaline pH represented 4.42 times the risk of suffering UTI in diabetic patients as opposed to those who had an acid urinary pH, the result has been statistically significant (OR = 5.42, 95% CI = 3.22 - 9.13, p <0.05). Despite this association having been verified, there were no studies that supported or disagreed with the present study when compared, leaving open the possibility of carrying out more studies on the subject, although before the bivariate analysis this variable showed a statistically significant association, however, in the multivariate analysis, it was found that the association was not statistically significant since the p-value was 0.7. The last variable to evaluate was glycemic control, resulting in that poor glycemic control had 4.44 times the risk for UTI compared to those patients who had good control, it was observed that this result was statistically significant (OR = 5.44, 95% CI = 3.34 - 8.88, p <0.05). Likewise, Suzanne Geerling, Vivian Fonseca, David Castro-Diaz, James List, and Shamik Parikh in their study "Genital and urinary tract infections in diabetes: Impact of pharmacologically-induced glucosuria"[5], found that poor glycemic control was a risk factor to present urinary tract infection. This agrees with the result of the present study, since the poorer glycemic control, the greater the commitment of white organs.

CONCLUSION

Based on the results obtained, we conclude that diabetic nephropathy is a risk factor for the presentation of urinary tract infection in those patients; furthermore, it was found that the other factors: ranges of proteinuria, urinary pH, and glycemic control play an important role, with poor glycemic control prevailing, which represents the greatest risk factor.

Correspondence: Maggie Fiorella Martinez Palomino
Address: Av. Honorio Delgado 555-Urb. Ing. San Martin de Porres, Lima-Perú
Telephone number: +51973874297
E-mail: maggie23_9@hotmail.com

BIBLIOGRAPHIC REFERENCES

1. Organización Mundial de la Salud. Diabetes [monografías en internet]* secretaria general de la OMS; 2015 [02/07/16]   disponible en: http://www.who.int/mediacentre/factsheets/fs312/es/

2. Ministerio de Salud. Día mundial de la Diabetes [monografías en internet]   portal web MINSA; 2014 [04/07/16]* disponible en: http://www.minsa.gob.pe/portada/Especiales/2014/diabetes/

3. Fauci A., Kasper D., Longo D., Braunwald E., Hauser S., Jameson J., et al. Harrison. Principios de medicina interna.17ª ed. México: Mc Graw Hill; 2009.

4. Orna N., Mazen E., Vibiana C., Walid S. Urinary tract infections in patients with type 2 diabetes mellitus: review of prevalence, diagnosis, and management. Diabetes, Metabolic Syndrome and Obesity: Targets and Therapy 2015; 8: 129–136.

5. Greerlings S., Fonseca V., Castro-Díaz D., James L., Parikh S. Genital and urinary tract infections in diabetes: Impact of pharmacologically-induced glucosuria. Diabetes research and clinical practice 2014; 103: 373-381.

6. Pesantez Mendez C., Ruilova Blacio J. Prevalencia de infección de vías urinarias en pacientes con diagnóstico de diabetes mellitus tipo 2. Ingresados en el departamento de medicina interna del hospital Vicente Corral Moscoso durante el año 2011 y factores asociados. [Tesis previa a la obtención del título médico]. Cuenca: Universidad de Cuenca, Facultad de ciencias médicas, Escuela de medicina; 2013.

7. Villarroel P., Parra X., Ardiles L. Prevalencia y clasificación de enfermedad renal crónica en pacientes con diabetes mellitus tipo 2 en el centro comunitario de salud familiar Pantanosa, Frutillar. Rev. Med. Chile 2012; 140: 287-294.

8. Herrera-Añazco P., Hernández A., Mezones-Holguin E. Diabetes mellitus y nefropatía diabética en el Perú. Nefrologia, Diálisis y Trasplante 2015; 35 (4): 229 – 237.

9. Torres A., Zacarías R. Nefropatía diabética. Rev Hosp Gral Dr. M Gea González 2002; 5 (1-2): 24-32.

10. Al-Rubeaan K., Moharram O., Al-Naqeb D., Hassan A., Rafiullah M. Prevalence of urinary tract infection and risk factors among Saudi patients with diabetes. Worl J Urol 2013; 31(3): 573-578.

11. Barrot J., Gonzáles A. Diabetes mellitus tipo 2. AMF 2012; Jun: 1-2.

12. Borregales L., Giordano F., Contreras L. Primer consenso venezolano de infección urinaria.1ª ed. Caracas: Sociedad Venezolana de Urología; 2011.

13. Chávez O. Uso de tiras reactivas para el cribado de Nefropatía en mayores de 60 años. Rev Cient Cienc Med 2013; 16(2): 26-30.

14. Feki M., Kamoun M., Hadj F., Bouaziz Z., Charfi N., Mnif F., et al. Complicated urinary tract infections associated with diabetes mellitus: Pathogenesis, diagnosis and management. Indian Journal of Endocrinology and Metabolism 2013; 17(3): 442-445.

15. Fünfstück R., Nicolle L., Hanefeld M., Naber K. Urinary tract infection in patients with diabetes mellitus. Clinical Nephrology 2012; 77(1): 40-48.

16. González A., Dávila R., Acevedo O., Ramírez M., Gilbaja S., Valencia C., et al. Infección de las vías urinarias: prevalencia, sensibilidad antimicrobiana y factores de riesgo asociados en pacientes con diabetes mellitus tipo 2. Revista Cubana de Endocrinología 2014; 25(2): 57-65.

17. Gonzales N., Rodríguez E., Manrique H. Características clínicas y factores asociados a morbilidad intrahospitalaria en los pacientes con diabetes mellitus tipo 2. Rev Soc Peru Med Interna 2013; 26 (4): 159-165.

18. Ramos W., López T., Revilla L., More L., Huamaní M., Pozo M. Resultados de la vigilancia epidemiológica de diabetes mellitus en hospitales notificantes del Perú, 2012. Rev Peru Med Exp Salud Pública 2014; 31(1): 9-15.

19. Palacios Villegas E., Ruilova Blacio J. Diabeticos tipo 2 en complicación aguda con infecciones adquiridas en la comunidad ciudad hospitalaria "Dr. Enrique Tejera" septiembre 2014 – mayo 2015. [Tesis previa a la obtención del título de especialista en medicina interna]. Valencia: Universidad de Carabobo, Facultad de ciencias de la salud, Dirección de postgrado; 2015.

ORIGINAL PAPER