Rev. Fac. Med. Hum. January 2020;20(1):27-31.
DOI 10.25176/RFMH.v20i1.2545
ORIGINAL PAPER
ISSN Version Online: 2308-0531
Faculty of Human Medicine URP

WAIST TO HIGHT RATIO A VISCERAL OBESITY MEASURE RELATED TO UNCOMPLICATED CYSTITIS

ÍNDICE CINTURA TALLA UN MARCADOR DE OBESIDAD VISCERAL RELACIONADO A CISTITIS NO COMPLICADA

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ABSTRACT

Objective: The aim of this study was to determine the association between waist to height ratio and uncomplicated cystitis in a primary health care center in Lima, during the year 2018. **Methods:** We conducted an observational, analytical, case-control study, in which a total of 131 cases and 131 controls were obtained by simple random sample, applying exclusion and inclusion criteria. Retrospective recollection of the data was performed using the medical record of each selected patient. Odds ratio was calculated to measure the strength of association. **Results:** The waist to height ratio mean for uncomplicated cystitis was 61.9 ± 6.39 and 58.12 ± 3.87 for the controls. We found an statistical significant association between uncomplicated cystitis and waist to height ratio (OR 5.27; 95%CI 3.10 – 8.95; p <0.001). Waist circumference (OR 2.11 95%CI;1.26 – 3.55; p=0.005) and body mass index (OR 2.02; 95%CI 1.20 – 3.37; p=0.007) were also associated. **Conclusion:** We found a strong association between waist to height ratio and uncomplicated cystitis, prospective studies are suggested to confirm the association between visceral obesity and the appearance of urinary tract infections.

Key words: Waist to height ratio; Uncomplicated cystitis; Body mass index; Abdominal circumference (source: MeSH NLM).

RESUMEN

Objetivo: Determinar la relación entre el índice cintura talla y la presencia de cistitis no complicada en los pacientes de consulta externa en un centro de atención primaria de Lima en el año 2018. **Métodos:** Se realizó un diseño observacional analítico, tipo casos y controles. Con una muestra de 131 casos y 131 controles, por muestreo aleatorio simple, sometidos a criterios de selección. Se revisó historias clínicas para la obtención retrospectiva de los datos. Se calculó el Odds Ratio como medida de asociación. **Resultados:** La media del índice cintura talla para cistitis no complicada fue de 61,91 ± 6,39 para los casos y 58,12 ± 3,87 para los controles. Se encontró asociación estadísticamente significativa entre la presencia de cistitis y el índice cintura talla (OR 5,27; IC95% 3,10 – 8,95; p <0,001). Asimismo, se encontró asociación con el perímetro abdominal (OR 2,11 IC 95% 1,26 – 3,55; p=0,005) e IMC (OR 2,02; IC95% 1,20 – 3,37; p=0,007). **Conclusión:** El índice cintura talla tuvo una fuerte asociación con la presencia de cistitis no complicada. Se sugieren estudios prospectivos para corroborar la asociación entre marcadores de obesidad visceral y el desarrollo de infección de tracto urinario.

Palabras clave: Índice cintura talla; Cistitis no complicada; Índice de masa corporal; Perímetro abdominal (fuente: DeCS BIREME).

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Cite as: Ezequiel Roque-Quezada, Claudia Saldaña, Joseph Alburqueque-Melgarejo. Waist to hight ratio a visceral obesity measure related to uncomplicated cystitis. Rev. Fac. Med. Hum. January 2020; 20(1):27-31. DOI 10.25176/RFMH.v20i1.2545

Journal home page: http://revistas.urp.edu.pe/index.php/RFMH

INTRODUCTION

The world health organization reported an alarming number of 650 million obese adults in 2016, which has tripled the number of obese adults in 1975[1]. In 2017 the Pan-American health organization reported a 23% prevalence for obesity in Latin America, with a total of 140 million people affected[2]. In 2017 the national institute of statistics and informatics reported a national prevalence of 23% for obesity[3]. Obesity is a major risk factor for metabolic, cardiovascular, neoplastic, musculoskeletal and infectious diseases[1].

The relationship between the infection-obesity physiopathology is still unclear[4], even though experimental models have reported an association between immune dysfunction and elevated leptin levels, an adipokine which serum levels increase proportionally to the amount of adipose tissue in the human body[5]. This alters the performance of Treg lymphocytes which are responsible for immune tolerance, including the communication between the immune system and the microbiota, resulting in a dysbiosis and posterior infectious events, on the other hand, increased leptin levels trigger an increase immune cellular response T-helper 1 and macrophage-mediated[5,6], which could trigger an out of proportion immune response in obese patients.

Body mass index (BMI) is the classic anthropometric marker for obesity, it estimates the total amount of adipose tissue distributed in the whole body, been its main drawback not been able to discriminate peripheral from visceral adipose tissue[7]. This drawback became crucial when studies reported that visceral adipose tissue produced more adipokines than peripheral adipose tissue[8], concluding that depending on its location, adipose tissue will exert influence on the immune system.

Waist to height ratio (WTHr) is the ratio of abdominal circumference in centimeters and height in meters, it is considered a good estimator for visceral adipose tissue because it corrects the abdominal circumference by sex, height and race, by doing so it is more specific than BMI or abdominal circumference[9].

In primary care attendance, cystitis is the most common bacterial, been the female population the most affected[10], it has been estimated that half of the female population will have a cystitis event before the age of 32[11].

Cystitis can be divided into uncomplicated and complicated cystitis; uncomplicated cystitis is defined as a bladder infection occurring in healthy, non-pregnant, fertile females, with no anatomical nor functional urinary tract pathology[12,13,14].

No previous studies exploring the relationship between WTHr and uncomplicated cystitis were found, the present study will be the first to explore an association.

METHODS

The present study was developed in 2019, in a primary care facility in Carabayllo, Lima, Peru. The study design was an observational, analytical, case-control study paired by age.

The sample design was a simple random sampling and the sample size was calculated using OpenEpi, we worked with a statistical potency of 80%, a 1:1 case-control ratio, 50% of exposed controls and an expected Odds Ratio of 2.1. we obtain a sample of 131 cases and 131 controls, using the Fleiss formula with correction of continuity.

For the cases, a retrospective recollection of the data was performed in the years of February and June 2019, using medical records as a primary source, with a total of 131 patients with the diagnosis of uncomplicated cystitis that fulfill the selection criteria. For the controls, a retrospective recollection was performed with a total of 131 who attended for routine medical checkups that fulfill the selection criteria.

For the cases the inclusion criteria included, ages between 18 and 59 years, lower urinary symptoms and a pathological urine analysis, the exclusion criteria on the other included postmenopausal patients, pregnancy, postpartum, cancer, diabetes mellitus, HIV, sexual transmitted diseases, urinary catheters, urinary incontinence, rheumatic pathology, chronic use of cortisol, kidney malformations, kidney stones and recurrent urinary tract infections.

For the controls the inclusion criteria included, female gender, ages between 18 and 59 years, no apparent pathologies at the time of the medical checkup, no urinary tract symptoms, the exclusion criteria on the other included postmenopausal patients, pregnancy, postpartum, cancer, diabetes mellitus, HIV, sexual transmitted diseases, urinary catheters, urinary incontinence, rheumatic pathology, chronic use of cortisol, kidney malformations, kidney stones and recurrent urinary tract infections.

The diagnosis of uncomplicated cystitis was determined by the exclusion of a history of recurrent and recidivate cystitis, the presence of dysuria, pollakiuria, urination urgency, suprapubic pain and the absence of lumbar pain, fever and costovertebral angle tenderness; A positive urine analysis showing pyuria, visible bacteria and positive nitrates.

The data was produced and registered by the professionals working in the primary health facility, the instrument used in this study where: a calibrated scale for the weight in kilograms using up to 1 decimal, an standardized tallimeter for the weight in centimeters using up to 2 decimals, a measuring tape to determine the abdominal circumference in centimeters using up to 1 decimal, this measure was performed by taking a midpoint in between the subcostal border and the iliac crest.

he statistical software STATA was used for the univariate analysis to calculate the frequencies for the qualitative variables, and the mean and standard deviation for the quantitative variables; the bivariate analysis used the chi-square and a logistic regression model for the calculation of the odds ratio for the strength of the association in between ICT and uncomplicated cystitis.

We counted with the approval of the health center headquarters to recollect and put in to work the present study, we respected the anonymity of the patients registered in our study. We used the STROBE checklist for a case-control study.

RESULTS

After univariate analysis was performed for the 131 cases and 131 controls, none of the study subjects presented absence of data for the study variables. Calculation of the mean with their respective standard deviation and relative frequencies for each of the quantitative and qualitative variables was performed (Table 1 and Table 2). Differences in the median distribution and interquartile ranges for WTHr was found for both cases and controls (Figure 1).

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Table 1. Comparison of waist-to-height ratio, body mass index and abdominal perimeter in patients with urinary tract infection and controls without infection.

	Controls (N=131)	Cases (N=131)	P value
Waist-to-height ratio	58.13 ± 3.87	60.02 ± 5.61	<0.001
Abominal perimeter	88.47 ± 6.17	93.77 ± 9.54	<0.001
Body mass index	28.10 ± 3.00	28.92 ± 4,57	0.141

Mean ± standard deviation are shown
P values obtained from non paremetric Mann–Whitney U test

Table 2. Comparison of high risk categories for waist-to-height ratio, body mass index and abdominal perimeter in patients with urinary tract infection and controls without infection.

	Controls (n=131)	Cases (n=131)	P value
High risk waist-to-height ratio (%)	34 (25.95%)	85 (64.89%)	<0.001
High risk abdominal perimeter	74 (56.49%)	96 (73.28%)	0.004
Obesity (BMI >29.99)	37 (28.24%)	58 (44.27%)	0.007

P values obtained from non parametric Chi squared test.

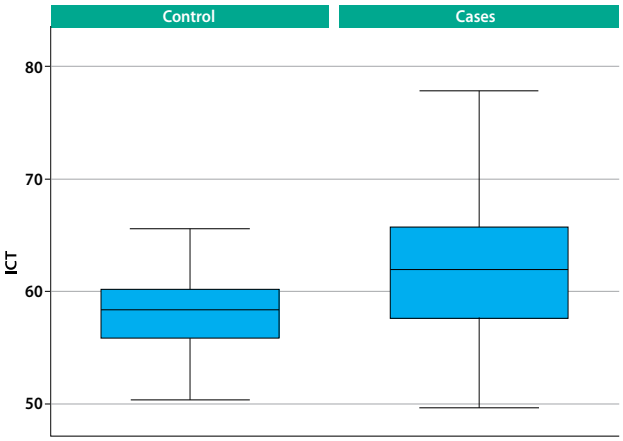

Figure 1. Box-and-whisker diagram comparing waist-to-height ratio in the cases of uncomplicated cystitis and controls.WHTr: waist-to-height ratio.

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In the bivariate analysis, an association between cystitis and the variables WHTr (OR 5,27; IC95 3,10-8,95; p <0,001), abdominal perimeter (OR 2,11; IC 1,25-3,55; p=0,005) and body mass index (OR 2,01; IC95 1,25-3,55; p=0,007) was found. (Table 3).

Table 3. Bivariate analysis with binomial logistic regression.

Variables	Odds Ratio	Confidence interval 95%	P value
Waist-to-height ratio	5.27	3.10 – 8.96	<0.001
Abdominal perimeter	2.11	1.25 – 3.55	0.005
Body mass index	2.02	1.21 – 3.37	0.007

DISCUSSION

Uncomplicated cystitis is the most frequent urinary tract infection in ambulatory attendance, for its diagnosis, it is required that the patient fit in a certain profile which excludes certain variables like male gender, post-menopause, diabetes mellitus, invasive urinary artifacts, functional and anatomical urinary tract pathologies[13]. Starting from the diagnosis a great number of possible confounding variables for its relationship with ICT are excluded.

In comparison to peripheral adiposity, visceral adiposity plays a major role in immunological deregulation. The alteration of the Treg lymphocytes affects the microbiota homeostasis, recent studies determined that the urinary tract is not sterile, and it has a microbiota[5,6,8,15,16]. The deregulation of the microbiota generated by the excess of visceral adipose tissue could be related to a higher risk of infections[5,6,15]. We recommend more studies that could explore the relationship between this anthropometric measure and other bacterial infections.

Our results about BMI presented similar findings with the results of Semins et al.[17], and differed with the results presented by Saliva et al.[18], Nassaji et al.[19], Sundus et al.[20]. Our study is the first to report an association between ICT and uncomplicated cystitis. We recommend studies that explore its association with other bacterial infections, as well as prospective that could determine the ICT as a risk factor for uncomplicated cystitis.

CONCLUSION

Our study found an association between ICT and the presence of uncomplicated cystitis. Prospective studies are suggested in order to determine if the ICT could be a risk factor for the development of uncomplicated cystitis.

Authorship contributions: The authors participated in the conception, drafting and final approval of the original article, in addition to ERQ in data collection.

Financing: Self-financed.

Conflict of interest: The authors declare no conflict of interest in the publication of this article.

Received: July 20, 2019

Approved: November 3, 2019

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