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Research Article

**ASSOCIATION OF KIDNEY STONES SEVERITY WITH
DIABETES MELLITUS, FATNESS & HYPERTENSION**

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Abstract:

Objective: The purpose of this research work is to interrogate the association between the availability of kidney stones with BMI, DM & HT (hypertension).

Methodology: Five hundred and seventy-four patients were the part of this research work. Past history of the kidney stones was not present in any patient. Total one hundred and twenty-one patients diagnosed with the presence of kidney stones with the evaluation of ultrasound & four hundred and fifty-three patients without stones compared with respect to body mass index, hypertension & diabetes mellitus. The burden of one hundred and twenty-one patients with stones also compared with similar variables.

Results: Out of 121 kidney stone's patient, 24.70% (n: 30) were available with hypertension, while 14.50% (n: 66) out of 453 without stone patients were present with hypertension. The values of body mass index in the patient with and without kidney stones were 27.20 ± 4.930 kg/m² & 25.290 ± 4.120 kg/m² correspondingly. Total 20.60% (n: 25) patients with kidney stones were available with diabetes mellitus whereas 10.8% (n: 49) patients without stones were available with diabetes mellitus. Analysis of logistic regression showed in the comparison of the patients of both groups that diabetes mellitus & body mass index has an association with the presence of the kidney stones. There was no important association among the similar variables and CSD (Cumulative Stone Diameter) and the surface area of stones assessed for the stone burden.

Conclusions: DM, HT and high BMI may add the risk factors for the possibility of the formation of the kidney stones but they were not affecting the burden of the stones.

KEY WORDS: Kidney, Ultrasound, Hypertension, Association, Cumulative, Diabetes, Mellitus, Cumulative Stone Diameter.

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INTRODUCTION:

Kidney stones are very frequent problems of health with a high incidence in the whole world and it can be the reason of important burden of health care particularly in the population of productive age. In the past thirty years, the occurrence of the kidney stones in United States of America has reached to double & risk of kidney stones for life time formation is from 6.0% to 12.0% [1-5]. In current era, this high incidence is id because of the dietary habits, luxury life style & resistance to insulin [4, 6-9]. The association among the metabolic syndrome like diabetes mellitus, fatness, hypertension and diseases of kidney stones is available in the past research works. But no research work is available to investigate the availability of these diseases & kidney stone burden. A large number of parameters as CSD, surface areas of stones and the volume of the stone are in use to mark the stone burden [10, 11]. This study aimed to search the association between the availability of kidney stones & stone burden with hypertension, BMI and diabetes mellitus.

METHODOLOGY:

Total six hundred and thirty patients having more than 18 year of age from November 2018 to March 2019 visited the department of urology of Bahawalpur Victoria Hospital Bahawalpur. Renal ultrasound of the patients suffering from flank pain carried out. The patients with the other serious diseases or in extreme stages of the kidney diseases were not the part of this research work. Total 29 patients without kidney stones as examined by ultrasound but with a history of the stones were not the part of this research work. 16 patients excluded because of the kidney stone's size which can affect the assessment of the study. Incomplete data caused the exclusion of 11 patients. So, total five hundred and seventy-four patients were the part of this research work. The separation of these patients carried out into two groups on the basis of presence or absence of the kidney stones. Total 21.1% (n: 121) patients diagnosed with stones while 78.90% (n: 457) patients were available without stones.

The information of the age of patients, profession, BMI, HT & HM recorded in the files of the patients.

Body mass index calculated according to the international formula. BP measured to measure the nature of hypertension. Measurement of fasting blood sugar carried out to know the severity of diabetes mellitus. The evaluation of all these variables carried out to find out the risk factors for the availability of the kidney stones. Radiologists with ten years of experience were performing the all ultrasound examinations. SPSS V. 20 was in use for the analysis of collected information. Averages \pm SD values were in use for the description of the quantitative variables. Kolmogorov-Smirnov method was in use to confirm preciseness in the distribution of samples. Chi square test, Whitney U analysis, Kruskal-Wallis methods and Mann-hitney U test method were in utilization for the comparison and determination of the significance of different variables.

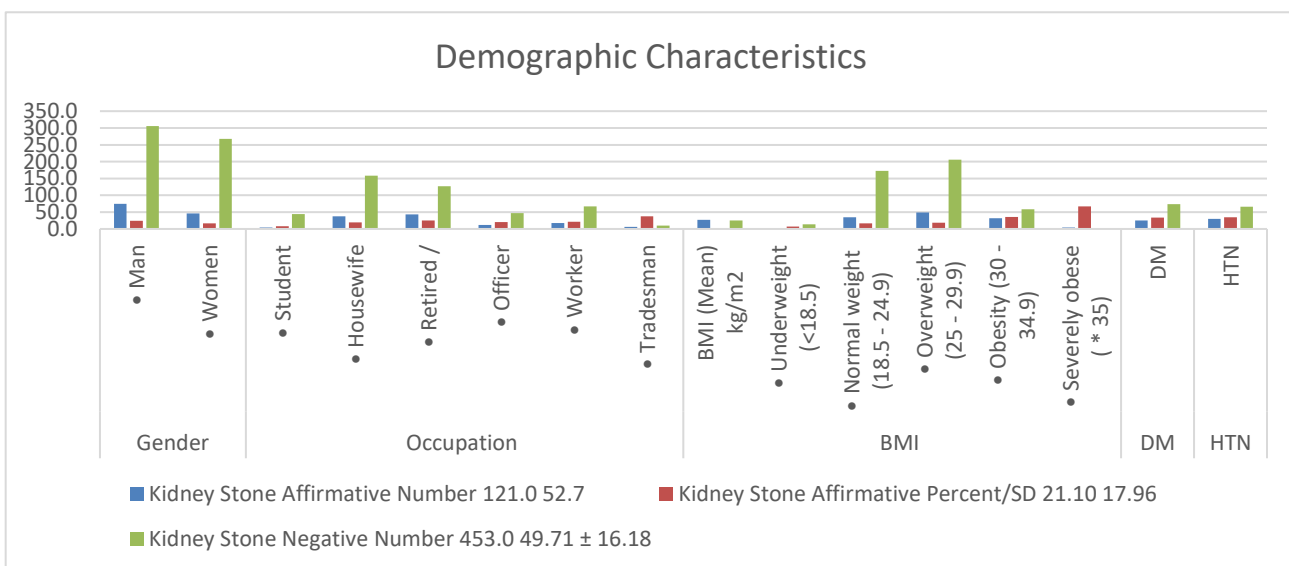
RESULTS:

Five hundred and seventy-four patients were the part of this research work in which 53.3% (n: 306) were male & 46.70% (n: 268) were female patients. The average age of the patients was 50.34 ± 16.6 . Out of total patients, 13.0% (n: 75) were available with diabetes mellitus whereas 16.70% (n: 96) found with hypertension. The mean value of body mass index was 25.740 ± 4.460 . Ultrasound assessment found that 21.10% (n: 121) patients were available with urinary stones, but 78.90% (n: 453) patients available with no stone in their urinary system. The mean CSD scores for the patients with the presence of urinary stones was 9.31 ± 6.42 millimeter, whereas the mean surface area was about 62.02 ± 109.19 -millimeter square. We found a small association between the stone availability and sex of the patient. We found no association between profession and stone availability. Thirty out of one hundred and twenty patients of kidney stones found with hypertension whereas there were sixty-six patients had hypertension among 574. We found no correlation between CSD & SA with hypertension.

There was no association between diabetes mellitus & body mass index and CSD & SA. Table-1 is providing the information of demography of the patients.

Table-I: Patient Demographics.

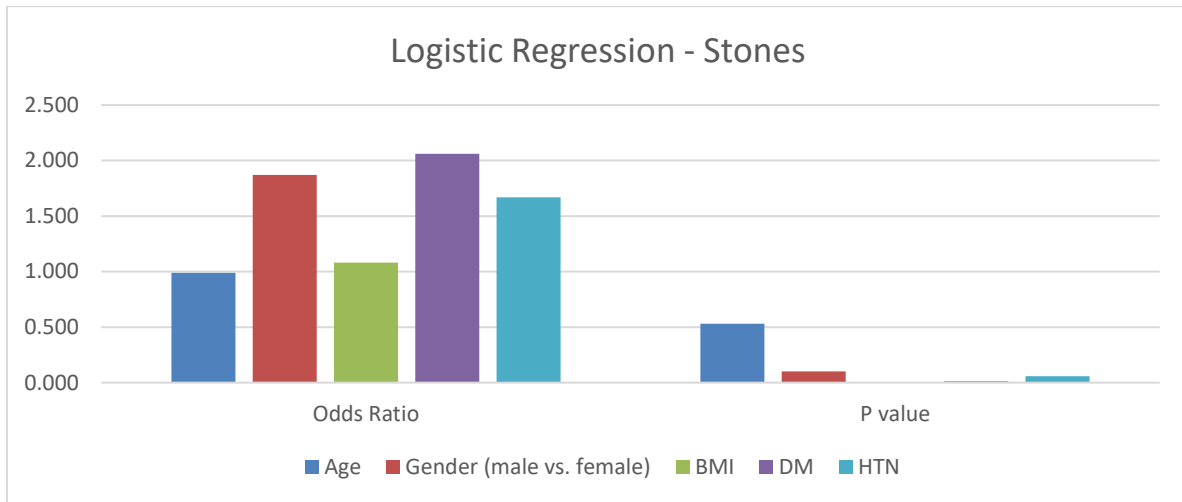
Variable		Kidney Stone			P. Value
		Affirmative		Negative	
		Number	Percent/SD	Number	
	No. patients	121.0	21.10	453.0	
Age	Mean age \pm SD (years)	52.7	17.96	49.71 \pm 16.18	0.1090
Gender	• Man	75.0	24.50	306.0	0.0310
	• Women	46.0	17.10	268.0	
Occupation	• Student	4.0	8.30	44.0	0.0630
	• Housewife	38.0	19.40	158.0	
	• Retired /	43.0	25.30	127.0	
	• Officer	12.0	20.30	47.0	
	• Worker	18.0	21.20	67.0	
	• Tradesman	6.0	37.50	10.0	
	BMI	BMI (Mean) kg/m ²	27.2		
	• Underweight (<18.5)	1.0	7.00	14.0	
	• Normal weight (18.5 - 24.9)	35.0	17.00	173.0	
	• Overweight (25 - 29.9)	49.0	19.00	206.0	
	• Obesity (30 - 34.9)	32.0	36.00	58.0	
	• Severely obese (* 35)	4.0	67.00	2.0	
Diabetes Mellitus	DM	25.0	34.00	74.0	0.0040
Hypertension	HTN	30.0	35.00	66.0	0.0070



In accordance with analysis of logistic regression to assess the independent predictors for availability of the urinary stones, diabetes mellitus & body mass index was available to enhance the risk of the formation of urinary stones (Table-2).

Table-II: Prevalence of Stones According to Logistic Regression.

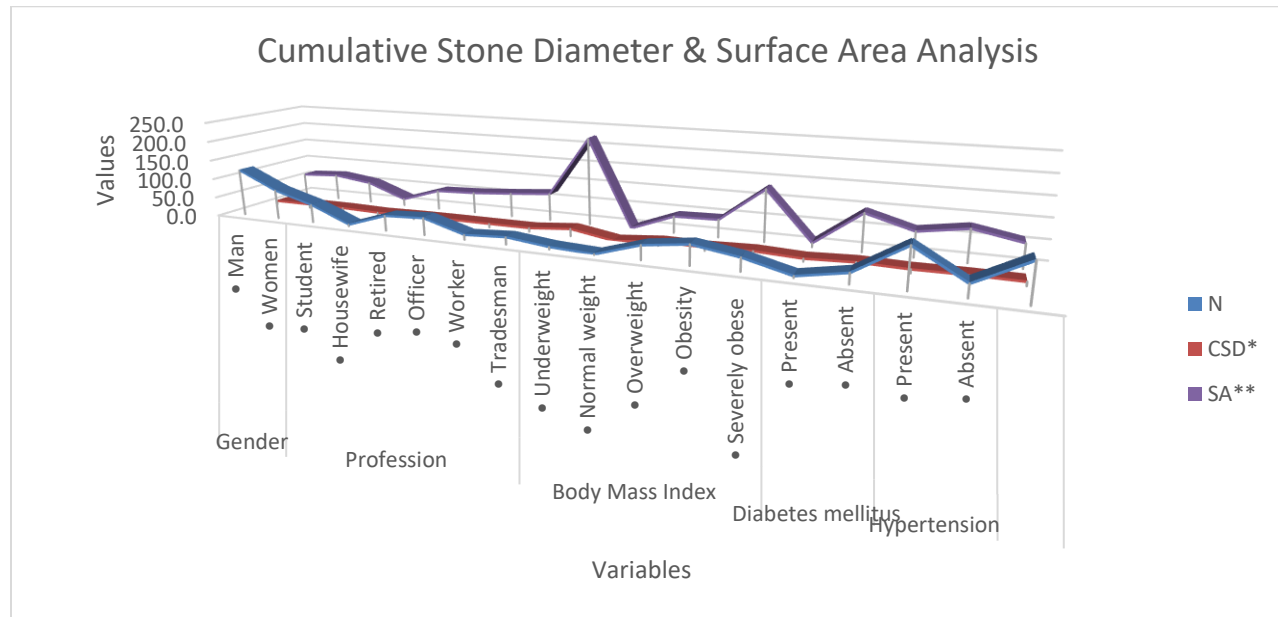
Risk Factors	Odds Ratio	95% CI	P value
Age	0.990	0.990-1.010	0.532
Gender (male vs. female)	1.870	0.890-3.930	0.100
BMI	1.080	1.030-1.130	0.003
DM	2.060	1.170-3.630	0.013
HTN	1.670	0.980-2.840	0.059



We found an important disparity between patients with the availability of stones or without kidney stones regarding categorical body mass index. The results of CSD & SA are available in Table-3.

Table-III: Cumulative Stone Diameter (CSD) and Stone Surface Area (SA) Results.

Variable	N	CSD	P value	SA	P value
No. patients	121.0	9.310 ± 6.420	0.580	62.020 ± 109.190	0.690
Gender					
	• Man	75.0	9.390 ± 0.700	68.110 ± 13.960	
	• Women	46.0	9.170 ± 1.030	54.720 ± 12.860	
Profession	• Student	4.0	6.750 ± 1.430	17.00 ± 4.910	0.480
	• Housewife	38.0	8.610 ± 0.740	49.890 ± 10.960	
	• Retired	43.0	9.140 ± 0.670	53.840 ± 9.050	
	• Officer	12.0	8.920 ± 2.270	61.670 ± 40.230	
	• Worker	18.0	9.060 ± 1.430	70.390 ± 26.630	
	• Tradesman	6.0	18.170 ± 7.040	223.170 ± 130.260	
	Body Mass Index	• Underweight	1.0	-	
• Normal weight		35.0	9.240 ± 1.300	41.790 ± 13.670	
• Overweight		49.0	8.410 ± 0.660	44.540 ± 10.280	
• Obesity		32.0	11.640 ± 1.410	130.110 ± 31.530	
• Severely obese		4.0	6.750 ± 0.750	9.240 ± 1.300	
Diabetes mellitus	• Present	25.0	11.320 ± 6.900	93.040 ± 12.290	0.080
	• Absent	96.0	8.780 ± 6.20	60.930 ± 11.790	
Hypertension	• Present	30.0	9.930 ± 1.200	78.830 ± 25.840	0.340
	• Absent	91.0	9.100 ± 0.660	57.800 ± 10.120	



DISCUSSION:

There is a high occurrence of urinary stones in recent years. The field is developing day by day because of the propensity of this disease to cause high rate of morbidity and very expensive treatment. Most important risk factors for the formation of the urinary stones are age, sex, ethnic group, and history of family, hypercalciuria, pH of urine, hyperoxaluria & hypocitraturia [12, 13]. The eating habits, obesity & change life styles are the main reason behind the occurrence of urinary stones [2, 9] different works have stated that diabetes mellitus, MS (metabolic syndrome) & fatness enhance the risk of the diseases of kidney stones [7, 14]. MS is very vital issue of health affecting 20% to 30% people [8]. Metabolic syndrome is the cause of more formation of the stones of uric acid, but current works have showed that it has the ability to enhance the risk of the stones made up of calcium [8, 15]. The association of the components of metabolic syndrome, DM, HT & fatness to urinary stone formation which was the outcome of much past research works [7, 12, 14, 16-19].

Morgagni for the very first time in 1761 described the association of HT & urinary stones [17]. Madore in a research work concluded that the danger of developing hypertension increased after the urinary stones [20]. Capuccio concluded in eight-year analysis that the risk of disease of urinary stones is much high in the patients of hypertension [17]. A research work with huge population comparing the traits of MS with the severity of the diseases of kidney stones, team concluded that hypertension has an association with the severity of the diseases of kidney stones [21]. The result of current research

work was not similar with that work in this matter.

DM is very common disease which can cause different complications of the urinary system. Recent research works have displayed a strong association between urinary stones and diabetes [14, 16, 19]. Meydan also concluded no association between diabetes and stones [19]. A transverse research work showed the association between diabetes mellitus severity & kidney stones [14]. It was the conclusion of the past research works that high BMI has an association with the high prevalence of the CVD (Cardiovascular Diseases) [22]. Taylor concluded that occurrence of the diseases of urinary stones has a relation with the body mass index and weight [23]. In this research study, there was no association of BMI with the formation of the urinary stones. Retrospective nature of this research work is a limitation of this work. Self reported height, weight & BP was in use. The study conducted on the patients who visited the urology department, the result can be different in the different populations.

CONCLUSION:

The results of this research work conclude that there may be contribution of the diabetes mellitus, hypertension and body mass index to increase the risk of the formation of the urinary stones but these factors found with no effect on stone burden.

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