

Do weather parameters affect the incidence of renal colic in a predominantly warm country? A multicenter study.

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Introduction & Objectives

Most studies reporting on weather factors influencing the incidence on renal colic events described a link between increased ambient temperatures and renal colic events, but there have been mixed reports on the effect of other weather associated factors. Our objective was to investigate multiple weather parameters effecting emergency room admissions due to renal colic in the subtropical weather of Israel.

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Methods

A retrospective, multi-center study, based on all ER admissions related to renal colic Israel between 2010 - 2017. The variables collected included the date of ER visits, age, gender and weather features, including ambient temperature, wind, noon heat index and barometric pressure. Multivariable logistic regression analyses were performed to ascertain predictors of increased ER visits due to renal colic.

Results

85,501 emergency room visits were recorded in the study period. Males represented 74% (62,935) of all ER visits, while 26% (22,566) were females (p<0.005). The mean age of males and females was 50 years old (SD 55.8), and 48 years old (SD 19.6), respectively (p=0.1). The age group of 31-50 years old (37%, 31,508) was the most affected in both males and females. On multivariable analysis we report on a yearly increase, during the summer months, of in ER visits due to renal colic 6.9%. Summer maximal ambient temperature, lower heat index, precipitation, increased wind velocity had all a significant linear effect on ER visits due to renal colic events.

Conclusions

Higher temperature during the summer months was significantly associated with increased occurrence of renal colic events. Conditions that increase the evaporation of sweat including decreased heat index (low humidity) and increased wind velocity were found to strongly correlate with renal colic events, most probably due increased sweat evaporation leading to dehydration.

ER visits and average meteorological seasonal changes in three distinct between 2010-2017 :

Variables	Season	Central Israel	Eastern Israel	Northern Israel
Emergency room visits: n (%)	Winter	8,528 (21)	3,773 (21)	5,547 (20)
	Spring	9,295 (23)	4,227 (23)	6,255 (23)
	Summer	11,433 (28)	5,089 (28)	7,843 (29)
	Autumn	10,956 (28)	4,902 (28)	7,653 (28)
Maximum Temperature: Celsius mean (SD)	Winter	20.2 (3.6)	21.4 (4.8)	17.1 (3.3)
	Spring	25.8 (4.6)	25.8 (5.2)	23.0 (4.9)
	Summer	31.8 (1.9)	30.5 (3.9)	28.8 (2.2)
	Autumn	29.1 (3.9)	29.0 (4.1)	26.1 (3.6)
Minimum Temperature: Celsius mean (SD)	Winter	8.9 (3.1)	10.4 (4.9)	10.8 (2.8)
	Spring	14.3 (3.6)	14.6 (4.3)	14.8 (3.3)
	Summer	22.8 (2.1)	21.1 (4.5)	22.6 (1.9)
	Autumn	18.4 (4.1)	18.3 (4.4)	19.3 (3.4)
Heat Index: mean maximum (SD)	Winter	20.5 (4.6)	23.0 (8.9)	17.1 (3.4)
	Spring	29.9 (11.5)	30.9 (13.1)	24.3 (8.0)
	Summer	46.1 (7.6)	43.0 (11.2)	37.3 (7.9)
	Autumn	37.1 (9.9)	37.8 (11.3)	30.1 (8.7)
Wind speed in knots (SD)	Winter	4.4 (2.1)	4.6 (1.9)	1.8 (1.8)
	Spring	4.9 (1.4)	5.0 (1.4)	2.1 (2.0)
	Summer	4.5 (0.75)	4.7 (1.0)	2.1 (2.4)
	Autumn	4.4 (1.0)	4.5 (1.2)	1.5 (1.7)
Precipitation in mm (SD)	Winter	3.2 (9.2)	3.2 (9.9)	4.1 (10.4)
	Spring	0.6 (3.3)	0.8 (3.9)	0.8 (3.7)
	Summer	0.003 (0.5)	0.4 (3.5)	0.002 (0.05)
	Autumn	0.9 (4.5)	1.2 (5.1)	1.1 (5.3)
Barometric pressure mean in mbar (SD)	Winter	1015.8 (4.1)	1014.7 (4.7)	911.9 (4.0)
	Spring	1011.5 (3.3)	1011.3 (4.0)	909.3 (2.7)
	Summer	1005.4 (2.4)	1006.7 (3.9)	906.0 (1.9)
	Autumn	1011.0 (3.1)	1010.5 (3.5)	910.5 (2.5)

Multivariable Logistic regression models predicting ER visits during the summer months :

	OR	95% CI	P value
Year	1.069	1.059-1.079	<0.0001
Gender (male)	0.973	0.932-1.017	0.2
Age (years)	1.000	1.000-1.000	0.8
Maximum Temperature (Celsius)	2.213	2.148-2.279	<0.0001
Heat Index	0.880	0.872-0.887	<0.0001
Precipitation (mm)	0.057	0.037-0.086	<0.0001
Wind velocity (Knots)	1.165	1.149-1.182	<0.0001
Location: (compared to the center) Easter region Northern region	2.571 3.934	2.432-2.718 3.707-4.175	<0.0001 <0.0001

ER visits and mean maximum monthly temperatures between 2010-2017:

