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Some Temperature-Mortality Relationships to the "Warm Season" in Chisinau

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Abstract

The paper presents results from the statistical description of total daily mortality dependence on ambient air temperature in the Chisinau municipality. Total daily deaths, taken from death certificates, characterize mortality in the period of April 1 to September 30 for the years 2000-2008. Mean (Tmean), maximal (Tmax) and minimal (Tmin) temperatures were used as independent variables. The extremely hot "warm season" of 2007 was excluded from the study. Pertinent statistical procedures were used to describe the statistical dependencies. The thermal optimum (minimal mortality temperature, MMT) was defined as a 2°C temperature band. It was shown that minimal daily mortality was observed at Tmean about 22^{0}C. In the first half of the period, each 1°C increase of Tmean is accompanied by a 1.43%-decrease in daily mortality. Analogous analysis for Tmax and Tmin identified corresponding MMTs as 27-28°C and 17-18°C, and decreases in deaths as 1.41% and 1.47%, respectively. In August-September, air temperature decrease determines, depending on the temperature variable used, between 19.3% and 23.9% of total mortality, and each 1°C decrease of Tmean, Tmax and Tmin causes respectively 0.64%, 0.61% and 0.80% increase of mortality.

Key words: mortality, time factors, air, temperature, global warming.

Взаимозависимость между температурой воздуха и смертностью в Кишинёве

В статье представлена статистическая зависимость ежедневной общей смертности от температуры атмосферного воздуха в Кишиневе. Ежедневная общая смертность характеризует период с 1 апреля по 30 сентября 2000-2008 годов. В качестве независимых переменных использованы средняя (Tmean), максимальная (Tmax) и минимальная (Tmin) температуры. Экстремально теплый период 2007 года исключен из обработки. В работе использованы соответствующие целям методы статистической обработки. Определен термальный оптимум, т.е. температура, при которой отмечается минимальная смертность (ТМС). Выявлено, что минимальная ежедневная смертность (15,2 смертей) отмечается при Tmean равной 22°С. В первой половине теплого периода каждый градус увеличения Tmean сопровождается снижением ежедневной смертности на 1,43%. Аналогичные расчеты для Tmax и Tmin идентифицировали соответствующие значения ТМС равные 27-28°С и 17-18°С и снижение количества смертей на 1,41% и 1,47% на каждый градус увеличения температуры. В августе-сентябре снижение температуры воздуха обусловливает, в зависимости от использованной переменной, снижение общей смертности от 19,3 до 23,9%, а каждый градус снижения Tmean, Tmax и Tmin сопровождается 0,64%, 0,61% и 0,80% приростом суточной смертности, соответственно.

Ключевые слова: смертность, временные факторы, воздух, температура, глобальное потепление.

Introduction

It is well known that mortality incidence rates are dependent on ambient temperature, and have long been associated with the effects of both heat and cold. In the last few decades, research by epidemiologists and climatologists regarding this issue has grown rapidly, driven by anthropogenic global warming, especially after heat waves in Europe in 2003 left a dramatic death toll in many western European countries and were considered as 'a shape of things to come' (Beniston 2004).

The effect of high temperature on mortality is well studied and documented. It is enough to only name some recent works (Basu et al. 2008; Carson et al. 2006; Confalonieri et al. 2007; Hajat et al. 2006; Gosling et al. 2007, 2009; Jendritzky and de Dear 2009; Laaidi et al. 2006; Matthies et al. 2008; Menne et al. 2008; Schär et al. 2004). In these, and other research analyses, a *J*- or *U*-shaped relationship was identified between daily temperature and mortality, with several associated critical points or threshold temperature values reported. Two main approaches have been widely applied to solve the task: (1) the time-series epidemiological analysis of long-term dependence of population-level mortality on temperature as well as on other meteorological, environmental and social confounding factors (e.g. Basu et al, 2005; 2008) and (2) the heat-episode analysis (e.g. Kyselý and Kříž 2008). While analysis of isolated heat waves provides a useful insight into the short-term response of populations to these events, the time-series analysis examines a temperature–mortality association over a long time period, thus enabling the investigation and quantification of not only a general temperature-related mortality but also various additional risk factors.

Air temperature is usually expressed in terms of its mean, maximum or minimum values, as well as the composite indices such as apparent temperature (AT), which takes into account humidity conditions (Steadman 1984). For specific aims, the biometeorological indices, for example the Universal Thermal Climate Index (UTCI), are being developed (Jendritsky and de Dear 2009) and used as exposure variables for modeling the effects on mortality and morbidity. It was also noted by Gosling et al. (2009a) that very little attention is paid to the explicit role of a diurnal temperature range (DTR).

This paper presents a part of the comprehensive analysis of heat impacts on human health carried out in the framework of climatological and epidemiological justification of the development of a Heat Health Warning System (HHWS) in Moldova. The research, as a corresponding project, was triggered by: the general drying of Moldova's climate, the record drought and heat waves the country experienced in 2007, as well as the nearly complete lack of national biometeorological research in recent times. Without overstatement, the above mentioned project is the first modern study of the Moldovan population's mortality dependences on air temperature. Being the first in the series of subsequent publications, this paper is targeted away from understanding the various mortality risk factors and towards a description of relationships between different air temperature variables and the total incidence of mortality. In other words, the research involves explaining mortality as a health outcome measure based upon air temperature (considered as a predictor) and potentially confounding variables, e.g. season. In such types of analysis, a research time unit is usually one day (Gosling et al, 2009a).

Materials and methods

Initial data

Proceeding from the goal of the research on the whole – *scientific support of heat health early warning* – the air temperature exposure was examined only during a warm season, rather than considering a full year, or limiting data to only periods of extremely high temperatures. The study period included a six month period (April 1 to September 30) for the eight years between 2000 and 2008, with that of 2007 excluded.

Daily mortality data comprised total daily counts of deaths from all causes in the resident populations of the municipality of Chisinau. This information was retrieved from the National Center of Management in Health database. The data heavily represent both urban and rural populations. As of January 1, 2009, from among 785.400 residents of the municipality 716.920 (91.3%) resided in the city itself and 68.500 (8.7%) resided in suburban areas. On the whole, the study encompasses about a quarter of Moldova's population, including about one half of the urban population.

Daily meteorological data were taken from the site of the Word Data Center: http://cliware.meteo.ru/inter/data.html. The daily values were calculated as the average of eight 3-h measurements.

The chosen period is assumed to be long enough for statistical processing and does not include a significant long-term trend in air temperature (Tab. 1). Moreover, because the idea of the research was to find the shape of relationships between air temperature and mortality for 'typical' years and to escape a bias in the results caused by extremely hot years, the warm period of 2007 (when extremely intensive heat waves were recorded) was excluded from the analysis. This year is considered separately, as a heat-episode analysis that deserves a special publication.

Table 1

Mean air temperature and aggregated daily deaths in April-September in Chisinau, 2000-2008

	Years								
	2000	2001	2002	2003	2004	2005	2006	2007	2008
Air temperature	18.5	18.1	18.5	18.4	17.3	18.2	18.0	19.9	18.2
Mortality counts	2802	2748	2966	2939	2880	3115	2978	3108	3117

To identify temperature-mortality relationships, both dependent (death incidents) and independent (temperature characteristics) daily variables were averaged across the entire sample (period of 2000-2008, without the year 2007)[1]. Such averaging smoothed the possible long-term trends and year-

1 Hereafter, the sake of simplicity, in all descriptions of the 2000-2008 period it is implied that year 2007 is omitted.

to-year variability in data. Combining the observations also reduces randomness by allowing the positive and negative random effects to partially offset each other.

Because mortality has an inherent seasonal cycle that can bias interpretation of the weather impacts, the mortality data are usually "de-seasoned" by different methods (Carson et al. 2006; Davis et al. 2004; Gosling et al., 2007; Najat et al. 2006; Pascal et al. 2006). In our study the Simple Moving Average procedure was used to choose the optimal degree of smoothing (length of the moving average) and thereby avoiding an over-smoothing that can result in removing some informative long-term and seasonal patterns from initial data. Concurrently, to account for seasonality, a simple regression analysis of daily mortality on the day of a year was used.

Since the main task of this work was to test methodical approaches allowing the adequate description of real temperature-mortality relationships, the different forms of regression analysis have served as a reliable research tool. However, such a straightforward approach sometimes has a serious limitation: it shows dependence of mortality on temperature irrespective of which part of the regression curve this dependence is estimated. Is a change in daily deaths the same when temperature increases to its optimal value, or decreases after this point? The left and right slopes of the U-like curve represent, symbolically speaking, the 'cold' and 'hot' risks of temperature change; the possible differences in these risks undoubtedly need to be accounted for. Thus, given that temperature–mortality relationships are a U- or J-like curve, the important moment in any epidemiological research is to find the breakpoint where mortality stops decreasing during its transition from the cold to *optimum temperature values* and starts to increase later. This *thermal optimum* (Laadi et al. 2006) corresponds to the average temperature with the lowest mortality level. Some works, e.g. Vigotti et al. (2006), use the term 'minimum mortality temperature' (MMT) to describe this point. As far back as the 1990s, the Europe-wide Eurosummer project (Keatinge et al. 2000) had revealed the existence of a relatively narrow temperature band in which mortality is lowest. This band varies substantially within the European continent, as well as in the U.S. and other countries (e.g. Donaldson et al. 2003).

Different methods are used to identify the thermal optimum (Donaldson et al. 2003; Gosling et al. 2007; Laaidi et al 2006). In our research, the "narrow-band approach" has proved itself to be the best identifier of thermal optimums and excess death thresholds in heat-event studies. We grouped daily deaths into 2°C temperature class intervals with 0.01°C increments. Such intervals smooth the high variability in daily mortality sometimes evident at higher temperatures (Gosling et al. 2007); the selected increment also allowed us to completely preserve initial information, attributing it to the center of an interval, expressed in integer Celsius degrees. It was also decided to directly examine the long-term temperature–mortality dependences for MMT identification. As it will be shown below, the results are encouraging.

Table 2

Descriptive statistic of monthly averages of total daily mortality in Chisinau, 2000-2008 years

Month	Tmean, °C	Death counts								
		Sum	Average	Sd	CV, %	Min	Max	Range	Skewness	Kurtosis
April	10.8	536	17.9±0.28	1.69	9.4	14.5	20.5	6.0	-0.08	-1.11
May	16.8	517	16.7±0.27	1.76	10.5	13.1	20.5	7.4	-0.09	-0.43
June	19.8	480	16.0±0.28	1.64	10.2	12.8	18.8	6.0	-0.95	-0.60
July	22.6	462	14.9±0.27	1.15	7.7	11.6	16.5	4.9	-1.71	0.63
August	22.4	475	15.3±0.27	1.40	9.2	12.2	18.2	6.0	-0.66	-0.71
September	16.2	475	15.8±0.28	1.44	9.1	13.1	19.4	6.3	1.10	0.23
Period	16.1	2946	16.1±0.26	1.79	11.1	11.6	20.5	8.9	1.53	-0.35

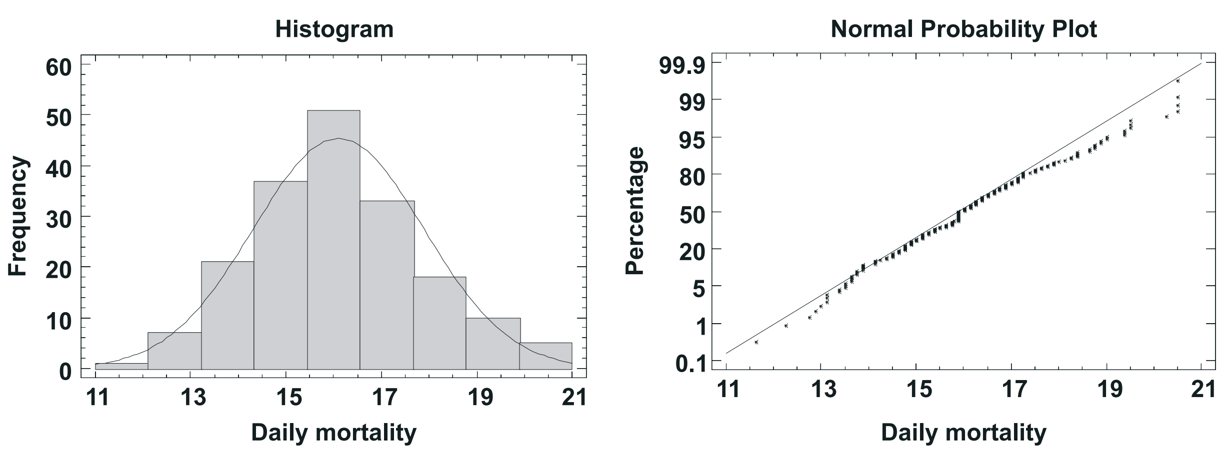

Fig. 1. Normal distribution fitting of daily mortality in Chisinau in warm periods, 2000-2008.

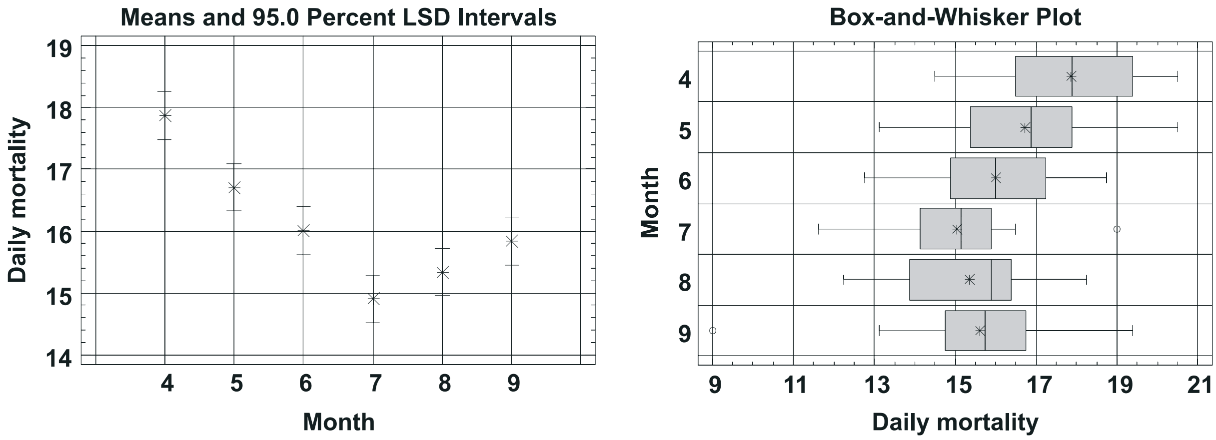

Fig. 2. Mean and Box-and-Whisker Plots* of daily deaths in warm period in Chisinau.

* The Box-and-Whisker Plot divides data into four equal areas of frequency. The central boxes cover the middle 50% of the mortality, the box's sides are lower and upper 25% quartiles, the vertical line – the median, and the whiskers – the range. The means and outliers are marked as a single point (+ and ±, respectively).

All statistical computations were performed using the *StatGraphics Centurion Data Analysis and Statistical Software* (Statgraphics 2009).

Results and discussion

Descriptive statistics of mortality

Reference or basic averaged mortality in 2000-2008 is shown in Table 2. Minimal mortality (15 deaths a day) was registered in July (the warmest month in Chisinau), while maximum mortality (about 18 deaths a day) was found in April. Thus, the range of monthly averages was only 3 deaths; while the range of their year-to-year variation is twice more than that – 6-7 deaths. Coefficient of correlation (CV), derived as the percentage ratio of standard deviation *(Sd)* to the average value, amounted to 9-10%. The standardized skewness and kurtosis of monthly deaths are within the range of -2 to + 2, thereby indicating the normal distribution of monthly death averages. A reliable normal distribution fitting is observed for daily deaths during warm periods on the whole (Fig. 1).

To identify the statistically grounded differences among monthly averaged deaths, or the presence of seasonality in daily mortality, the One-Way Analysis of Variance (ANOVA) statistical tool was applied. Fig. 2 demonstrates two outputs of ANOVA.

Means plot shows monthly death averages and Fisher's Least Significance Differences (LSD) intervals (Statgraphics 2009). The overlapping of intervals signifies that two means are the same with 95.0% confidence. In our case, the death means in April are statistically different from all other months, in May – from all months except June, in June – from July. All other combinations of monthly deaths show no significant differences between them. Both plots clearly demonstrate a seasonal course in mortality.

Daily mortality smoothing and approximation

Fig. 3a demonstrates the scatterplot of daily mortality averaged for the whole period. One can see that seasonality in data is evident and well approximated by the 2nd order polynomial. Coefficient of determination *(R^2)* shows that 30.7% of daily mortality depends directly on the day of a year. This dependence is described by the equation:

$Md = 26.47 - 0.108*Day + 0.00026*Day^2$; $R^2 = 30.72$; $p = 0.000$, (1)

where *Md* – daily total deaths, *Day* – day of the beginning of year (Julian day).

Thus, we can state that in the warm period, starting from April 1, with each consecutive day the mortality is increasing up to a moment when the quadratic term of Eq.1 will exceed the first term. Let us presuppose that in this moment the thermal optimum is observed. The polynomial curve can also be considered as a hypothetical seasonal course of daily mortality with unlimited lengthening of the period of observations or the period of smoothing.

Table 4

Dependence of daily mortality statistics (deaths number) on the degree of smoothing

Statistics	Length of simple mowing average, days				Polynomial
	0	3	7	31	
Count, day	183	181	177	153	183
Average	16.1	16.1	16.1	15.9	16.1
Sd	1.79	1.35	1.16	0.76	0.99
Minimum	11.6	13.2	14.3	14.9	15.2
Maximum	20.5	19.5	19.2	17.8	18.8
Range	8.9	6.3	4.9	2.9	3.6
Sum	2946	2900	2830	2418	2946

Really, this assumption is well demonstrated in Fig. 3b, where daily mortality is smoothed using simple moving averages of different lengths. With increasing the moving period from zero to 31 days, the corresponding plots approach the polynomial approximation. Simultaneously, we observed

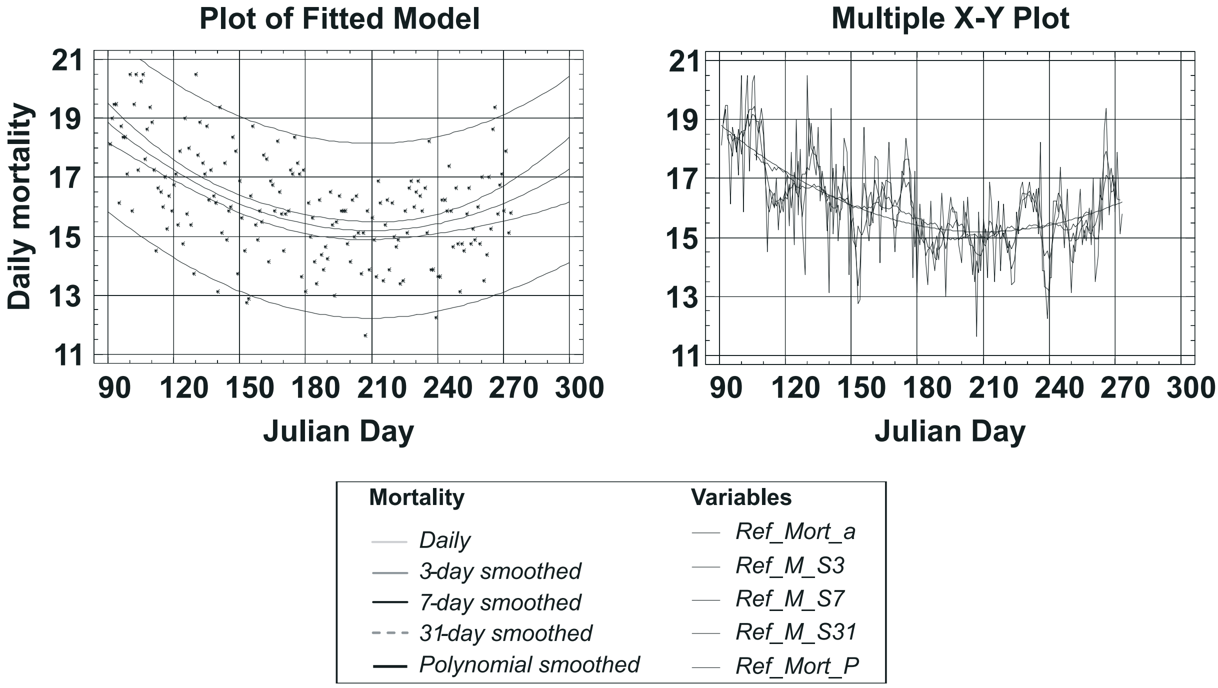

Fig. 3. Scatter plot of warm periods' daily mortality in Chisinau (2000-2008), approximated by 2nd order polynomial (*left*) and simple moving averages of different lengths (*right*).

gradual decreases in variances, expressed as standard deviation *(Sd),* and ranges of smoothed averages (Tab. 4). However, while information in this table is a good illustration of the reliability and power of the smoothing procedure, it can hardly be used for selection of the best period of averaging. For example, the 31-day moving average results undoubtedly in over-smoothing and moreover – in loss of information at borders of the deaths record. A comprehensive addressing of this discourse is possible only in the framework of a direct temperature-mortality relationship investigation.

Dependence of daily mortality on mean temperature

Based on the above-shown dependency of death counts on each day of the year, we can presuppose that this evidence is caused, along with other weather factors, by the seasonal course of air temperature. Really, in warm periods the dynamic of mean air temperature is also very well approximated by the 2nd order parabolic curve (Fig. 4) that can be described by an equation:

$Tmean = 32.06 + 0.55*Day-0.0014*Day^2$; $R^2 = 92.04$, $p = 0.000$ (2)

where *Tmean* – daily mean temperature*; Day* – Julian Day.

The inverse arches of the temperature curve against the concave one for daily mortality (Fig. 3) presuppose negative correlations between air temperature and mortality. Table 4 presents the results of a simple regression analysis of daily mortality vs. daily temperature where both linear and polynomial models were used and calculated with different lengths of simple moving averaging of the initial data. All variants of associating the daily mortality with air temperature result in statistically significant models ($p < 0.001$) showing the

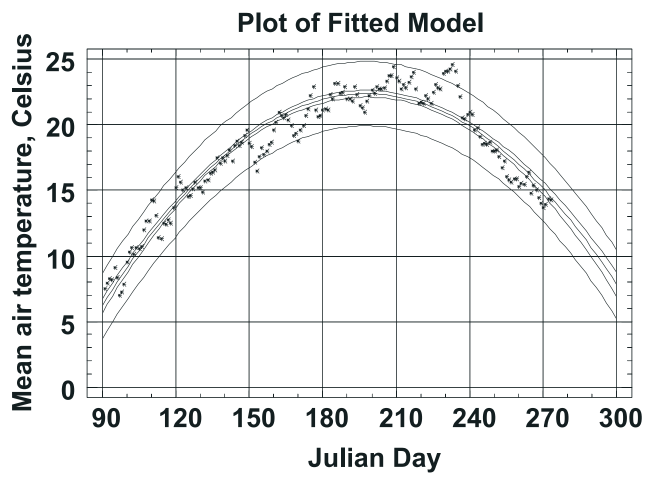

Fig. 4. Plot of the dependence of mean air temperature on Julian day in Chisinau.

increase of correlation and decrease of errors with extension of the smoothing period up to 31 days.

However, using the linear regressions to correlate the two curves (the upper part of Table 5) is not correct, and these models were applied with only one goal: to estimate roughly the response of mortality on a change in temperature. Really, all linear regressions, regardless of the level of smoothing, show very close values of the regression coefficient – about – 0.20 to – 0.21. This means that with average daily deaths of 16.1 during Chisinau's warm season, a 1°C change in mean daily temperature causes 1.2-1.3%-change in all-causes mortality. These figures are in the range of European estimations – between 0.7% and 3.6% (WHO, 2009).

The polynomial models (e.g. Fig. 5) demonstrate somewhat better, although with practically the same behavior,

Table 5

Summary of regression analyses of warm period daily mortality on mean air temperature for different lengths of smoothing

Period of smoothing, days	Parameters of regressions							
	Constant	Regression coefficients		r	r^2	p	Standard error, SE	Mean abs error, MA
		Tmean	*Tmean^2*					
Linear regression of reference mortality on mean T								
0	19.79	-0.203	-	-0.497	24.66	0.000	1.56	1.27
3	19.83	-0.205	-	-0.651	42.33	0.000	1.03	0.82
7	19.92	-0.210	-	-0.749	56.14	0.000	0.77	0.61
31	20.02	-0.215	-	-0.929	86.28	0.000	0.28	0.20
Polynomial regressions (2nd order) of reference mortality on mean T								
0	22.71	-0.581	0.011	-0.514	26.43	0.000	1.54	1.26
3	22.76	-0.580	0.011	-0.671	45.08	0.000	1.01	0.81
7	22.82	-0.575	0.011	-0.769	59.12	0.000	0.75	0.61
31	21.63	-0.401	0.005	-0.932	86.81	0.000	0.28	0.21

dependencies of daily mortality on temperature. Both for linear and polynomial models, the 7-day moving average (if we reject 31-day smoothing,) as seen as more preferable. This length is preferable not only due to higher correlation, but also because it represents the entire weekly cycle of mortality, including the working and week-end days. Some authors (e.g. Kyselý and Kim, 2009; Kyselý and Kříž, 2008) use a special correction coefficient to allow for this factor, calculated separately for Sunday, Monday and other working days and defined as a ratio of mean mortality (on a given day/days) to overall mean mortality. "Day of the week" was added to the model as an indicating variable by Basu et al. (2008). But we don't think that such details are necessary in the assessment of general dependencies of total mortality on air temperature.

Fig. 5 also demonstrates the unacceptability to estimate a temperature-mortality dependency as uniform for the whole warm period because such approach blurs over the already mentioned differences of the mortality response to a temperature increase at two slopes of the dependency curve.

As the first approximation, a thermal optimum could be found as the mean temperature (or another temperature variable) in the day when minimal mortality was observed. In Chisinau, if we follow the polynomial approximation (Fig. 3a), the mean daily mortality (15.2 deaths) is observed in the last week of July. In those days, the analogously approximated mean temperature reaches about 22^{0}C. These values were examined through the narrow-band approach. Observed death counts in 2^{0}C temperature intervals were smoothed by cubic splines (Fig. 6) that show the MMT equal to ~ 21.8^{0}C, with a minimal daily death count equal to 15.2. These figures are practically the same as those derived from the polynomial approximation.

Considering the MMT as a certain cut-point, we modeled the 7-day smoothed mortality *(Md_d)* decrease in the first half of a warming period. The good estimations gave

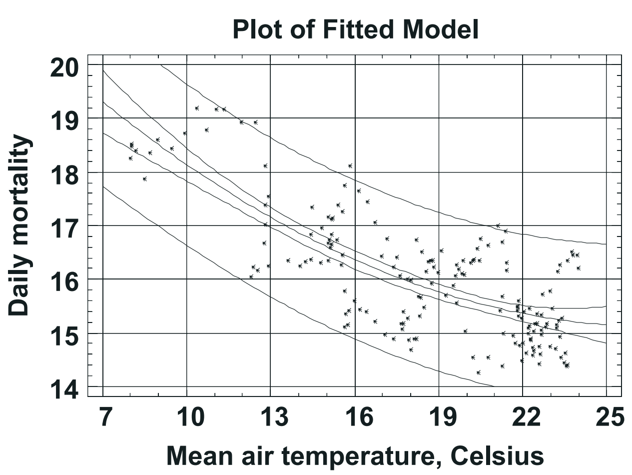

Fig. 5. 2d-order polynomial regression of daily mortality on mean temperature (both variables are smoothed by 7-days mooving averages).

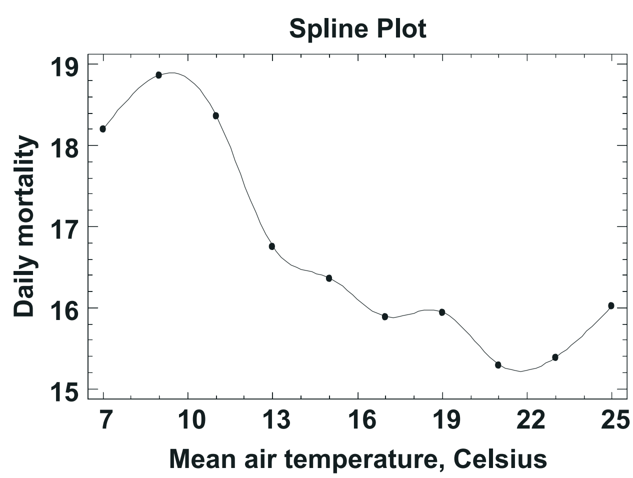

Fig.6. The third order spline of daily mortality grouped by 2°C class intervals of mean daily temperatures.

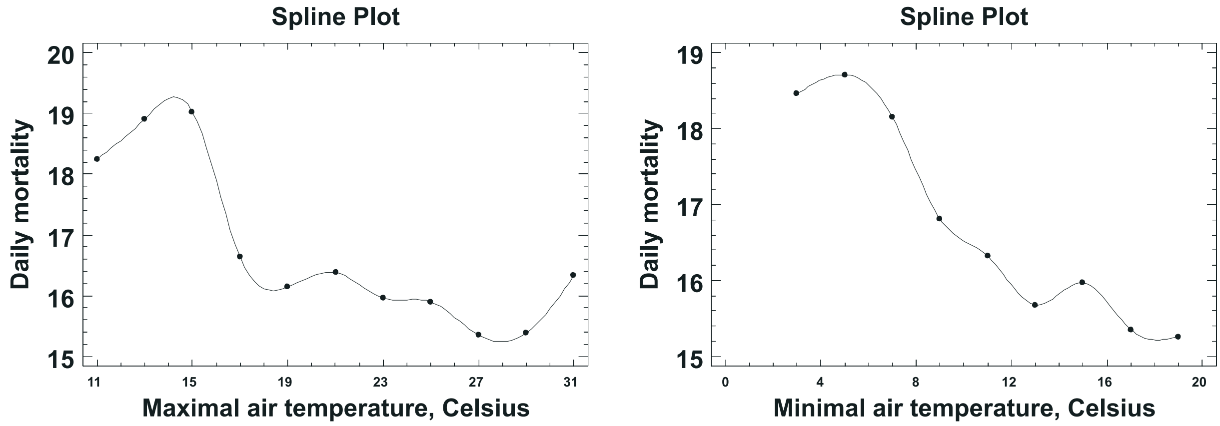

Fig. 7. The third order spline of daily mortality grouped by 2°C class intervals of maximal and minimal daily temperatures.

the simple linear model, described as the following equation (notation conventions as in Table 4):

Md_d = 20.51 - 0.236*Tmean; R^2 = 83.2%; p = 0.000; SE = 0.69, MA = 0.54 (3)

Here, both daily mortality and mean air temperatures are smoothed by 7-day moving averages.

Thus, the regression coefficient on the left slope of mortality-temperature dependency is somewhat more than that for the curve on the whole (– 0.236 vs. – 0.203). More importantly, this value is more reliable, and we can state with high confidence (p < 0.000) that April–July warming in Chisinau, for example by 4^0C, results in a decrease of total mortality by about one death per day.

As regards to the right, or increasing slope of mortality-temperature curve, the corresponding equation is:

Md_i = 14.12 + 0.100*Tmean; R^2 = 19.3%; p = 0.001; SE = 0.67, MA = 0.56 (4)

Although relationships between daily mortality (Md_i) and mean temperature on this part of the curve is weaker, the high statistical significance of the model allows us to state that a temperature conditioned increase in mortality in August-September is slower than the April-July decrease, amounting to one death per ten days.

Maximal and minimal temperatures as predictors of mortality

Due to high correlation among daily mean, maximal and minimal temperatures, it is not necessary to repeat-in-full the analysis afore described with regards to Tmax and Tmin; the narrow-band approach, which presents the most reliable and representative results, could be sufficient here.

Splines of daily mortality grouped by 2^0C class intervals of maximal and minimal temperatures and the overloaded 2-d orders polynomials are shown in Fig. 7. One can see that if we use Tmax and Tmean as MMT identifiers, the thermal optimums are about 28^0C and 18^0C respectively. These values, identified as temperatures corresponding to the day where mortality in Chisinau is minimal, are 27.6^0C and 17.4^0C. Thus, once again the practical adequacy of two approaches

Table 6

Simple linear regression models of 7-day moving averages of daily mortality on decreasing and increasing parts of their dependencies on analogously smoothed daily air temperatures

Part of the regression line	Parameters of regressions						
	Constant	Regression coefficient	r	r^2, %	p	Standard error	Mean abs error
Daily mean temperature							
Decreasing	20.52	-0.236	-0.832	69,2	0.000	0.69	0.54
Increasing	14.12	0.100	0.439	19,3	0.001	0.67	0.56
Daily maximal temperature							
Decreasing	21.69	-0.231	-0.833	69,3	0.000	0.69	0.54
Increasing	13.67	0.095	0.442	19,5	0.001	0.67	0.56
Daily minimal temperature							
Decreasing	19.46	-0.241	-0.828	68,6	0.000	0.70	0.56
Increasing	14.36	0.125	0.489	23,9	0.000	0.65	0.55

– the long-term mortality approximation and narrow-band grouping – was confirmed.

The main parameters of regression models of daily mortality vs. increasing temperatures are shown in Table 6. Obviously, all three variables are good predictors of a temperature-conditioned change in daily mortality in the two periods. Although simple linear regressions are not always the best models, they are used here for an easier physical interpretation, or quantification of mortality-temperature dependencies. Regression coefficients of these models are *per se* the sensitivity of mortality to ambient temperature exposure. Proceeding from the averaged daily deaths in Chisinau in April-July (about 16.4 deaths) and from the values of regression coefficients, it can be stated that each 1^0C increase of mean, maximal and minimal daily temperatures results in a 1.43, 1.41 and 1.47 percentage decrease in daily mortality, respectively. Likewise, in August-September (with a mean daily mortality of about 15.6 deaths), each 1^0C decrease of these temperatures results in a 0.64, 0.61 and 0.80 percentage increase in daily mortality, respectively.

However, we should note here that if on the "left" part of the curve the air temperature explains about 69% of variability in the decrease of daily deaths, then on the "right" part it is responsible for between 19.3% and 23.9%. The use of alternative curvilinear models can increase these values by 5-10%. Such low percentages can be partly explained by insufficient duration of the research period in this part of the warm season – only two months were examined. Undoubtedly, the study of a yearly cycle of daily mortality can present more representative estimations.

Conclusion

Statistical analyses of temperature-mortality dependencies in the warm period (April-September) allowed formulating the following principal conclusions:

1. The increase of ambient temperature from spring to summer months is followed by a certain decrease in human mortality, with its minimal values observed in July (14.9 ± 0.27 deaths a day). The transition from daily mortality decreases to the following daily increases is observed in late July–early August.

2. The course of daily mortality in a warm period smoothed by simple moving averages, as the length of the smoothing period increases, approaches convergence with the second order polynomial that can be used to identify the dates of minimal mortality.

3. Dependence of daily mortality on ambient temperature must be estimated independently for descending and ascending parts of the mortality–temperature curve. A narrow-band approach, based on the distribution of daily mortality in 2^0C temperature intervals with 0.01^0C increments, is a good identifier of the optimal temperature.

4. Due to high multicolinearity, the prognostic power of mean, maximal and minimal temperatures are practically adequate.

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Tratamentul ortopedo-medical în afecţiuni displazice lombosacrate la copii

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The Methods of Conservative Treatment in Children with Dysontogenetic Process at the Lumbosacral Region of the Spine

A modern understanding of degenerate-dystrophic changes in the backbone, as a dysontogenetic process phase, views them as a disease of the whole body. Consequently, for treatment and preventive maintenance of a clinical manifestation of pathological processes in the spine, a complex approach is required. The mechanism of vertebrogeneus and neuroreflex infringements should be considered as one pathological process. The possibility of such therapy, in our opinion, presents the combined prescription of manual therapy, antihomotoxical facilities and “Detenzor” therapies. Use complex antihomotoxical preparations as a basis of medication provides unique organ-tissue component treatment. On a medical basis, the treatment “Detenzor” provides effective physiological influences on a spine, improves its kinematics and corrects its functional position.

Key words: dysplastic affections, lumbosacral region, children, conservative treatment, recurrence.

Консервативное лечение детей с диспластическим процессом пояснично-крестцового отдела позвоночника

Современный взгляд на дегенеративно-дистрофические изменения в позвоночнике, как фаза диспластического процесса, позволяет рассматривать их как заболевание всего организма. Следовательно, к лечению и профилактике рецидивов клинических проявлений патологических процессов в позвоночнике требуется комплексный подход, при котором учитывался бы механизм вертеброгенных и нейрорефлекторных нарушений, а также состояние организма в целом. Лечение этой патологии, по нашему мнению, предусматривает сочетание назначения мануальной терапии, антигомотоксических средств и «detensor»-терапии. Использование комплексных антигомотоксических препаратов в качестве основы медикаментозной коррекции обеспечивает единый, органно-тканевой компонент лечения, реализуемый на уровне костно-мышечных и хрящевых структур позвоночника. Доказано, что терапия на лечебном мате «detensor» эффективна для мягкого физиологического тракционного воздействия на позвоночник, разгрузки его кинематической системы и придания ему оптимального функционального положения.

Ключевые слова: диспластические заболевания, пояснично-крестцовая область, дети, консервативное лечение, рецидив.

Actualitatea temei

Abordarea contemporană a schimbărilor degenerativ-distrofice, distinse drept o etapă a procesului displazic al coloanei vertebrale, permite a le considera drept o maladie a întregului organism. Respectiv, pentru tratamentul şi prevenirea recidivelor manifestărilor clinice ale proceselor patologice ale coloanei vertebrale, este necesară abordarea complexă, care va lua în consideraţie mecanismul dereglărilor vertebrogene şi neuroreflectorii, precum şi starea organismului în ansamblu. Posibilitatea aplicării unei astfel de terapii, la părerea noastră, permite combinarea indicării terapiei manuale, a preparatelor antihomotoxice şi terapia cu Detensor. Utilizarea preparatelor antihomotoxice complexe, în calitate de modulatori medicamentoşi de bază, asigură obţinerea unei componente organo - tisulare terapeutice unice, realizate la nivelul structurilor osoase, musculare şi cartilaginoase ale coloanei vertebrale. Eficacitatea terapeutică a saltelei Detensor este determinată de acţiunea sa lejer tracţională asupra coloanei vertebrale,