



**INFLUENCE OF SUNSHINE (IN HOURS) ON THE DEVELOPMENT  
OF STROKES AMONG THE POPULATION IN SOUTHERN  
KYRGYZSTAN**

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<b>ABSTRACT</b>	<b>KEYWORDS</b>
Acute cerebrovascular accidents (ACVA) occupy priority ranking positions in the structure of neurological pathologies. The differences and incidence of stroke may be due to climatic conditions that differ in different regions of Kyrgyzstan. The purpose of the study is to study the risk of developing cerebral stroke over 4 years under the influence of meteorological factors for the timely adoption of preventive measures.	Stroke, meteorological factors, sunshine, Kyrgyzstan

**Introduction**

Over the past decades, the unprecedented rate of global warming and climate change has been a source of concern. In recent years, climate change has been considered as one of the leading factors influencing public health and the formation of acute and chronic non-infectious diseases [1].

The occurrence of stroke is caused by a complex of factors, among which uncorrectable environmental factors occupy a large place. A generally accepted risk factor for the development of stroke is increased hemomagnetic activity and the influence of meteorological factors themselves.

As is known, meteorological factors also take an indirect and/or direct role in the formation of non-communicable diseases. But even on this issue there are no clear opinions of modern researchers [3, 2, 1].

**Material and Research Methods:**

Using the method of retrospective epidemiological analysis, medical records of patients hospitalized with a diagnosis of stroke in the hospital of a medical organization in Osh from 2016-2019 were analyzed. The study volume included 382 stroke patients. We conducted a study using data from meteorological factors of the Kyrgyz Hydrometeorological Center in Osh, such as sunshine for a 4-

year period from 2016-2019. When statistically processing the obtained data, methods of relative statistics, Microsoft Excel and Microsoft Access programs, Spearman's rank method, paired and unpaired Student's t tests, parametric Wilcoxon test, sign test and methods for comparing the specific weight of characteristics, as well as covariance-regression analysis, variance and logistic regression analysis with determination of B-coefficients and odds ratios, using the IBM Statistics computer program, correlation coefficients (r), connections between the studied characteristics and the critical value of Student's t-test were determined.

**The results of an analysis** to study the detection of strokes against the background of fluctuations in sunshine (SS) according to prospective clinical and meteorological observation data are presented on Table 1.

Table 1. The influence of sunshine on the development of strokes among the population in the south of Kyrgyzstan (1st line - in absolute numbers, 2nd - in %).

Duration of sunshine (in hours)	Prevalence of various forms														
	Ischemic stroke					Hemorrhagic stroke					General stroke				
	2016y	2017y	2018y	2019y	2016-2019	2016y	2017y	2018y	2019y	2016-2019	2016y	2017y	2018y	2019y	2016-2019y
9,2-10,4	34	14	33	8	89	10	6	15	3	34	44	20	48	11	123
	52,3	24,6	51,6	11,9	35,2	40,0	7,1	46,9	16,7	38,2	48,9	28,2	50,0	12,9	36,0
10,5-11,7	11	12	13	16	52	5	1	5	5	16	16	13	18	21	68
	16,9	21,1	20,3	23,9	20,6	20,0		15,6	27,8	18,0	17,8	18,3	18,8	24,7	19,9
11,8-13	4	15	4	12	35	4	0	5	3	12	8	15	9	15	47
	6,2	26,3	6,3	17,9	13,8	16,0	50,0	15,6	16,7	13,5	8,9	21,1	9,4	17,6	13,7
13,1-14,3	16	16	14	31	77	6	7	7	7	27	22	23	21	38	104
	24,6	28,1	21,9	46,3	30,4	24,0	100,0	21,9	38,9	30,3	24,4	32,4	21,9	44,7	3,-4
Bcero:	65	57	64	67	253	25	14	32	18	89	90	71	96	85	342
	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0
r(+/-)					0,257					0,196					0,239
Mp(+/-)					32,4%					39,5%					34,2%
t					0,375					0,283					0,349
P					0,771411					0,824206					0,786330

From the data obtained it follows that the frequency of detection of strokes begins to increase from the level of sunshine (SS) >9.2-10.4 hours, and in its levels from 2.6 to 9.2 hours - there was no such pattern, it was noted and therefore they were not included in the statistical analysis.

At different intervals of fluctuations in sunshine, general stroke is determined with the following frequency: at 9.2-10.4 hours - 36.0%, <10.5-11.7 hours - 19.9%, <11.8 - 13 hours - 13.7%, <13.1-14.3h-30.4%. This trend was observed in all years of observation except 2019, when, as the duration of SS increases, the frequency of detection of cerebral stroke during the year increases from 12.9% (with SS <9.2-10.4 hours) to 44.7 (with SS <13,1-14.3h), i.e. the detection of patients with general stroke increases by 31.8% or 2 times (p <0.01).

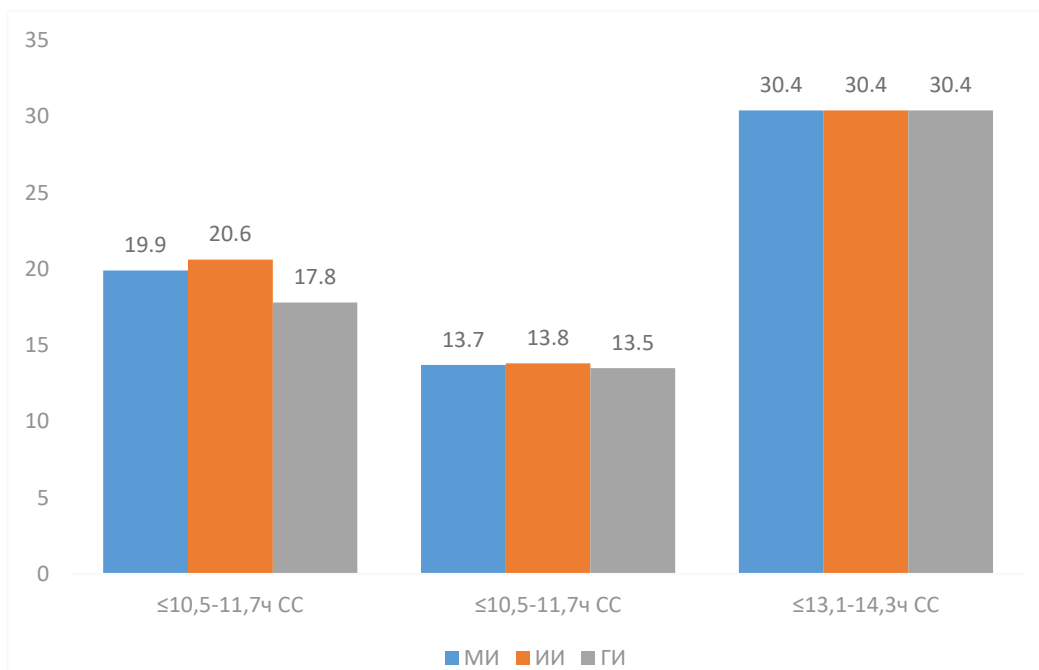
From this we can conclude that the frequency of cases of cerebral stroke detection has a direct correlation with the duration and fluctuations of sunshine throughout the year. Apparently, to approve this concept, even more lengthy research in this direction will be required.

It was confirmed that ischemic stroke, only in some years of observation (2019), under the influence of this meteorological factor increases from 11.9% (with SS <9.2-10.4 hours) to 30.4% (with SS <13.1- 14.3), by 18.5% or 2.7 times ( $p < 0.001$ ). During a 4-year observation, under the influence of sunlight, ischemic stroke is detected with the following prevalence: at levels of fluctuations in sunlight from 9.2- up to 10.4 hours-35.2%, at <10.5-11.7 hours-20.6%, at <11.8-13 hours-13.8% and at <13.1-14.3 hours-30, 14%.

Similar data were obtained for hemorrhagic stroke. The largest number of hemorrhagic strokes occurred during periods of sun exposure ranging from 9.2 to 10.4 hours. (38.2%) and 13.1-19.3 hours. (30.3%). A comparatively low frequency of GI is determined when the duration of sunshine is <10.5%-11.7 hours (17.8%) and 11.8-13 hours (13.5%). In general, it was revealed that there is a correlation or direct relationship between increasing fluctuations in the duration of sunshine and the number of hemorrhagic strokes in the climatic conditions of Osh.

Based on a statistical correlation-regression study of the development of strokes depending on fluctuations in sunshine in the south of Kyrgyzstan, the following was shown: the correlation coefficient ( $r$ ) is 0.239. The relationship between the characteristics under study - the direct strength of the connection on the Chaddock scale - is weak. The dependence of the signs is not statistically significant ( $p > 0.05$ ). The coefficient of determination  $rr$  is 0.057, the average error of approximation is 34.2%.

The presented bar graph-histogram (Fig. 1) shows that the population frequency of all forms of strokes turned out to be higher with prolonged exposure to sunshine than among individuals who did not have such exposure to this meteorological factor.



**Fig. 1. Development of strokes against the background of exposure and fluctuations in SS in the extreme continental climate of Osh**

## Conclusion

Thus, according to the data obtained, along with other factors or meteorological elements, sunshine can also contribute to the formation and more severe course of strokes in the conditions of southern Kyrgyzstan.

The identified results in this direction also, of course, have direct practical significance in developing the implementation of effective correction (with medical, social and economic benefits), treatment, rehabilitation and preventive programs among the population living in the climatic and weather conditions of Osh in the south of Kyrgyzstan.

These data, noted and recommended by us for practical use, are of great importance in optimizing the provision of emergency and rehabilitation medical care to stroke patients in regions with a sharply continental climate in the south of Kyrgyzstan.

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