Monthly number of newborns and environmental physical activity

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Summary. *In the last decades many studies have demonstrated the cosmophysical influences on human homeostasis. The aim of the study was to explore links between environmental physical activity – solar, geomagnetic, cosmic ray – and monthly number of newborns in general and, separately, for each gender.*

Material and methods. The distribution of newborns' number (n=286,963) over 96 months in the Republic of Lithuania from 1995 to 2002 was compared with the monthly cosmophysical indices nine months before the month of delivery. For the comparison of gender ratio, other 52,289 newborns at the same time were studied in a big Israeli hospital. Pearson's correlation coefficients and their probabilities between the newborns' number and cosmophysical indices were established.

Results. A strong and significant inverse correlation of monthly newborns' number with monthly solar activity indices (r=–0.72, p<0.0001) and similar, but positive, with cosmic ray activity was shown (r=0.67, p<0.0001).

Conclusions. The monthly number of newborns of both genders is strongly and significantly related to the level of monthly cosmic ray and, inverse, to solar activity indices nine months before the month of delivery. Geomagnetic activity was not significantly related to the monthly number of newborns. The subject and mechanism of these relationships needs further investigation.

Introduction

"The human will is free only within the bounds of a determined cosmic system." – A. Einstein, "Mein Weltbild", 1932.

The human history is accompanied by belief that exogenic-environmental forces are involved in the fate, development, health, longevity, and other aspects of life. The recent achievements in genetics concentrate our attention on endogenous factors, but do not exclude the role of environmental physical activity in these processes. Since the first half of the 20th century many studies have been published that focused on the links between solar activity, geomagnetic activity (GMA) and human homeostasis (1–7).

The recent cosmophysical studies added to the considered factors also such forces like space proton flux and cosmic ray as possible biologic regulators (8–10) not only in clinical events, but also in fetal growth (11–13), some congenital disorders related to chromosome aberrations and congenital maladies (14–16).

The aim of this study is to explore the relationship between environmental physical activity – solar, geomagnetic, cosmic ray (and close related to cosmic ray high-energy space proton flux, >90–100 MeV, r=0.93, p<0.0001) – and the monthly number of newborns in general and, separately, for each gender.

Material and methods

A total of 286,963 newborns, 148,089 male and 138,830 female (in 44 cases the gender was not pointed out in the birth documents), born in the Republic of Lithuania in years 1995–2002 (96 consecutive months) were included in the study. The monthly distribution was considered. For gender ratio (male/female) a comparative group of newborns of the same period of 96 months (n=52,289, 26,990 male and 25,299 female) born in the Department of Obstetrics at Rabin Medical Center, Beilinson Campus, in Petah Tiqwa, Israel was used. The data of cosmophysical parameters (nine months before delivery) was used for comparison with number of newborns per month. Physical parameters

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included: (1) monthly sunspot number; (2) solar flux of 2800 MGH, at 10.7 cm wavelength; (3) three internationally recognized indices of GMA – Ap., Cp., Am. (based on Planetary or multi-station data); (4) cosmic ray activity, based on neutron monitoring data was measured in impulses/minute on the Earth's surface (remains of atoms broken by Cosmic Ray, close related to high-energy space proton flux – >90–100 MeV, r=0.93). The cosmophysical data were obtained from National Oceanic Atmospheric Administration National Geophysical Data Center and National Space Service Center, USA, IZMIRAN Institute and Polar Geophysical Institute of the Russian Academy of Science (Neutron monitoring data) (17–21).

Pearson's correlation coefficients (r) and their probabilities were obtained for monthly newborn and physical parameters 9 months before the month of birth. Probabilities of 95% and higher were described as significant, those of 85–94% as a strong trend to significance.

Results and discussion

In both groups of newborns, Lithuanian and Israeli, the male/female ratio was the same – 1.07 (1.07±0.039 for Lithuania, 1.07±0.0978 for the Israeli data); in the first group the gender ratio was not significantly correlated with the physical parameters, in the second (Israeli) group it was significantly linked to monthly sunspot number (r=0.223, p=0.028) and solar flux (r=0.174, p=0.09) and, inverse, to cosmic ray (r=–0.175, p=0.08) – a week suggestion that at higher solar activity more male newborns are born. Table presents the results of comparison of monthly newborns' number in general and for each gender with three groups of cosmophysical activity indices nine months before the birth.

Environmental physical activity is involved in the regulation of human homeostasis and time distribution of death (1–5, 8–12). Wave energy is known as a specific killer of young and rapidly growing cells in oncology (22). Cosmophysical activity is related to the pathogenesis of some congenital disorders (14–16), maybe, to chromosome aberration which causes such congenital diseases like Down syndrome (14, 23). Newborns' weight and length, pathologies of pregnancy such as pregnancy-induced hypertension are connected with the space physical activity (11, 24).

Important components of the human physiologic system such as level of hormonal secretion (12, 13), blood pressure, coagulation, the immune system (25–27) and a number of mechanisms involving the serotoninergic regulation are under influence the of environmental physical factors (25).

All these observations stimulated to explore the possible effects of these forces on childbirth. The presented data show an inverse relationship of the number of newborns to solar activity. We can presume that high solar activity reduces the chances of the beginning or first steps of pregnancy development; on other hand, it is not clear if low solar activity per se or concomitant rising in such circumstances influences cosmic ray (and high-energy proton flux) (activities of solar and cosmic ray are inverse related (r from –0.9

Table. **Newborns and cosmophysical activity, Lithuania–Israel, 1995–2002* (Pearson's correlation coefficients (r) and their probabilities (p))**

Number and gender ratio of newborns		Physical parameter						Number of months
		Number of sunspots	Solar flux 2800 MGH 10.7 cm	Geomagnetic activity indices			Cosmic ray	
				Ap.	Cp.	Am.		
Total	286,963**	–0.66 <0.0001	–0.72 <0.0001	NS	NS	NS	0.67 <0.0001	96
Male	148,089	–0.65 <0.0001	–0.72 <0.0001	NS	NS	NS	0.7 <0.0001	
Female	138,830	–0.66 <0.0001	–0.71 <0.0001	NS	NS	NS	0.66 <0.0001	
Ratio, M/F	1.07	NS	NS	NS	NS	NS	NS	

* – physical data compared nine months before the month of delivery; ** – in 44 cases the birth documents did not include the gender.

NS – non significant.

to –0.8) in 312 consecutive months (8) and play a role as stimulators of rise in the number of newborns). Anyway, in this study the monthly level of cosmic ray activity at the month of conception shows a strong, positive and highly significant connection with the monthly number of newborns, in general and for both genders. The results remain significant despite our ignorance of some inequalities in the lengths of the months (30–31 days) and February exceptions. Geomagnetic activity that is involved in many regulatory environmental influences on human homeostasis (3, 5, 6, 12, 13, 18) was not a significant factor in this study. The object and mechanism of those actions is a subject of further investigation.

Conclusions

The monthly number of newborns of both genders is strongly and significantly related to the monthly level of cosmic ray activity and, inverse, to the indices of solar activity nine months before the month of delivery. Monthly indices of geomagnetic activity were not significantly related to the monthly number of newborns. The mechanism of possible cosmophysical influences on the monthly number of newborns is still unknown, but adds data to the significant influence of cosmic ray on terrestrial life dynamics. The newborns' distribution by gender was similar in two different geographic and climatic areas, with some small prevalence for male newborns.

Naujagimių, gimstančių per mėnesį, skaičius ir kosmofizinis aktyvumas

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Raktažodžiai: naujagimiai, saulės aktyvumas, geomagnetinis aktyvumas, kosminis spinduliavimas, mėnesiai.

Santrauka. Pastaraisiais dešimtmečiais daugelis studijų įrodė kosmofizinių veiksnių įtaką žmogaus homeostazei. Šio *darbo tikslas* – įvertinti ryšius tarp naujagimių, gimstančių per mėnesį, skaičiaus, pasiskirstymo pagal lytį ir kosmofizinio aktyvumo (saulės, geomagnetinio, kosminio spinduliavimo).

Medžiaga ir metodai. Lietuvos naujagimių skaičiaus pasiskirstymas per 96 mėnesius 1995–2002 metais (n=286963) sugretintas su kosmofiziniais rodikliais per devynis mėnesius iki gimimo datos. Palyginimui, vertinant lyčių santykį, nagrinėti duomenys apie 52289 naujagimių, gimusių tuo pačiu laiku Izraelyje, pasiskirstymą. Pearsono koreliacijos koeficientu įvertinti ryšiai su kosmofiziniais veiksniais.

Rezultatai. Naujagimių pasiskirstymas pagal lytį dviejuose geografiškai ir klimato sąlygomis skirtinguose pasaulio regionuose buvo identiški, su nežymia vyriškosios lyties persvara. Stiprus ir statistiškai reikšmingas atvirkštinis koreliacinis ryšys nustatytas tarp saulės aktyvumo devynis mėnesius iki gimimo ($r=-0,72$, $p<0,0001$) ir tiesioginis ryšys su to paties laikotarpio kosminio spinduliavimo lygiu, matuojamu neutronų aktyvumo vienetais (imp/min.) žemės paviršiuje ($r=0,67$, $p<0,0001$).

Išvada. Saulės aktyvumas ir kosminis spinduliavimas turi ryšį su naujagimių, gimstančių per mėnesį, skaičiumi. Šių poveikių mechanizmas kol kas nežinomas, tačiau tyrimas pateikia papildomą įrodymą apie kosminio spinduliavimo reikšmingą įtaką gyvybės dinamikai mūsų planetoje.

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