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Pedagogical Academy of Cracow

MOLECULAR AND PHYSIOLOGICAL ASPECTS OF REGULATORY PROCESSES OF THE ORGANISM

Materials of [illegible]th International Symposium of Polish Network of Molecular and Cellular Biology UNESCO/PAS

Edited by
Henryk Lach

Cracow 2003

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Contents

The dosed vestibular influence on hearted- vascular system of children with different types of blood circulation

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The functions of vestibular analyzer and vestibular irritants' influence on vegetative reactions have been widely researched in literature. However, the vegetative reactions of children at vestibular stimulation haven't been researched enough, even more in the age aspect. That's why the problem of vestibular and vegetative systems' internship at different stages of human evolution has been of great importance.

Paying attention to all vestibular and vegetative reactions the most important information carriers are hearted-vascular and breathing data.

It's necessary to underline that irritation threshold for parasympathetic nervous system is much lower than for sympathetic one in case of vestubular nervous stimulation.

The internship between vestibular and motor analyzers is becoming much closer. In this case the riciprocal relations concerning motor and vegetative systems are stated. The differences between vestibular and motor systems cause the important break of reflective reaction and functional decrease of organism's and work ability.

So, the differences of another authors' opinions on the problem of functional position of the vestibular analyzer and insufficient research of vestibular and vegetative reactions of children with hearing pathology require more detailed research.

The research involved schoolchildren aged 7-11. The experimental group included 58 persons with inherent or gained sensor-nervous deafness of III-IV grade. No other diseases were discovered. The control group of 55 persons included healthy children without hearing disabilities. The standard vestibular sample was used as functional sample for dynamics of blood circulation at charging. The vestibular's irritation was created by the revolutions in Barani's chair with our modification. Each researched person was examined by 20 revolutions with angle speed at 360 dpc. The blood stroke volume was determined with the integral body rheography before and after revolutions. The rheograph PG4-02 was used for integral rheography method.

The following formula was used for stroke volume (SV) calculations:

Y/Yk*l^2 C
SV=0, 24------------
*-----R D

Y – anacrotive curve amplitude
Yk – caliber signal amplitude

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L – the researched person's height
C – heart circle duration
R – outer resistance of electrodes
D – duration of canacrotive curve (AP, DP, SP)

At the same time the arterial diastolic and systole pressure was fixed by Korotkov's auscultative method. The following parameters were also measured: the blood circulation in minutes (BCM), stroke index (SI), heart index (HI).

When dividing children into groups of different blood circulation the heart index data was taken: the eu-kinetic type of blood circulation (ETBC) was according to HI data of 3, 8-4,4 lpm. If HI is lower than 3, 8 lpm, the child with such data was included into hypo kinetic type of blood circulation group (HTBC). In case of HI with higher than 4, 4 lpm the child was included into hyperkinetic type of blood circulation group (HrTBC). The blood circulation type grouping didn't take the sexual attributes.

The hearted-vascular system reaction on dosed vestibular charge was determined by changes of SV, BCM, HI, CI and AP data.

The HCC changes of deaf and healthy children after dosed charge are opposite (table 1). According to our research data the first group was discovered with decrease of HCC. This determines the regressive influence of irritation on heart activity. This confirms the vascular-narrowing effect at adequate irritation. It's necessary to notice the inner-group difference of deaf children's HCC changes. After vestibular stimulation the decrease of HCC was 5-17 s/m for 35 children with hearing pathology, the HCC remained indifferent for 9 children, and the pulse speed up to 7-13 spm was for 14 children.

The opposite breaks were discovered during control: the decrease of HCC is connected with decrease of the heart rhythm functioning. For this reason it can be thought that this researched group has cynoartrial knot influenced by sympathetic chain of extra-cardial regulation. The increase of HCC was up to 5-13 spm foe healthy children in 32 cases, the decrease of HCC was up to 3-10 spm for 16 children, the stability of HCC was for 7 children.

If HCC of deaf and healthy children doesn't differ in calm condition, the evidential difference can be seen after dosed vestibular charge. The diastole and systole arterial pressure exactly increased in both groups.

As a result of diastole pressure's increase being much more considerable the pulse pressure decreased in both groups. The total peripheral vascular resistance greatly increased in both groups, especially of deaf children. This was caused by increase of the average homodynamic pressure upon BVM decrease. The stroke volume didn't increase considerably. However, the little increase of SV was determined in case of dosed vestibular charge for 20 deaf and 14 healthy children. Upon this parameter the HVS became indifferent statistically in spite of difference of average number of deaf and healthy children.

The deaf children's blood circulation volume decreased inconsiderably while the healthy children's BVM increased up to 0, 08 lpm. Such changes can be explained firstly by short-time charge and secondly by the charge functional specification. The HI changed accordingly, i.e. – inconsiderable decrease for the healthy children.

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Table 1.
The character of the Hearted-Vascular System Data of Junior children after Dosed Vestibular Charge

Data		Hearing disease children (n=58)	Healthy children
HCC, spm	Before load	77±1,8	75±1,9
	After load	73 ±1,8#	82±1,0*#
Systolic pressure,mm	Before load	105±2,4	108±1,2
	After load	110±2,8	111±1,3
Diastolic pressure, mm	Before load	69±2,0	71±1,9
	After load	80±1,6#	79±1,7#
Blood volume in minute, lpm	Before load	3,69± 0,12	4,01±0,12*
	After load	3,53± 0,1	4,09±0,09*
Heart index	Before load	3,69± 0,11	4,13±0,09
	After load	3,81± 0,11	4,17±0,09
Blood stroke volume,ml	Before load	41,02± 0,76	45,04±0,8*
	After load	40,4±1,08	43,4±1,1*
Stroke index,ml/m^2	Before load	44,67±1,7	48,53±1,6*
	After load	43,2±1,2	46,25±1,32*
Total peripheral resistance of vascular system, cm^2	Before load	1818±54,5	1702±54,8*
	After load	2083±60,4#	1802±68,16*

*- the difference between hearing diseased and healthy is correct (p{0,05)
- the difference of pre-charging and after-charging conditions

Our research discovered the outlet of homodynamic that determined the blood circulation reactions on vestibular stimulation of the most children. Taking under consideration the blood circulation type when evaluating the hearted-vascular system it was confirmed that children with different blood circulation types would react on vestibular charge differently. The children with HTBC are characterized by BVM and HI increase.

The SV and SI of deaf children with HTBC are characterized by their increase, while HCC of healthy children is characterized by its increase up to 10 spm. The BVM increase for healthy children with HTBC is caused by HCC increase up to 8-10spm. However, SV didn't change. The BVM dynamics for deaf children with HTBC iş influenced by SV increase. The HCC changes and SV increase naturally influence on BVM changes. The BVM increase is caused by blood SV. In this case the HCC is relatively decreased and the total energy outlay of myocardial id decreased accordingly. That's why the economy of blood circulation reactions adopted to the functional charge evaluated by BVM contribution, which is achieved by blood SV. The obtained data let us find out more effective reaction on vestibular charge for deaf children with HTBC either than for healthy ones.

The healthy children and deaf girls with ETBC discovered SV, SI, BVM and HI decrease.

The deaf children's SV and BVM decreased. The healthy children's SV decreased to 9%, BVM – to 5%, their HCC increased. The deaf children's HCC decreased. The Hrtbc deaf children's HCC, SV and BVM data increased. The deaf children's SP and DP increased considerably. The HrTBC healthy children's AP increased considerably either. The third group of healthy children with HTBC didn't have any changes of AP.

The deaf schoolchildren have considerable differences in hearted-vascular data comparing with healthy ones. Dosed vestibular charge influence depends on the blood circulation type.

The dosed vestibular charge causes different homodynamic data of children with various blood circulation types. The hypo kinetic group of children has considerable increase of BVM, the deaf group has increase of the blood SV, and the healthy group has increase of the heart systole frequency.

For children with ETBC the dosed vestibular charge causes BVM decrease because of blood SV decrease.

The deaf children with HrTBC react by BVM decrease because of blood SV decrease. The vascular periphery increase greatly.

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