TESTING THE METHOD FOR ESTIMATING BODY AND FOOT STATUS

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Abstract. *The clinical method is by oll means among the most frequently used methods for early discovering of changes of spinal column, rib cage, knee and foot in health facilities and school institutions. Since the posture, i.e. the position of segments and the value of deviation from normal are subjectively evaluated by this method, we fried to unify the mentioned method and check it throyoh practise. The method was tested by a specially made clinical sheet with numerical values for estimating deviation, with the help of 158 examiners. Before the test the examiners got acquainted with the method and practically trained. Each patient was simultaneously examines by the professor of corrective gymnastics, assistant of corrective gymnastics and two students. In order to confirm or reject the above mentioned method, the result will be statistically processed.*

Key words*. method, testing, body status, school*

"Model" for estimating body and foot status was presented at the scientific meeting "FIS Communications". This "model" should make easier and more precize estimation of pupils' body status in school conditions possible for P.E. teachers.

The above mentioned "model" is based on the former experience of clinical estimation of body and foot status carried out in medical and paramedical institutions (faculties, schools, kindergartens etc.).

Since the previous way of estimating body and foot status is rather subjective and unequal, we tried to unify the exsisting clinical (somatoscopic) method and make it more objective and correct.

Suggested "model" means completely determined way and order of observation, i.e. consideration of physiological posture of some segments relevant for estimating body and foot status.

Physiological posture of certain segments and possible deviations are numerically

evaluated $(0,1,2)$[1], and this makes precise statistical processing possible.

As a logical continuation of the presented "model", it was followed by its confirmation in practice.

2. AIM AND TASKS OF THE WORK

The intention (aim and tasks) was to establish whether "model" as an instrument for estimating body and foot status of subjects was reliable. Although the consruction of "model" is based on objective methods for estimating body status, final results are still subjective estimations of the examiners. This fact in itself sets certain limitations. That is way, on the parallel level, aim and task of this research was to fix those elements from the "model" which require additional education of examiners which will provide their highest level of agreement (unification) possible, while estimating same elements of body status.

Segmentary aims and tasks of the research were the following:

- to determine at which estimated indexes of body and foot status there is the smallest degree of agreement between examiners and "competent examiner", or, in other words, to find out at which estimates of status indexes the biggest mistakes are made;

- to determine whether degree of agreement is higher between "competent examiner" and examiner, as well as mutual agreement among examiners in subjects who have the indexes evaluated as normal or in those with deviations from normal posture;

- to determine which examiners have higher degree of agreement with "competent examiner" and how important is the role of previous knowledge (education) in the level of agreement;

- to find out whether the examiners fail to notice deviation from normal posture or declare normal posture as deviation more often.

3. METHOD

In order to check the reliability of estimating deviations from normal body posture by the described "model"[2] its testing was carried out. After some neccessary instructions, four examiners evaluated the sample of 40 subjects. They entered their observations into protocol, i.e. clinical sheet which was prepared in advance (appendix 1).

Since the first examiner was also the author of the mentioned "model" and according to his experience in estimating body status, his estimation in this research was considered as the "competent ezamination", i.e. the correct one.[3]

The second examiner was always present and also had large experience being the assistant at the subject Corrective gymnastics.

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[1] 0-normal posture, 1-minor deviation from normal, 2-major deviation from normal
[2]"Model" contains drawings of some segments in normal posture and with deviations.
  Protocol (clinical sheet) (appendix 1) is coordinated with it.
[3]-He had examined over 10000 school and pre-school children.
  -He is a professor of Kinesitherapy (Corrective gymnastics).
  -He has published over 50 scientific and professional papers in this field.
  -He wrote the textbook on Corrective gymnastics and kinesitherapy.
  -He is a coauthor of monograph from the field of body deformities' prevention.

The third and fourth examiner were changed and they were students at the Faculty of Physical Culture reading, practising and preparing for the subject Corrective gymnastics.

Solving given tasks should enable suggestions of some new steps which will contribute increasing the agreement of examiners in estimating the indexes of body status by using the suggested "model".

3.1 Data Processing

The research is dealing with estimations of body status indexes, i.e. with estimating the presence (or absence) of deviations in the examiners' body posture. That is why all incorrect estimates were unwelcome (in this work in regard to "competent examiner"). Data given by main statistics were important to us, because in regard to them we should fix indexes at which disagreement in estimating among examiners exists and for whom it is neccessary to provide some additional education in order to minimize wrong estimations. Importance and difference between proportions of total examinations among examiners were given as additional information.

4. RESULTS OF RESEARCH WITH DISCUSSION

On the occasion of observing estimations both on the total sample and all indexes together, as well as at some examiners and each index separate, we should bear in mind that analysis of agreement, i.e. disagreement of examiners in their estimations was more important for interpretation than character, number and estimate evaluations. For furher information as well as for addition if interpretation, mean values and percentage of some examiners for all indexes together are stated in table 1. Data of agreement between examiners' estimations and "competent examiner" are shown in table 2, and mutual agreement among examiners are given in table 3 - on one side of all four examiners and on the other hand of three examiners without "competent examiner".

Table 1. Estimates of each examiner

	0		1		2	
	a	%	a	%	a	%
1st examiner	34,33	85.83	5.48	13.69	0.19	0.48
2rd examiner	34.90	87.26	4.71	11.78	0.38	0.95
3rd examiner	32.24	83.09	6.62	16.54	0.14	0.36
4rd examiner	33.14	82.86	6.48	16.19	0.38	0.95

Table 2. Agreement with competent examiner

	0		1		2		Σ		error	
	a	%	a	%	a	%	a	%	a	%
1st examiner	33.19	82.97	3.38	8.45	0.14	0.36	36.91	91.78	3.28	8.21
2rd examiner	31.0	77.5	3.24	8.09	0.143	0.36	34.38	85.95	5.62	14.05
3rd examiner	31.28	78.21	3.24	8.09	0.095	0.24	34.62	86.54	5.38	13.45

Table 3. Mutual agreement of examiners

	examiners	agreement	examiners	disagreement
	number	%	number	%
four examiners	30.43	76.07	9.57	23.93
examiners 2,3,4 without competent examiner	33.19	82.97	6.80	17.0

Observing average values of agreement in estimation of all four examiners for all subjects together (table 3) we can see that in average they came to an agreement in 30.43 cases out of 40 subjects which means 76.07%, while disagreement showed in 9.57 cases or 23.93%. If we observe three examiners (without "competent examiner") we can notice the difference which is in favor of their better mutual agreement. Keeping in mind the fact that "competent examiner" and first examiner, being permanent and more experienced than the other two examiners, are coorinated in 36,91 cases or 91.78% as well as number and evaluation of their marks are more similar then in cases of third and fourth examiner (table 1), we can say that disagreement resulted from differences in percieving the existance of deviations for same indexes at some examiners as well as from more frequent and a little more strict access in estimating by less experienced examiners. If we proceed from the point where observed person frequently reacts to external irritations, for example to noice, voice, etc., during the observation and estimation of certain segments' posture, explaination that certain disagreements between "competent examiner" and other examiners resulted from more strict access in estimating by less experienced examiners can be accepted as partly correct. Minimal moving of head, shoulders, arms or leg brings automatic to immediate disturbance of the observed segments' posture which makes an illusion of dissymmetry and illusory disturbation of body status. All these can create a dilemma in insufficiently experienced and careless examiners, which results with incorrect estimate.

It was also important to notice which estimated indexes caused the existing disagreements in using the "model", i.e. at which indexes there is the highes disagreement between the examiners and why.

According to the level og agreement between all four examiners, the indexes which define body and foot status, could be classified into several groups, in this case five:
- Igroup   - 90-100% agreement
- II group   - 80-90% agreement
- III group   - 70-80% agreement
- IV group   - 60-70% agreement
- V group   - under 60% agreement

I group - At indexes "X legs", recessed foot and convex chest the agreement of examiners was the highest. In 39 out of 40 cases (97.5%) they all estimated that there was no deviation from normal. "Competent examiner" estimated that in all three variables in all subjects there was no deviation from normal physiological posture.

Such high level of agreement resulted from the fact that at some segments it was rather easy to notice the change, i.e. transition from physiological to nonphysiological posture. In this case the status of estimated segments was good in the largest number of subjects

which decisively influenced on such high level of agreement.

In estimating the posture of Achilles heel, which defines foot status (recessed foot), posture of shoulder blades (winged shoulder blades), neck bend (when it was reduced) and chest bend (flat back), the examiners were "more strict" than "competent examiner" who had not registred any case of deviation in these indexes. However, there was still high level of agreement between examiners and "competent examiner" in these indexes - from 90 to 100%. Also, on this occasion it could be said that percentage of examiners' agreement was the highest in indexes at which there was no deviation from physiological posture.

At the same time, in several cases, examiners "have seen" deviation which did not exist according to "competent examiner's" estimate.

II group - In the group of indexes in which agreement of examiners ranged from 32 to 35 out of 40 subjects or 80 to 87.5% were following variables: knee hypertraction, recessed chest, disbalanced pelvis, "O legs".

Certain disagreement came from the fact that at some segments it was not easy to notice up to which level the changes ranged in physiological borders and when they tranfered to patological condition. Concerning the knee joint, hesitation of 10 degree was tolerated as normal and over 10 degree deviation appeared as patological condition.

However, pelvis disbalance used to be tolerated up to a few millimeters (5 mm at the most). This was interpreted by unequal growth of lower extremities, which were completely equalized after the period of puberty. Because of the realization that minimal pelvis disbalance can lead to the so called lumbar static scoliosis, "competent examiner" had noticed better than other examiners that no pelvis disbalance could be tolerated.

III group - In the group of indexes where agreement of examiners ranged from 28 to 30 out of 40 subjects or 70 to 75% were following indexes: head posture, lordotic posture, flat foot.

If we bear in mind estimation of lordotic posture and flat foot, insufficient level of high agreement could be imputed to examiners' inexperience and insufficient qualification. During estimation of lumbar bend status the lumbar bend was straightening if a subject stretched stomach musculature or tried to "pull in" the stomach at the moment of observation.

Estimating the foot status examiners had neglected mechanics of foot lowering. There are few phases in the process of foot lowering. At the beggining changes of posture of Achilles heel, maleolus, heel and toes appear, but foot arch can be still preserved, which examiners have not estimated well. Existance of some mentioned symptoms can lead to rather careless conclusion that flat foot exists.

IV group - In the group where agreement of examiners ranged from 24 to 27 out of 40 subjects or 60 to 67.5% were the following indexes: posture of Achilles heel according to which the status of side foot arch and kyphotic posture are estimated.

Lower level of agreement in estimation of mentioned variables could be interpreted like the previous one. It is known that willing contraction of back musculature, i.e. minimal "throwing back" of shoulders or momentary relaxation (completelly relaxed position) at the moment of observation can change the status of chest bend.

V group - In the group of indexes in which the level of examiners' agreement was under 60% were following variables: symmetry of Lorenzo's triangles, shoulder's posture (raised shoulder), shoulder blades' posture, neck bend's posture (increase). Mentioned variables are usually used to register the lateral deviation of spinal column. For estimating

Clinical sheet

Name and surname   --sex ----------
Date of birth   ----------------Date of examination ------------- Place of birth   ----------------

	posture of segments	normal posture	deviation from normal posture	degree of the deviation	
				minor	major
observation from the back	posture of head	0	slope on one side R- L	1	2
	posture of shoulders	0	raised shoulder R- L	1	2
	posture of shoulder blades	0	raised shoulder blade R- L	1	2
		0	distance from the spinal column R- L	1	2
		0	winged shoulder blades R- L both	1	2
	triangles of build (Lorentziois triangles)	0	bigerr R- L	1	2
	posture of pelvis	0	slope R- L	1	2
	posture of knee	0	"X" posture	1	2
		0	"O" posture	1	2
	posture of achilles heel	0	bend inside (flatfoot)	1	2
		0	bend outside (recesse foot)	1	2
observation from the side	neck	0	increased bend (ilyphosis)	1	2
	bend	0	reduced bend	1	2
	chest	0	increased bend (ilyphosis)	1	2
	bend	0	reduced - flatback	1	2
	loins bend	0	increased	1	2
	knee posture	0	hipertraction	1	2
	foot	0	flatfoot	1	2
	posture	0	recessed foot	1	2
observation from the front					
	rib	0	convex chest	1	2
	cage	0	recessed chest	1	2

these variables, in order to estimate whether dissymmetry resulted as a cosequence of certain changes on the spinal column or as a consequence of moving neighbouring or distant segments, large experience is neccessary.

If we bear in mind that students have no sufficient practical experience and that during introduction of the programme of postural deviations so called "ideal position", i.e. body posture was presented to them, we can not criticize their certain inprecision. On the contrary, more strict estimation is smaller mistake than neglecting certain deviations from physiological posture which can in time lead to body deformities.

5. CONCLUSION

Considering the set aims and tasks of the research, the following conclusions can be deduced:

-The smallest level of agreement between "competent examiner" and examiners was registered at posture of Lorenzo's triangles, shoulders (one shoulder raised), shoulder blades (one shoulder blade raised) and increase of neck bend. At the same time, these were also indexes in which more attention should be paid during estimation;

-The highest percentage of agreement belateral deviations, which were, after all, the most delicate for estimating.

On the base of received results, especially in connection with the conclusion about agreement between examiners with the highest level of training with "competent examiner" it can be concluded that "model", as an instrument for estimating body and foot status, is more reliable if examiners are better trained.

This is the reason why more attention should be paid during training for using "model" particulary in the following indexes: posture of the Achilles heel, chest bend, posture of Lorenzo's triangles, shoulders and shoulder blades.

TESTIRANJE METODE ZA OCENU TELESNOG STATUSA I STATUSA STOPALA

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Jedna od najrasprostranjenijih primenjivanih metoda za ranu detekciju promena na kičmenom stubu, grudnom košu, kolenu i stopalu u zdravstvenim i školskim institucijama je, svakako, klinička metoda. Budući da se ovom metodom postura, odnosno položaj segmenata i veličina odstupanja od normalnog, subjektivno procenjuje, nastojali smo da pomenutu metodu unificiram i istu u praksi proverimo. Pomoću posebno izrađenog kliničkog lista, sa numerički izraženim vrednostima ocenjivanja veličine odstupanja od normalnog, pomoću 158 ispitavača (ocenjivača) testirana je ova metoda. Testiranju je prethodilo upoznavanje sa metodom i praktičnom obukom ocenjivača. Testiranje je sprovedeno tako što su istog "pacijenta" istovremeno pregledali predmetni nastavnik i asistent sa predmeta Korektivna gimnastika i dva studenta. Radi utvrđivanja ili odbacivanja pomenute metode izvršiće se statistička obrada rezultata.