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Functional involution in rural areas of south Poland – preliminary report

by

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The main objective of this work was determination of influence of involution process on the level of chosen somatic and functional parameters in adult population from rural areas in south Poland. Considering, evaluated somatic and functional features the highest influence of calendar age was observed in area of co-ordination and strength abilities. Among co-ordination aspects the highest regression was registered in case of most complex ability i.e. space orientation. These changes are caused undoubtedly by typical for rural areas involution related with lack of psychomotor stimuli in everyday life. Overlapping of secular trend and involution factors causes changes in somatic variables.

Keywords: *functional involution, motor abilities, rural population*

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Introduction

The course of progressive development is well described in literature because of relatively simple methods of research. In case of functional involution changes in adults age the scientific data is rather scarce. Majority of research regarding involution in Poland was related to somatic features, while sporadically scientists focused complex experiments diagnosing changes in somatic and functional factors (see review Szopa 1988). Moreover these researches had cross-sectional character and the only exceptions are works by Jopkiewicz (1989) who tested 250 male subjects aged 18 to 50 years and Slezynski (1977) diagnosing chosen somatic traits in former athletes. He stated that professional sports careers do not stop involution trends at later stages of life.

The main problem in works regarding involution in area of motor fitness is related with methodology (especially in case of co-ordination) and the use of different motor tests and laboratory devices. These factors and liability of tested variables hinder the comparisons and evaluation.

General conclusions from theoretical considerations suggests that only intensified physical activity may be the factor favoring the delay of involution processes, which are, as is commonly known, inevitable.

Therefore, research continuation is needed in area of functional and somatic involution based on experimental data from different populations. Subjects living in rural areas of south Poland seem to be ideal for this type of research. The following research questions were formed:

a) Are subjects at relatively young age characterized with involution changes?
b) What is the range of changes in case of different variables?

Material and methods

The research was conducted in 2002-2003 on 292 adult male and female subjects from rural areas of south Poland (Beskid Zywiecki). The range of subjects' age was from 26 to 72 years in males and 25 to 77 years in females. Subjects – because of quantity – were divided into three sub-groups according to calendar age: younger than 35 years, from 36 to 45 years and older than 46 years. The amount of subjects in described age categories is presented in tab. 1.

Table 1 The number of male and female subjects in particular calendar age categories

Age group	Males		Females	
	Mean age [years]	n	Mean age [years]	n
I	33,00	29	31,90	54
II	40,11	68	39,42	56
III	52,95	43	57,17	42
Total	**140**		**152**	

The measurements in area of somatic traits included body mass and height and flexibility (functional and structural predisposition) evaluated with the use of sitting forward bend with straight legs (Eurofit 1983). The following motor abilities were also tested:

a. static strength (Collin dynamometer)
b. relative strength (to body mass)
c. maximal anaerobic work MAW – calculated as product of body mass and standing long jump (Szopa 1989),
d. reaction time – catching of Ditrich stick ((Mekota and Blahuš 1983)
e. movement frequency – "plate tapping" test (time of 15 cycles, Eurofit 1983),
f. sense of balance – "flamingo balance" test (Eurofit 1983),
g. space orientation – cross apparatus AKN-102 registering time of 49 tasks in "free" mode.

Basic descriptive statistic parameters were calculated ($\bar{X}$,SD, t_o) in determined calendar age categories. The involution dynamics were presented as percentage related to the youngest group treated as 100%.

Results and discussion

Because of preliminary character of presented below data the analysis of results will be performed simultaneously with its discussion. The analysis of somatic variables (fig. 1) showed that body height decreases with age in both sexes.

These changes were generally very small and equaled only 1,5% of group I (i.e. approximately 0,75% per decade). It was rather caused by secular trend, than involution because these changes start not earlier that after 55-60th year of age. The results of own research were confirmed by many authors (Panek 1978,

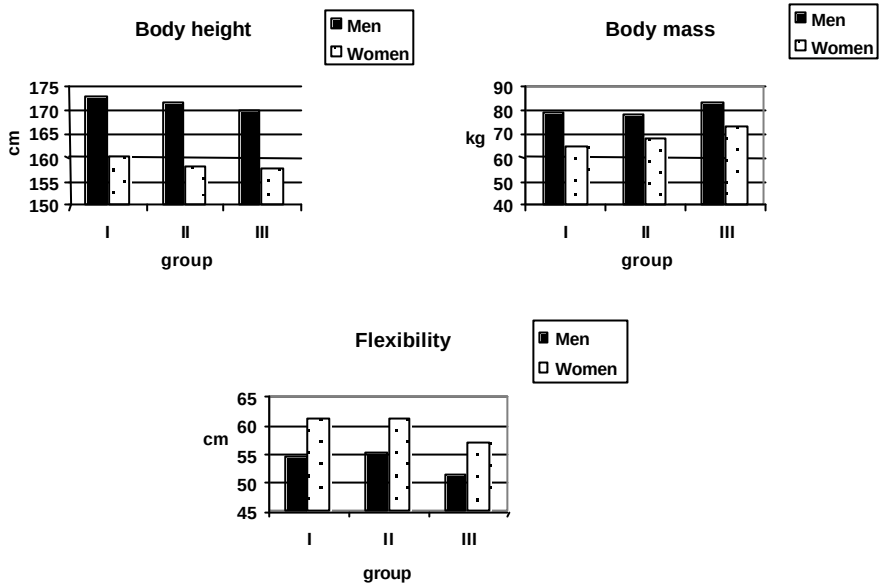

Fig. 1 The influence of calendar age on somatic traits

Table 2 Influence of calendar age on somatic parameters in male subjects

Variable		Age group			Differences		
		I	II	III	Group	d	d %
Body height	$\bar{x}$	172,78	171,47	170,06	I-II	1,31	0,76
	SD	4,55	5,49	5,55	I-III	2,72	1,57
Body weight	$\bar{x}$	78,68	78,32	82,85	I-II	0,36	0,45
	SD	11,30	11,77	16,16	I-III	-4,17	5,29
Flexibility	$\bar{x}$	54,62	55,51	51,57	I-II	-0,89	1,62
	SD	8,11	7,43	6,80	I-III	3,05	5,58

Szopa 1988). Significantly larger changes were registered in body mass, which increased with age in both sexes with higher dynamics in females. During analyzed period of time body mass of females increased by 13% (5,16% per decade) what may be related with increased body fat. Presented results are similar to works by Szopa (1988) and Jopkiewicz (1996). In the whole observed period of experiment a significant decrease in spine flexibility was registered. This decrease is smaller than in case of body mass and equaled only 5% and is caused by involution of muscle-ligament apparatus which decreases mobility.

Table 3 Influence of calendar age on somatic parameters in female subjects

Variable		Age group			Differences		
		I	II	III	Group	d	d %
Body height	$\bar{x}$	160,04	158,12	157,80	I-II	1,92	1,19
	SD	4,44	5,06	5,33	I-III	2,24	1,39
Body wieght	$\bar{x}$	64,92	68,05	73,30	I-II	-3,13	4,82
	SD	8,55	13,98	15,35	I-III	-8,38	12,90
Flexibility	$\bar{x}$	61,40	61,39	57,00	I-II	0,01	0,02
	SD	6,21	6,16	6,78	I-III	4,40	7,16

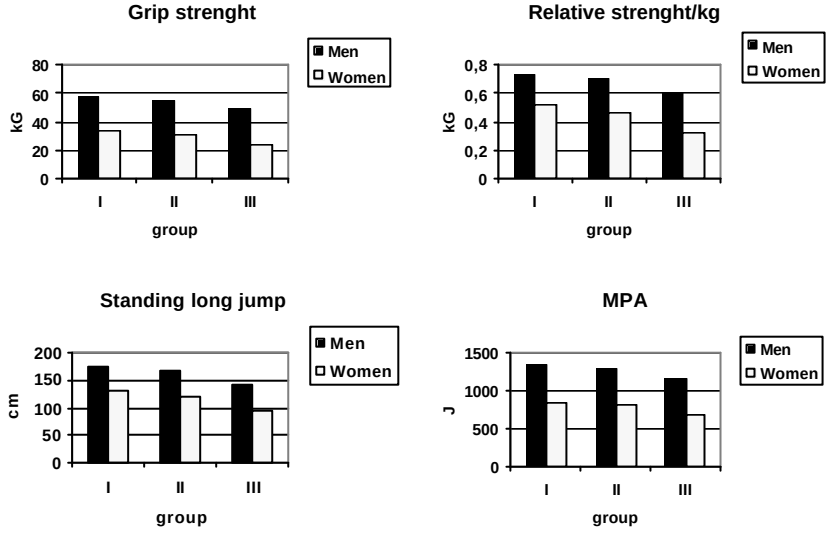

Fig. 2 The influence of calendar age to strength abilities

The acquired data showed that the level of strength and relative strength decreases with calendar age. Regarding the influence of body mass and its components on strength it is possible to state that greater regression was registered in females what may be related with professional inactivity or style of life. In males the decrement is significantly smaller and equal 7-9% in relation to the youngest group. Literature data (Wolanski and Siniarska 1986; Jopkiewicz 1998) shows that highest regression is generally observed after 45 years of age. Own research data confirms that finding.

Table 4 Influence of calendar age on functional parameters in male subjects

Variable		Age group			Differences		
		I	II	III	Group	d	d %
Static strength	$\bar{x}$	57,37	55,11	48,80	I-II	2,26	3,93
	SD	8,62	9,99	13,21	I-III	8,57	14,93
Relative str.	$\bar{x}$	0,74	0,71	0,60	I-II	0,03	4,05
	SD	0,13	0,14	0,16	I-III	0,14	18,91
Standing broad jump	$\bar{x}$	174,65	168,16	141,52	I-II	6,49	3,71
	SD	19,95	22,17	29,75	I-III	33,13	18,96
MAP	$\bar{x}$	1343,94	1287,36	1147,84	I-II	56,58	4,21
	SD	224,62	228,53	317,32	I-III	196,10	14,59
Reaction time	$\bar{x}$	0,20	0,21	0,22	I-II	-0,01	5,00
	SD	0,01	0,02	0,02	I-III	-0,02	10,00
Speed of movement	$\bar{x}$	7,53	7,86	8,63	I-II	-0,33	4,38
	SD	1,28	1,30	1,60	I-III	-1,10	14,60
Balance	$\bar{x}$	4,35	3,41	2,84	I-II	0,94	21,60
	SD	2,51	2,79	1,35	I-III	1,51	34,71
Space orientation	$\bar{x}$	63,17	71,72	89,04	I-II	-8,55	13,53
	SD	14,18	15,96	23,21	I-III	-25,87	40,95

The analysis of results in area of co-ordination is relatively difficult because of methodological reasons. Lack of sufficient experimental data limits its analysis and discussion. The comparison of results had to be based on works with similar evaluation methods (Szopa 1989; Mleczko 1990). Data presented in tables 4 and 5, illustrated graphically on fig. 3 allowed to notice that mean values had specific character: group I>group II>group III. It should be remembered that higher result in tests evaluating reaction time, speed of movement and space orientation means worse result. The highest decrement (even higher than in comparatory populations) was registered in case of space orientation (the most complex) in both sexes. In case of female subjects in the oldest group it reached 40% (regression respectively 20% and 16% per decade for males and females) what may be related with area of inhabitation. In rural population lack of sensorimotor stimuli is commonly known, so there is insufficient environment to develop this ability. These results are similar to earlier data of other authors.

Table 5 Influence of calendar age on functional parameters in female subjects

Variables		Age group			Differences		
		I	II	III	Group	d	d %
Static strenght	$\bar{x}$	33,12	31,39	23,19	I-II	1,73	5,22
	SD	8,25	7,68	9,46	I-III	9,93	31,63
Relative strenght	$\bar{x}$	0,52	0,47	0,32	I-II	0,05	0,09
	SD	0,15	0,12	0,12	I-III	0,20	38,46
Standing broad jump	$\bar{x}$	132,03	121,76	96,53	I-II	10,27	7,77
	SD	18,41	19,48	19,68	I-III	35,50	26,88
MAP	$\bar{x}$	836,81	805,77	693,28	I-II	31,04	3,70
	SD	145,99	182,67	180,87	I-III	143,53	17,15
Reaction time	$\bar{x}$	0,21	0,22	0,23	I-II	-0,01	4,76
	SD	0,01	0,02	0,02	I-III	-0,02	9,52
Speed movement	$\bar{x}$	8,49	8,65	9,59	I-II	-0,16	1,88
	SD	1,16	1,07	2,16	I-III	-1,10	12,95
Balance	$\bar{x}$	3,35	3,20	2,62	I-II	0,15	4,47
	SD	1,88	2,12	1,47	I-III	0,73	21,79
Space orientation	$\bar{x}$	73,59	76,03	103,63	I-II	-2,44	3,31
	SD	15,42	15,63	31,61	I-III	-30,04	40,82

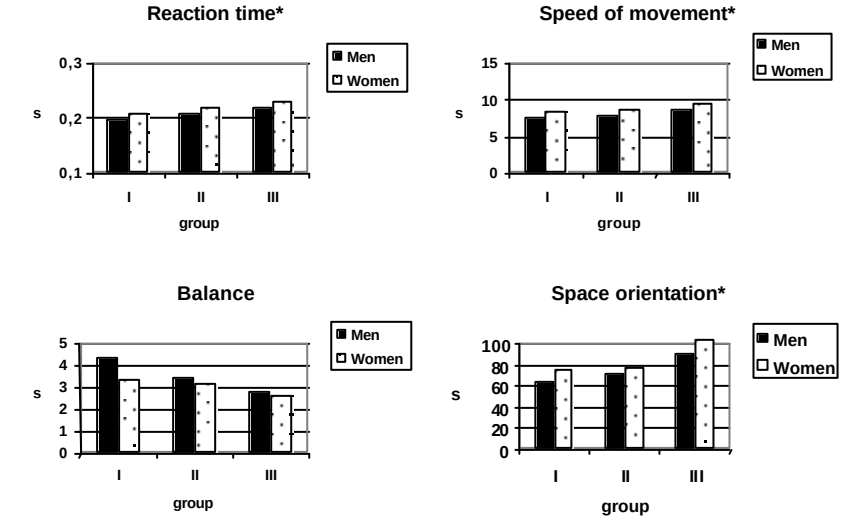

Fig. 3 The influence of calendar age on co-ordination (* higher value means worse result)

Conclusions

1. Significant changes in functional and somatic parameters showed specific traits of involution processes in rural environments.
2. The highest involution changes were observed in co-ordination aspects, especially ? space orientation.
3. Registered inter-group differentiation in case of body height is caused by a secular trend rather than involution.

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