

Environmental hazard and health status of population in Poznan district

Zagrożenia środowiskowe a stan zdrowia populacji powiatu poznańskiego

RENATA ADAMEK^{1, A-G}, ADAM M. ADAMEK^{2, A-G}, MONIKA ZYSNARSKA^{1, D-F},
EDYTA KURZĘPA-HASAN^{3, D, E, G}

¹ Department of Public Health, Chair of Social Medicine, Poznan University of Medical Sciences
Head: Tomasz Maksymiuk, PhD

² Department of Toxicology, Poznan University of Medical Sciences
Head: Prof. Jadwiga Jodynis-Liebert, PhD

³ Department of Education, Poznan University of Medical Sciences
Head: Mirosława Cyłkowska-Nowak, PhD

A – Study Design, **B** – Data Collection, **C** – Statistical Analysis, **D** – Data Interpretation,
E – Manuscript Preparation, **F** – Literature Search, **G** – Funds Collection

Streszczenie **Wprowadzenie.** Eksperti Światowej Organizacji Zdrowia informują, że wielkość oddziaływania czynników środowiska na zdrowie jest niedoszacowana, głównie z powodu bardzo ograniczonych danych na ten temat.

Cel pracy. Celem pracy była ocena wpływu zanieczyszczeń wybranych komponentów środowiska na zdrowie populacji powiatu grodzkiego m. Poznań oraz ziemskiego powiatu poznańskiego.

Materiał i metoda. W badaniach zastosowano metodę taksonomiczną według Dutkiewicza i współautorów. Metoda ta pozwala na ocenę środowiskowych zagrożeń zdrowia populacji zamieszkującej badany obszar.

Wyniki. Rejony pozamiejskie powiatu poznańskiego wykazały większe zróżnicowanie zarówno stanu środowiska, jak i sytuacji zdrowotnej, a potencjalne korelacje nie były silnie wyrażone. W powiecie m. Poznania częściej występowały wartości miar syntetycznych świadczące o wysokim zagrożeniu dla zdrowia i wysokim nasileniu ujemnych skutków zdrowotnych. Korelacje między miarą syntetyczną zagrożeń środowiskowych a wybranymi znormalizowanymi współczynnikami – negatywnymi miernikami zdrowia, w rejonie powiatu grodzkiego świadczyły o dużej sile związku, z których najsilniej korelował współczynnik umieralności z powodu nowotworów złośliwych.

Wnioski. Najwyższe współczynniki korelacji zaobserwowano w przypadku umieralności z powodu nowotworów złośliwych, małej urodzeniowej masy ciała oraz umieralności noworodków z powodu wrodzonych wad rozwojowych. Słabsze korelacje uzyskano, porównując miarę stanu środowiska w rejonach gmin powiatu poznańskiego z negatywnymi miernikami stanu zdrowia. Zaobserwowano zmiany w strukturze zgonów. Najwyższe współczynniki korelacji stwierdzono w przypadku umieralności z powodu chorób sercowo-naczyniowych.

Słowa kluczowe: środowiskowe zagrożenia zdrowia, zdrowie, populacja, metoda taksonomiczna.

Summary **Background.** World Health Organization experts note that dimension of harmful effects of environmental agents on human health is insufficiently assessed, mainly due to very limited data.

Material and method. Taxonomic methodology by Dutkiewicz et. al. has been applied. This methodology allowed assessing of environmental health hazards in the studied areas. The main aim of this study was an assessment of impact of pollution in selected environmental components on health of population living in urban (city of Poznan) and non-urban areas of Poznan district.

Results. The non-urban areas have been more differentiated than urban areas in both environmental hazards and the health status and thereby potential interactions have not been clearly expressed. In the city of Poznan, values of integrated (synthetic) measures have been considerably more frequently noticed. It provides with the information about high risk to health and high intensification of adverse health effects.

The correlations between integrated measure of environmental hazards and selected normalized coefficients – negative health rates, in the city area have been strong. The strongest correlation has been found in mortality from malignant tumors.

Conclusions. The highest correlation coefficients have been observed while considering mortality from malignant neoplasms, low-weighted births and newborns mortality from congenital malformations. There is a weak link between environmental hazards and health status of the population from non-urban areas. Change in death rate structure has been also observed there. The highest correlation coefficients for mortality from cardiovascular diseases have been noticed.

Key words: environmental hazards, health, population, taxonomic method.

Background

World Health Organization experts note that dimension of harmful effects of environmental agents on human health is insufficiently assessed, mainly due to very limited data. It is assumed that environmental factors determine premature deaths and health breakdown. It is the risk that may not be avoided by the population from polluted areas, as they can do so in case of lifestyle change and individual health behaviour.

The environmental pollution is considered as a potential causal factor or one of the causal factors in relation to wide spectrum of health disturbances, including, inter alia: cancer, respiratory diseases, cardiovascular ones, diseases of nervous system, allergy, and abnormalities of fetus growth [1–4].

In Poland, in last decade of the recent century, favorable changes in sphere of environmental protection were achieved. Despite this, Poland has relatively high level of toxic substances emission.

Material and method

The aim of this study was to assess the impact of pollution of selected environmental media (the air, the water and the soil) on the population health – people living in urban and non-urban areas of Poznan district in years 1996–2000.

Secondary information sources divided into population health material and environmental status one have been of essential importance.

The only data that have been taken into account based on the following criteria: data availability, territorial extent and data credibility. The data that have been included in the study selected from among over 40 of indicators were as follow: immission of air pollutants, (mid concentration in year of gas pollutants Da, excluding CO₂); (mid concentration in year of particle pollutants Da) and number of industrial plants burdensome to the natural environment.

Following indicators have been selected to proceed the analysis: low birth weight rate, death births, mortality from congenital malformations, newborns mortality from hypotrophy, overall mortality before age 50, mortality from neoplasms (in age groups 0–4, 5–19, 35–49), mortality from cardiovascular diseases (in age groups 0–4, 5–19, 35–49) and finally mortality from respiratory diseases (in age groups 0–4, 5–19, 35–49). The indicators of environmental hazards as well as indicators of negative health effects have been normalized and then aggregation process. The taxonomic methodology of Dutkiewicz et al. modified and adopted by the authors of this paper has been applied [5, 6].

Synthetic measures of complex phenomena limited by scale from 0 to 1 created the ranking indexes.

The correlations between values of each normalized health indicators and synthetic measure of environmental hazards have been carried out [7–9].

To create a ranking of studied areas, Paasivirta model has been applied. The following interpretation criteria have been adopted from this model.

If the value of synthetic measure $S_j > 0,55$, then, there is a high hazard to health (index 3) in the specific area.

If the value $0,55 \geq S_j \geq 0,30$, there is potential high hazard to health (index 2) and finally if $S_j < 0,30$, then there is no substantial risk (index 1).

Synthetic measures of population health status have been arranged in the same way. The tables of indexes being the effect of analyses of the two collections were used to rank the studied areas with regard to environmental hazards to health and quality of life of the populations living in the areas.

Results

In table 1 there are synthetic measures of environmental hazards in the area of the city of Poznan in the year 1996, 1997, 1998, 1999 and 2000. Moreover, the quarters of the areas being studied, were ranked according to hazard indexes.

The values of synthetic measures of population health status of the city of Poznan were presented in table 2.

The highest rates of low-weighted births in 1996 was noticed in the quarter of Poznan-Wilda (805,01), in 1997 in the quarter of Poznan-Jeżyce (871,63), in 1998 in the quarter of Poznan-Stare Miasto (611,93), in 1999 in the quarter of Poznan-Wilda (846,46) and 602,84 in 2000 per 10 thousand of live births).

The lowest rates of low-weighted births in 1996 were observed in Poznan-Stare Miasto (543,48), in 1997 also in Poznan-Stare Miasto (525,91), in 1998 in Poznan-Grunwald (543,16), in 1999 in Poznan-Stare Miasto (527,08) and in 2000 in Poznan-Jeżyce (461,78) per 10 thousand of live births.

The lowest rates of death births in 1996 was noticed in the quarter of Poznan-Nowe Miasto – 42,77, in 1997 in the quarter of Poznan-Stare Miasto – 22,81, in 1998 in the quarter of Poznan-Wilda – 37,24, in 1999 in the quarter of Poznan-Jeżyce – 32,10 and in 2000 in the quarter of Poznan-Nowe Miasto – 35,40 per 10 thousand of overall births.

The highest rates of death births were recorded in the quarter of Poznan-Jeżyce in 1996 – 82,53,

Table 1. The values of synthetic measures of environmental hazards in quarters of the city of Poznan in years 1996, 1997, 1998, 1999 and 2000

Quarter	Synthetic measure					Index of environmental hazards					Rank				
	1996	1997	1998	1999	2000	1996	1997	1998	1999	2000	1996	1997	1998	1999	2000
Poznan-Grunwald	0,76	0,11	0,20	0,54	0,61	3	1	1	2	3	5	1	1	5	4
Poznan-Jeżyce	0,66	0,64	0,59	0,53	0,50	3	3	3	2	2	4	5	3	4	3
Poznan-Nowe Miasto	0,30	0,47	0,79	0,17	0,23	2	2	3	1	1	1	4	5	1	1
Poznan-Stare Miasto	0,47	0,53	0,59	0,50	0,73	2	2	3	2	3	3	3	4	3	5
Poznan-Wilda	0,41	0,30	0,23	0,27	0,29	2	2	1	2	1	2	2	2	2	2

Table 2. The values of synthetic measures of health indicators in quarters of the city of Poznan in years 1996, 1997, 1998, 1999 and 2000

Quarter	Synthetic measure					Index of health effects					Rank				
	1996	1997	1998	1999	2000	1996	1997	1998	1999	2000	1996	1997	1998	1999	2000
Poznan-Grunwald	0,75	0,57	0,35	0,32	0,78	3	3	2	2	3	5	4	3	2	5
Poznan-Jeżyce	0,57	0,66	0,36	0,11	0,37	3	3	2	1	2	4	5	4	1	3
Poznan-Nowe Miasto	0,24	0,35	0,24	0,51	0,25	1	2	1	2	1	1	2	1	4	1
Poznan-Stare Miasto	0,55	0,22	0,71	0,46	0,58	2	1	3	2	3	3	1	5	3	4
Poznan-Wilda	0,41	0,53	0,29	0,72	0,26	2	2	1	3	1	2	3	2	5	2

in the quarter of Poznan-Wilda in 1997 – 146,25, in the quarter of Poznan-Nowe Miasto in 1998 – 116,17, in the quarter of Poznan-Stare Miasto in 1999 – 92,99 and Poznan-Grunwald in 2000 – 110,44 per 10 thousand of overall births. The morbidity rate of malignant neoplasms in general had an upward trend from 37,56 in 1996 to 41,09 in the year 2000.

In 1996 in the district of Poznan, in 5 gminas, there weren't environmental risk: Puszczykowo, Buk, Dopiewo, Kleszczewo i Mosina, and the best health status was represented by the population of gminas: Lubon, Puszczykowo, Dopiewo, Kleszczewo, Mosina, Murowana Goslina, Pobiedziska, Suchy Las i Swarzędz. The potential environmental hazard to health (index 2) was observed in the following gminas: Czerwonak, Komorniki, Kostrzyn, Kórnik, Murowana Goślina, Pobiedziska, Rokietnica, Stęszew i Suchy Las, ho-

wever, while considering the health status, significant intensification of the adverse health effects, was noticed in the following gminas: Buk, Czerwonak, Komorniki, Kostrzyn, Kórnik, Stęszew i Tarnowo Podgórne. In the other gminas, the values of synthetic measure of environmental hazards to health exceeded the value of 0,55 and thus they were recognized as ones of the highest risk.

The best health situation of population was observed in the following gminas: Luboń, Puszczykowo, Dopiewo, Kleszczewo, Mosina, Murowana Goślina, Pobiedziska, Suchy Las i Swarzędz. The worst health situation was noticed in the population in one community: Rokietnica.

In 1997 in the following gminas: Puszczykowo, Dopiewo, Kleszczewo, Komorniki, Pobiedziska and Rokietnica there weren't any environmental hazards. The synthetic measure (value "2") was

noticed in the gminas: Buk, Czerwonak, Kostrzyn, Kórnik, Mosina, Murowana Goślina, Stęszew, Swarzędz, Tarnowo Podgórne. In the other gminas the level of environmental hazards was higher than 0,55 and there were high level of health risk. The best health situation of population was observed in the following gminas: Puszczykowo, Dopiewo, Komorniki, Kostrzyn, Kórnik, Mosina, Murowana Goślina, Stęszew and Suchy Las.

In 1998 in eight gminas: Puszczykowo, Buk, Dopiewo, Kleszczewo, Komorniki, Kostrzyn, Kórnik i Mosina there weren't any environmental hazards. The synthetic measure (value "2") was noticed in the gminas: Czerwonak, Murowana Goślina, Pobiedziska, Stęszew i Tarnowo Podgórne. In the other gminas the level of environmental hazards was higher than 0,55 and there were high level of health risk. The best health situation of population was observed in the following gminas: Puszczykowo, Czerwonak, Dopiewo, Komorniki, Kostrzyn, Kórnik, Mosina, Murowana Goślina, Pobiedziska, Stęszew, Suchy Las i Swarzędz.

In 1999 in seven gminas: Puszczykowo, Buk, Dopiewo, Kostrzyn, Kórnik, Mosina i Rokietnica. There weren't any environmental hazards. The synthetic measure (value "2") was noticed in the gminas: Czerwonak, Kleszczewo, Komorniki, Murowana Goślina, Pobiedziska, Stęszew, Suchy Las, Swarzędz i Tarnowo Podgórne. In the other gminas the level of environmental hazards was higher than 0,55 and there were high level of health risk. The best health situation was noticed in nine gminas: Luboń, Puszczykowo, Buk, Czerwonak, Kleszczewo, Komorniki, Rokietnica, Stęszew i Suchy Las. The worst health situation was noticed in the population in one community: Murowana Goślina.

In 2000 no environmental hazards was observed in the following gminas: Puszczykowo, Buk, Dopiewo, Kleszczewo i Mosina. Index 2 was calculated for gminas: Czerwonak, Komorniki, Kostrzyn, Kórnik, Murowana Goślina, Pobiedziska, Rokietnica, Stęszew i Suchy Las. In the other gminas, the values of synthetic measure of environmental hazards to health exceeded the value of 0,55, and thus they were recognized as ones of the highest risk. The best health situation was presented by the inhabitants of the following gminas: Buk, Czerwonak, Kleszczewo, Komorniki, Kostrzyn, Kórnik, Murowana Goślina, Stęszew, Suchy Las i Tarnowo Podgórne. The health status of the citizens of the following gminas: Lubon, Puszczykowo, Dopiewo, Kostrzyn, Mosina, Pobiedziska, Rokietnica i Swarzędz was considered as significantly affected. There were no gminas of index 3.

The rate of low birth weight reached the highest value in 1996 in Pobiedziska – 935,67, in 1997 in Murowana Goślina – 935,67, in 1998 in

Kleszczewo – 1090,91, in 1999 in Murowana Goślina – 1266,67, in 2000 in Dopiewo – 800 per 10 thousand of live births. The lowest rate of low birth weight was recorded in 1996 in Puszczykowo – 289,85, in 1997 in Komorniki – 240, in 1998 in Stęszew – 322,58, in 1999 in Rokietnica – 259,74 and in 2000 in Kleszczewo – 169,49 per 10 thousand of live births.

The rate of death births in 1996 reached the highest value in Stęszew – 191,08, in 1997 in Czerwonak – 265,49, in 1998 in Luboń – 197,37, in 1999 in Murowana Goślina – 196,08 and in 2000 in Dopiewo – 196,08 per 10 thousand of overall births.

The lowest rate of death births in 1996 was recorded in Kórnik – 57,14, in 1997 in Swarzędz – 26,95, in 1998 in Mosina – 38,61, in 1999 in Swarzędz – 27,4 and in 2000 in Mosina – 38,76 per 10 thousand of overall births. The morbidity from neoplasms among inhabitants of district of Poznan increased from 27,11 in 1996 to 31,1 in 2000.

The analysis of accordance of the table of environmental hazards and health effects showed that this proportionality was not completed and not obvious. The convergence coefficient of synthetic measures of environmental hazards and health effects in 1996 reached the value – 0,59, in 1997 – 0,50, in 1998 – 0,41, in 1999 – 0,36 and in 2000 – 0,45.

Discussion of results

In the city of Poznan, the highest correlation coefficient between environmental hazards measure and normalized indicators of adverse health effects was calculated for the mortality rate from malignant neoplasms ($r = 0,6$), mortality rate from respiratory diseases ($r = 0,6$), death births rate ($r = 0,5$) in the year 1996. Weak correlations, including those, without statistical significance were noticed in case of mortality rate from cardiovascular diseases ($r = 0,2$) and mortality rate from congenital malformations ($r = 0,2$). In 1997 the situation was similar to the situation in 1996 (normalized indicators for the mortality rate from malignant neoplasms, $r = 0,4$). There weren't correlations between environmental hazards and mortality rate from cardiovascular disease and congenital malformations. In 1998 the mortality rate from malignant neoplasms reached value – $r = 0,5$ and there was correlation between environmental hazards and low birth weight ($r = 0,5$). In 1999 the mortality rate from malignant neoplasms reached value – $r = 0,6$ and there wasn't correlation between environmental hazards and low birth weight.

The dramatic increase of the correlation coefficient was recorded in 2000 in case of the impact of environmental hazards on the incidence

of deaths from malignant neoplasms ($r = 0,9$). The highest value of correlation coefficient ($r = 0,36$) was noticed for low-weighted births and mortality from congenital malformations ($r = 0,31$) in 1996, the mortality rate from cardiovascular diseases in 1997 ($r = 0,32$), in 1998 ($r = 0,4$) and in 2000 ($r = 0,32$).

As shown by the values of particular correlation coefficients, only some of the adverse health indicators may be determined by environmental impact to some extent. This correlation may be significantly more often seen in case of urban and industrial areas, what is confirmed by the other scientists [10].

The analysis of dependence between environmental status and health condition of the population showed the increase of risk of morbidity from neoplasms in both the city of Poznan and the district of Poznan.

Many studies revealed clearly that children, including newborns and infants were the specific population that was particularly susceptible to environmental hazards. This is associated with physiological conditions and different from adults, features that may be essential in case of exposition to toxic substances. This susceptibility starts at prenatal period. Thus, there are cases of congenital malformations, allergies and so on [6]. Konczalik et al. describes other factors potentially influencing infant mortality rate being the specific indicator. They are as follow: access to healthcare, lifestyle, and behaviors related to

health presented by the parents. The differences in infant mortality rate depend also on industrialization and the level of environmental pollution. Therefore, discussed indicator, may reach different values in urban and non-urban areas [6]. It was also confirmed in this study. The mortality rate from congenital malformations and low birth weight in newborns, were these features that characterized population health in the area of the city of Poznan more often.

Conclusions

1. Higher rates of convergence have been noticed in urban areas of Poznan district, what may provide with information on greater interaction between environment and health.
2. There is strong link between environmental hazards and health status of the population living there.
3. The highest correlation coefficients have been observed while considering mortality from malignant neoplasms, low-weighted births and newborns mortality from congenital malformations.
4. There is a weak link between environmental hazards and health status of the population from non-urban areas. Change in death rate structure has been also observed there. The highest correlation coefficients for mortality from cardiovascular diseases have been noticed.

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Address for correspondence:
Dr n. med. Renata Adamek
Zakład Zdrowia Publicznego KMS
Uniwersytet Medyczny w Poznaniu
ul. Dąbrowskiego 79
60-529 Poznań
Tel. (061) 854-68-19
E-mail: radamek@ump.edu.pl

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PRACE ORYGINALNE • ORIGINAL PAPERS

The cluster analysis of body build in aspect of functional traits in boys aged 7–14

Typ budowy ciała a wydolność fizyczna chłopców w wieku 7–14 lat, w świetle analizy skupień

JUSTYNA ANDRZEJEWSKA^{B-F}, ANNA BURDUKIEWICZ^{A, B, G}, JADWIGA PIETRASZEWSKA^{B, F}

Department of Physical Anthropology University School of Physical Education, Wrocław
Head: Anna Burdukiewicz, PhD

A – Study Design, B – Data Collection, C – Statistical Analysis, D – Data Interpretation,
E – Manuscript Preparation, F – Literature Search, G – Funds Collection

Streszczenie **Cel pracy.** Celem pracy była ocena wzajemnych powiązań między cechami morfologicznymi oraz fizjologicznymi u chłopców w wieku szkolnym.

Materiał i metody. W analizie wykorzystano: pomiary ciągłe cech wysokościowych i masywności szkieletu, obwodów mięśniowych kończyn, grubości fałdów skórno-tłuszczowych i masy ciała oraz wydolności fizycznej 117 chłopców w wieku 7–14 lat z Wrocławia. Korzystając z pomiarów, wyliczono udział komponentów budowy ciała oraz typy budowy ciała. Uwarunkowania morfologiczne cech wydolności fizycznej zbadano za pomocą metody analizy skupień, którą posłużono się do uporządkowania macierzy korelacji cech morfo-funkcjonalnych.

Wyniki. Uzyskane wyniki wskazują na występowanie silnych powiązań między cechami charakteryzującymi poziom otluszczenia ciała i komponentu endomorfii. Kolejną wyraźną i izolowaną strukturę tworzy komponent ektomorfii. Cechy związane z masywnością szkieletu zwykle są ściśle powiązane z cechami wysokościowymi, masą ciała, obwodami mięśniowymi kończyn oraz komponentem mezomorfii. Parametry charakteryzujące wydolność fizyczną są często powiązane z komponentem budowy – mezomorfia i ektomorfia. Pojemność życiowa płuc natomiast tworzy niewielkie skupienie z długością tułowia i wysokością ciała. Nie zaobserwowano ścisłych powiązań między wydolnością fizyczną i cechami związanymi z otluszczeniem ciała.

Wnioski. Zastosowanie metody hierarchicznego uporządkowania powiązań między sferą czynnościową i morfologiczną przyczyniło się do precyzyjnego określenia możliwości wysiłkowych badanych chłopców w dwóch różniących się dynamiką rozwoju etapach ontogenezy (okres wczesnoszkolny i dojrzewania płciowego).

Słowa kluczowe: budowa ciała, typ budowy ciała, poziom wydolności fizycznej.

Summary **Background.** Physical function is ability to hard, long-lasting physical work without exhaustion. The decrease of ability to physical work is determined by the decrease of function of both respiratory and cardiovascular systems as well as by changes in morphological structure. The diverse dynamics of increasing of somatic features and body composition modifies level of physical function that determines human effort abilities.

Objectives. Evaluating of mutual relations between morphological and physiological features in boys aged 7 to 14.

Material and methods. Longitudinal measurements of somatic features (heights, breadths, circumferences, skin-folds) and physical function (vital capacity, maximum oxygen consumption) of 117 boys were used. The body build components were calculated: mesomorphy, endomorphy and ectomorphy. Physical endurance was assessed by using an indirect method employing the cycloergometric test. Morphological factors of physical function features were examined by using of cluster analysis.

Results. The obtained results indicate strong correlations between body fatness and endomorphy. Another isolated structure is created by ectomorphy. Massiveness of the skeleton are correlated with height features, body mass, limbs circumferences and mesomorphy. Parameters of physical function are connected with mesomorphy and ectomorphy. Lungs capacity created an agglomeration with the trunk length and body height. No connections between physical function and features relating to body fatness were found.

Conclusions. The application of method of hierarchical agglomeration of relations between morphological and functional spheres contributed to precise determination of effort capacities of the examined boys in early school and puberty period.

Key words: body building, type of body, physical endurance.

Introduction

Dissemination of knowledge concerning development phenomena is very significant as it facilitates counteraction of various threats both of social nature and arising from interferences in the natural biogeographical environment, which are brought on by civilization. For this reason, accurate recognition of regularities governing ontogenesis has basic significance for determining optimal and harmful factors for human development. A morphological description is based on the analysis of quantitative parameters, which directly characterize the human body and may be used for creation of a multidimensional and multifaceted view of the human being. Owing to this, numerous methods allowing for evaluation of body build types and tissues compositions have been developed. Body build components have many times been a point of reference for functional characteristics of the body, which also depend upon age and sex. Therefore physical function of children is subject to constant challenges as regards the growth and development of an organism [1, 2].

Experimental procedures

The research material consists of constant longitudinal measurement results of tests conducted in a group of 117 boys aged from 7 to 14 and attending one of the primary schools in Wrocław. The research work takes into account somatic characteristics measured with the measurement technique. The body build was characterized using W. Sheldon's typology and Heath & Carter's modification [3]. The research work has used such physiological parameters as maximum oxygen consumption per minute (VO_2max l/min) and the volume of performed work. The above-mentioned physiological features have made it possible to calculate indexes of quotients facilitating the evaluation of oxygen in relation to the body mass [VO_2max (ml/min)/body mass] of a tested person. Additionally lungs capacity was measured using the spirometer (cm^3).

Results

The application of analysis of agglomerations in seven aged boys made it possible to distinguish four complexes of features (Fig. 1 and 2). The first one includes a component of ectomorphy, oxygen absorption in its absolute values and in relation to the body mass and the volume of performed work. The other agglomeration includes features characteristic of the body obesity and

massiveness of body, like skinfolds on trunk and extremities and endomorphic component, Rohrer or BMI indexes and mesomorphic component. A separate group includes traits of muscles, skeleton and body mass. The fourth complex of features includes parameters characteristic of height and width measurements of the skeleton connected with the lungs capacity.

Another examination (8 years old) involved the shifting of the considered features, whereas the number of agglomerations remained unchanged (Fig. 1). The endomorphy, skin folds still create a clearly separated agglomeration. Another examination took into account the mesomorphy and muscle circuits of the arm, shin and thigh as well as all the variables characteristic of the level of the body massiveness. Another agglomeration of three elements consisted of physical function features and ectomorphy component. The last group involved the body height, the length of lower limbs and trunk, the width of epiphysis and lungs capacity.

In the group of 9-year-old boys there has been an increased value of agglomeration coefficients (Fig. 1). The features of physical function and slender of body constitute a clearly separated complex. The second complex of features includes parameters characterizing the stoutness of the body build, among which there are: the mesomorphy, the width of epiphysis, muscle circuits and the body mass. The other agglomeration includes features relating to the body obesity and connected with the endomorphy, the contents of number of skinfolds on the arm regarded as a good obesity indicator. The capacity of lungs refers to the height and length features. Another examination (10 years old) did not reveal any significant changes in the outlay of particular agglomerations (Fig. 1). It is worth noting the increase of strength of relations between lungs capacity, the length of trunk and, in general, the features connected with the body obesity and characteristic of stoutness of the body build. Compared to the previous examination carried out, 11-year-olds were proved to have a distinct dichotomous division of the complex of features constituting the stoutness of the body build (Fig. 2). One agglomeration consists of muscle circuits and one mesomorphy component, whereas the other includes the skeleton dimensions, lungs capacity and the body mass and the volume of performed work. Physical function parameters strictly refer to the described agglomeration. The features characteristic of the body obesity, the slender body build, constitute separate complexes, which are relatively weakly linked with the previous group of measurements.

As far as the age of 12 is concerned, they have found still relations between oxygen absorption,

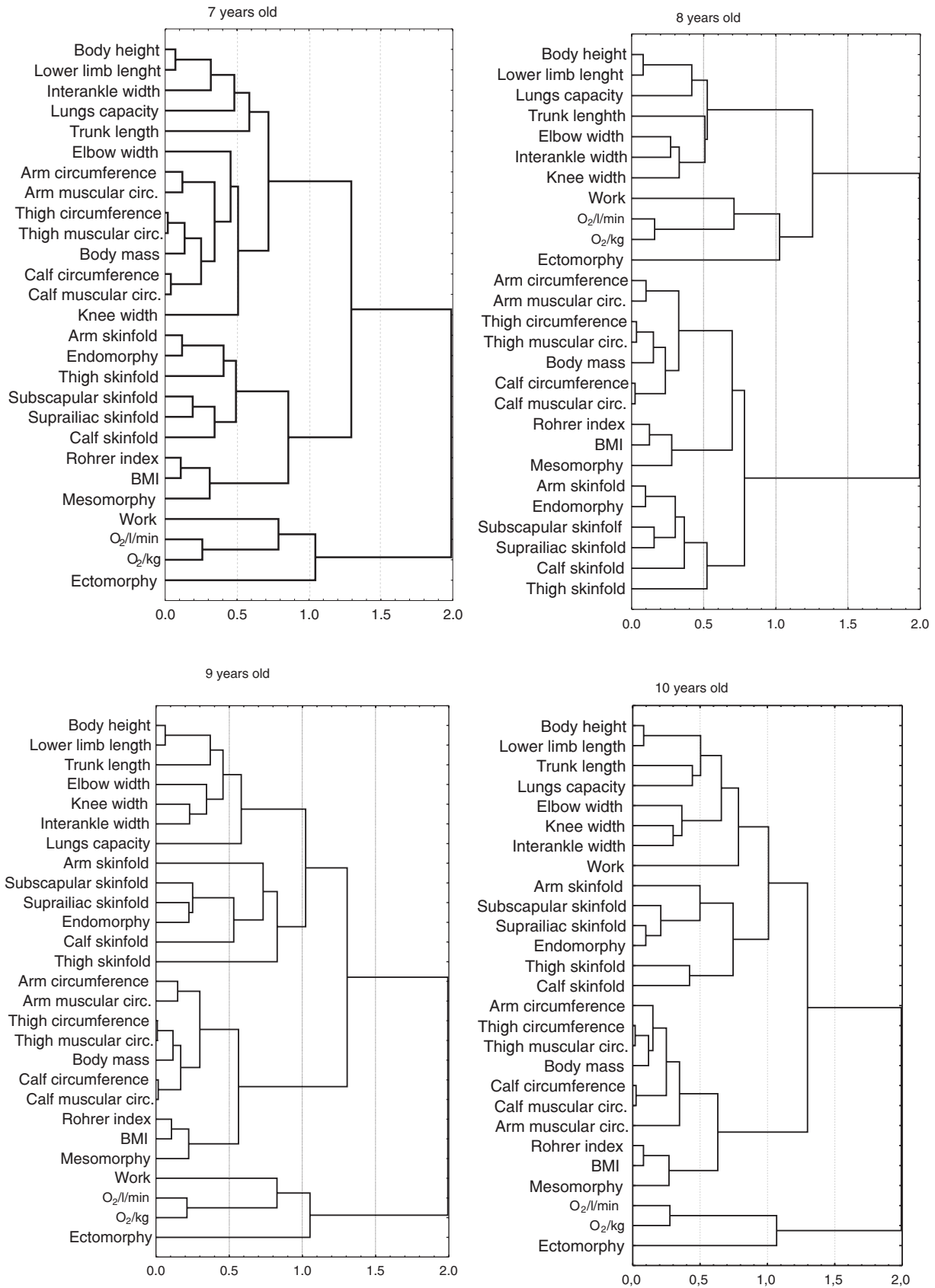


Fig. 1. The cluster analysis of somatic and functional traits in prepubertal boys

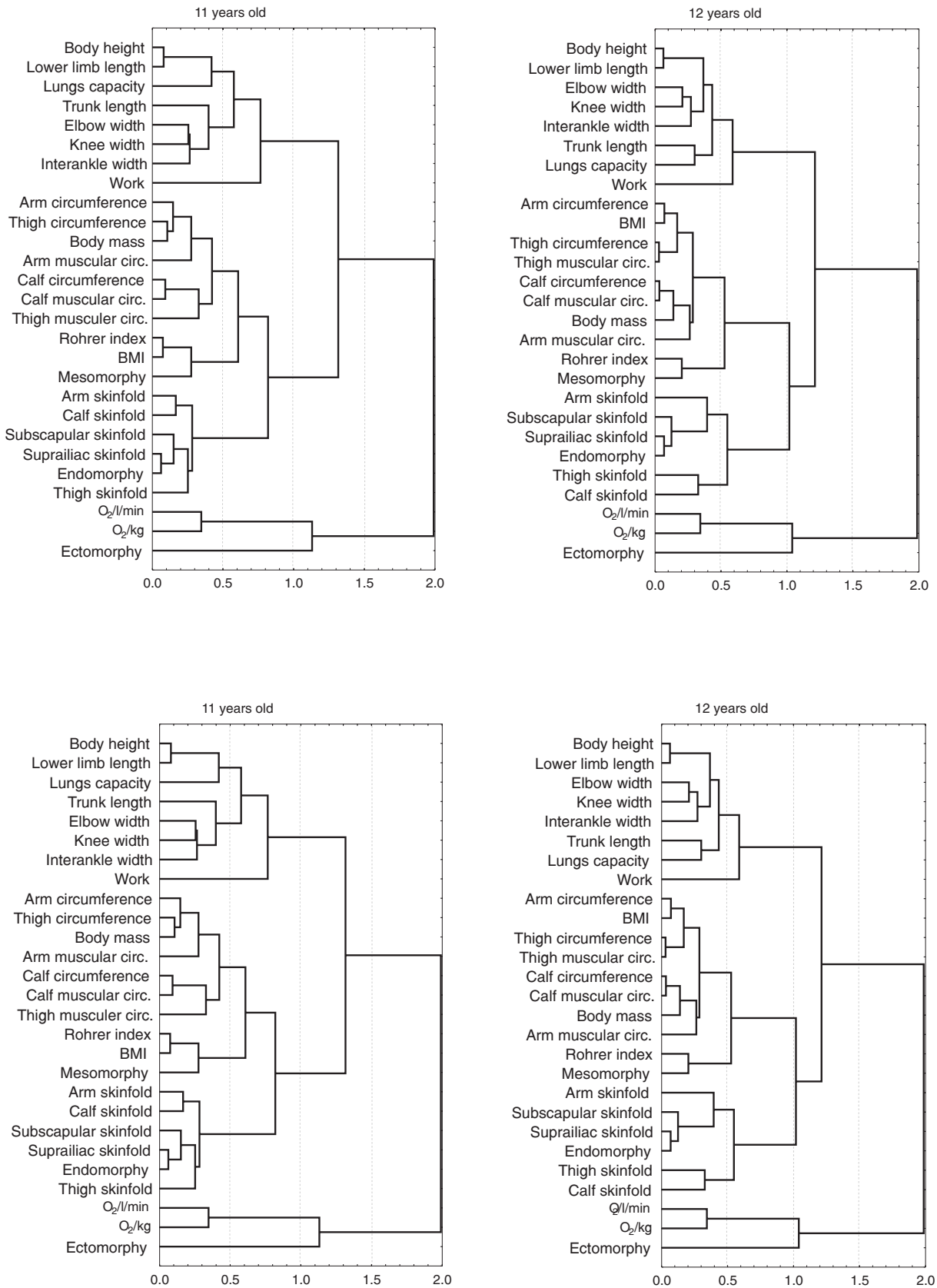


Fig. 2. The cluster analysis of somatic and functional traits in pubertal boys

and the ectomorphy. On the other hand, the features characteristic of the development of skeleton and muscle system, constitute a clearly separated agglomeration with its volume of lungs capacity and the work performed (Fig. 2).

Grouping of features in 13-year-old boys have brought other changes (Fig. 2). Although there are still four agglomerations, the attention is focused on, as compared to the previous examination, the fact that the oxygen absorption has been included in the group of features characteristic of the massiveness and length of skeleton. There are still very permanent complex like the ectomorphy and oxygen consumption per kilogram of body mass. At the same time stricter connections between obesity parameters and isolation these features from general measurements of the body and its massiveness have been found.

In another age group (14 years old) we can see the dichotomous division of morphological features into the complex consisting of the height and width measurements of the skeleton with weakly connection with physiological features on the one hand, and the features characteristic of the development of muscle system and body obesity on the other hand (Fig. 2). Lungs capacity is strictly connected with the length of trunk, whereas the volume of oxygen absorption per kilogram constitute a separate two-element complex as regards the first agglomeration in question. Another group of features consists of the endomorphy, skinfold on the iliac crest, under the bottom angle of shoulder blade, on the arm and, a bit weaker related, skinfold on the shin.

Discussion

Owing to the cluster analysis we separated a complex of features consisting of parameters characteristic of height sections and body massiveness supplemented by lungs capacity. Oxygen consumption and work performed by boys in their pre-puberty stage indicate tendencies of merging with the ectomorphy, whereas in older boys these two elements tend to shift towards features characteristic of the body massiveness [4]. The features characterizing the body obesity always create a clear and separate agglomeration.

The correlations between the features of physical function are high. According to researchers of the field there is a significant relation between maximum oxygen consumption, restitution and the performed work [5]. Owing to this, the maximum oxygen consumption and the level of performed work seem to be good indicators of the human physical function. The maximum oxygen consumption indicated to a high degree of relation to physical function indicators, which is the

result of the same structure of both parameters. However, with age, they indicate tendencies of decrease of their influence upon the maximum oxygen consumption.

The level of work performed depends upon motivation; however, the dominant element is the contents of the muscle mass facilitating the performance of work with increasing load [6, 7]. Boys are characterized both by the increased willingness to perform exercises and a greater number of active elements of the body composition and, therefore, they have a higher level of performed work. Additionally, males are characterized by the dominance of the mesomorphy component in their body build which favours the performance of a given work [8, 9].

Effort capacities, which are characterized by oxygen consumption in relation to the body mass and the lean body mass of an organism, depend upon lungs capacity and the muscle mass. The above mentioned indicators have greater values in males during the entire ontogenetical development [10, 11]. However, the evaluation of oxygen consumption in case of children is ambiguous due to the lack of plateau stage during exercises made by some children, which is the result of nothing else but unwillingness to make excessive effort. Therefore we can discern some differences in the evaluation of oxygen consumption depending on a country or environmental background of the examined children and young people [12, 13]. In all of the tests boys proved to have greater skeleton mass, increased contents of the lean body mass, which results in their mesomorphic build. Moreover, boys achieved high degree of development of physical function parameters [14, 15].

On the basis of their examinations of children not related to one another and twins, Lutoslawska [16] and Halicka-Ambroziak [17] proved that the volume of physical function (VO_2max) and capacity of lungs are genetically conditioned [18]. Lutoslawska [19] also found a significant relationship between the mass body height and oxygen consumption value in one minute. Among the examined they found a strong relationship between the capacity of lungs, performed work and morphological elements with the exception of the body obesity elements. The build and tissue components have a rather weak influence upon the level of the examined parameters. Boys, being more mesomorphic than girls, show higher level of work performance than their female peers [20].

To sum up we can state that the features indicating the body obesity in the examined boys prove to create a clearly separated complex consisting of skinfold on the arm, iliac crest, under the bottom angle of shoulder blade, endomorphy, and fat mass and, a weakly related, skinfold on the shin. Another relatively stable agglomeration

consists of the ectomorphic component and the percentage share of water and the lean body. In boys entering their puberty stage there are tendencies of stronger relations between the described complex and the stoutness of the body build. At the same time in the pre-puberty stage there is a tendency of attaching physical function

features. Boys have distinctly separated measurements characteristic of the stoutness of the body build. Additionally, their massiveness of build indicates strong relations with physical function features. Lungs capacity, however, most commonly co-exists with the length of trunk.

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Address for correspondence:

Dr n. o kult. fiz. Justyna Andrzejewska

Zakładu Antropologii Fizycznej

Akademii Wychowania Fizycznego

al. I.J. Paderewskiego 35

51-612 Wrocław

Tel. (071) 347-32-63

Tel. 0693 312-928

E-mail: justyna.Andrzejewska@awf.wroc.pl

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PRACE ORYGINALNE • ORIGINAL PAPERS

The amount and kind of feet defects with relation to normal feet in kindergarten and primary school children

Ocena ilości i rodzaju wad stóp w stosunku do stóp prawidłowo wysklepionych u dzieci w wieku przedszkolnym i wczesnoszkolnym

ANETA BAC^{1, A-G}, RENATA WOŹNIACKA^{2, A-G}, TOMASZ SZAPORÓW^{1, C, D}¹ Department of Clinical Rehabilitation, Orthopedics Unit, AWF Kraków
Head: Prof. Anna Marchewka, PhD² Department of Physiotherapy, Anatomy Unit, AWF Kraków
Head: Prof. Marek Pieniążek PhT, PhDA – Study Design, B – Data Collection, C – Statistical Analysis, D – Data Interpretation,
E – Manuscript Preparation, F – Literature Search, G – Funds Collection

Streszczenie **Wstęp.** Stopy ludzkie bardziej niż inne części narządu ruchu są narażone na działanie niekorzystnych czynników środowiskowych, stąd też ich wady stały się zjawiskiem bardzo często spotykanym, zwłaszcza u dzieci i młodzieży [1].

Cel pracy. Celem badań była próba oceny ilości i rodzaju wad stóp w stosunku do stóp prawidłowo wysklepionych u dzieci w wieku przedszkolnym i wczesnoszkolnym.

Materiał i metody. W listopadzie i grudniu 2007 r. przeprowadzono badania podoskopowe stóp u dzieci w wieku przedszkolnym i wczesnoszkolnym. Grupę badawczą stanowiło 361 dzieci urodzonych w latach 1995–2004 uczęszczających do przedszkola i szkoły podstawowej w Krakowie. Do badania wykorzystano metodę podoskopową. Wśród ocenianych cech znalazły się: wskaźnik Sztritera-Godunowa (Ky), kąt piętowy γ , koślawość palucha α , szpotawość palca małego β , długość i szerokość stopy.

Wyniki. W badanej grupie wraz z wiekiem zwiększa się odsetek stóp patologicznych. Częstszym zaburzeniem wysklepienia jest stopa wydrążona.

Wnioski. Najrzadziej występującą patologią wysklepienia stóp u dzieci w badanej grupie było płaskostopie. U dziewcząt po 8. r.ż. najczęściej występuje stopa wydrążona. W badanej grupie dzieci 4–12-letnich zaobserwowano niewielki odsetek nieprawidłowego ustawienia palców I i V. U ponad połowy dzieci kąt piętowy przyjmuje wartości poza normą.

Słowa kluczowe: płaskostopie, stopa wydrążona, badanie podoskopowe, wady stóp.

Summary **Background.** Human feet are more than other parts of organ of movement, adverse environmental factors prone. Therefore, their defects are very common especially among children and youngsters [1].

Objectives. The aim of the research was the attempt to estimate the number and kind of feet defects in relation to feet correctly profiled.

Material and methods. In November and December 2007 podoscopic research was carried out among pre-school and schoolchildren. The group researched consisted of 361 children born between 1995–2004 attending a kindergarten and a school in Cracow. Podoscopic method was used for the research. The following characteristics were evaluated: Sztriter-Godunow index (Ky), heel angle γ , hallux valgus α , digitus varus β , the length and width of foot.

Results. In the group examined the percentage of pathological feet increases with the age. Hollow foot is a more common foot profile disorder.

Conclusions. The least common pathology of feet profile among the children was flat foot. Hollow foot is the most common pathology among the girls aged 8. Is it pathology or a desired feature? In the group of examined children between 4–12 a small percentage of incorrect orientation of toes I and V. Over a half of children show the heel angle value over the norm.

Key words: flat foot, hollow foot, podoscopic research, feet defects.

Introduction

Human feet are more than other parts of organ of movement, adverse environmental factors pro-

ne. Therefore, their defects are very common especially among children and youngsters [1].

There is a lot of news in literature on the widespread problem of feet profile constitution, both

longitudinal and lateral, especially among children [2–5].

Taking into consideration an important role that a foot plays in everyday life, it is justifiable to carry out a proper diagnosis and the evaluation of children's feet state, in order to detect any potential problem in their constitution. It guarantees a successful treatment taken at this stage [6, 7]. One of the modern methods of human feet constitution is a podoscopic method. During diagnosis it is possible to get a foot scanned and provide a solid evaluation of chosen ratios. Simplicity of both, receiving the picture of a foot and counting the angles and the parameters chosen allow for a quick and exact hollow level estimation, as well as its length, width and other potential pathologies estimation, such as hallux valgus or digitus varus.

Objectives

The aim of the research was the attempt to estimate the number and kind of feet constitution defects in relation to proper feet profile among school and pre-school children.

Material and methods

The research was carried out in November and December 2007. The children attended a randomly picked kindergarten and school in Cracow. Material under investigation included 361 children born between 1995–2004. Among the pre-school children (111 children) there were

59 girls and 52 boys, while in the school children group (250 children) there were 125 girls and 125 boys.

A podoscopic method of feet profile evaluation was used to gather the basic research parameters. An apparatus, which was the property of "Reh-As" company from Cracow, was used to carry out the survey. The set consisted of a scanner with built-in sensors and a computer with an author's program for scanned picture analysis. Each measurement was taken simultaneously for both feet. Feet scanning was performed twice for every child – the first picture was used for the calibration of the apparatus and the second was the proper picture. On the basis of the second scan the parameters determining a foot constitution and level of its profile were calculated. The following parameters were used for feet evaluation: Sztriter-Godunow (Ky), heel angle γ , hallux valgus α and digitus varus β . The marking of the above parameters was based on the norms included in a book "Wady postawy ciała" by T. Kasperczyk [8].

Additionally, the height, weight and three skinfolds (subscapula skinfold, abdominal skinfold, triceps skinfold) were measured.

Results

Table 1 and 2 shows average values of angle α (hallux valgus), angle β (digitus varus) and γ (heel angle) as well as average values for Sztriter-Godunow index (Ky). In the group examined those values were shown separately for pre-school children and school children.

Table 1. Average α , β and γ angle values among pre-school children

	\bar{x}	Sd	min	max	\bar{x}	Sd	min	max
	angle α left foot				angle α right foot			
Boys	4.4	2.9	0	13.5	4.6	3.6	0	17.4
Girls	4.1	3.1	0	10.9	4.1	3	0	12.9
Total	4.2	3	0	13.5	4.3	3.3	0	17.4
	angle β left foot				angle β right foot			
Boys	4.3	4	0	16.4	4.9	3.8	0	21.3
Girls	3.1	2.4	0	8.3	4.5	3.8	0	18.9
Total	3.7	3.3	0	16.4	4.7	3.8	0	21.3
	angle γ left foot				angle γ right foot			
Boys	15	2.1	10.4	20.1	15.5	2.1	10.1	19.4
Girls	14.8	2.2	9.2	21.9	15.3	2.4	9.2	22.9
Total	14.9	2.2	9.2	21.9	15.4	2.2	9.2	22.9
	Ky index left foot				Ky index right foot			
Boys	0.3	0.23	0	1	0.34	0.2	0	0.96
Girls	0.26	0.24	0	1	0.29	0.21	0	1
Total	0.28	0.23	0	1	0.31	0.21	0	1

Source: own calculations.

Table 2. Average α , β and γ angle values among the school children

	\bar{x}	Sd	min	max	\bar{x}	Sd	min	max
	Angle α left foot				angle α right foot			
Boys	4.2	2.9	0	12.1	4	2.9	0	12.3
Girls	4.4	3.2	0	14.4	3.7	3.1	0	15.4
Total	4.3	3	0	14.4	3.9	3	0	15.4
	angle β left foot				angle β right foot			
Boys	3.9	2.3	0	9.8	4	2.9	0	15.2
Girls	3.8	2.7	0	14.7	4.3	3.2	0	14.3
Total	3.8	3	0	14.7	4.1	3.1	0	15.2
	angle γ left foot				angle γ right foot			
Boys	14.6	1.9	9.6	20.6	14.8	1.9	9.6	20.6
Girls	14.4	1.9	8.8	19	14.4	1.9	7.1	18.3
Total	14.5	1.9	8.8	19	14.6	1.9	7.1	20.6
	Ky index left foot				Ky index right foot			
Boys	0.2	0.2	0	0.89	0.2	0.2	0	0.82
Girls	0.14	0.17	0	0.45	0.16	0.16	0	0.48
Total	0.17	0.18	0	0.89	0.18	0.17	0	0.82

Source: own calculations.

Table 3 shows a percentage of properly built and profiled feet as well as a percentage of feet with defects in given age groups. In the group examined the percentage of children with the norm of α and β angles exceeded is small. In some age groups there are no children with hallux valgus or digitus varus. The different situation is with regards to the values of γ angle. In most age groups and both sex groups the values for this angle are exceeded over 50%. The correct values of γ angle found among over half of the children, occurred among 4 year-old girls in right foot, among boys the same age in both feet and among 12 year-old boys also in right foot. In view of the small number of 4 year-old children, the results cannot be reliable and they require a confirmation.

The foot profile was estimated on by analyzing the Ky index value. Among the pre-school children properly profiled feet were ascertained among 45,9% of the children on the left side and 51,4% on the right side. In the school children group the percentage of children with properly profiled feet was 36,8% for both feet.

In the group examined the percentage of children with flat foot was relatively small: 11,7% for left foot and 12,6% for right foot in kindergarten, and 2,8% for both feet among the school children. The Ky index value indicating a hollow foot occurred among 60,4% of the school children. In the kindergarten group these values were noted among 42,3% of children for left foot and 36% for right foot.

Table 4 shows the percentage distribution of Ky index value for specific age groups and sex. Girls after over the age of 8 were not suffering from flat

foot. In the same sex group the hollow foot was the most common between 7 and 10. The percentage of girls with hollow foot oscillated from 68% to 80% for left foot and 64% to 80% for right foot. Over a half of girls with properly profiled feet were found in groups aged 4 and 6. Flat foot was more common among the boys than girls. It was not observed among 8 and 10 year-olds. The values of 10% children with flat foot were found in groups of 4,5 and 7 year-olds for both feet among the boys aged 9 (left foot) and 12 (right foot). Hollow foot was less common in the group of boys rather than in the group of girls. 74,1% of boys with hollow foot were at the age of 10. The overpoise of properly profiled feet were observed in the group of 6 year-olds only (66,7%).

Discussion of results

The feet constitution pathologies among children and youth, are widely discussed in Polish and foreign literature. According to Lizis [9] the development of foot ends at the age of 11, so the research among pre-school and school children is the best way to show the dynamics of foot development as well as allow early diagnosis of occurring pathologies.

In the work of Demczuk [10], evaluating the percentage characteristics of the foot profiles types based on different classification, the percentage of hollow foot is 21,4%, proper 51,4% and flat 27,2%. The above results obtained by Sztriter-Godunow method in foot weight do not overlap the results of the research carried out by

Table 3. Percentage of correct and defected feet in respective age groups among girls													
Age	n	angle α L		angle α R		angle β L		angle β R		angle γ L		angle γ R	
		% c	% d	% c	% d	% c	% d	% c	% d	% c	% d	% c	% d
Girls													
4	3	100	0	100	0	100	0	66	33	33	66	66	33
5	12	91.7	8.3	91.7	8.3	100	0	100	0	25	75	50	50
6	27	96.3	3.7	96.3	3.7	100	0	92.6	7.4	25.9	74.1	44.4	55.6
7	39	84.6	15.4	94.9	5.1	97.4	2.6	92.3	7.7	46.2	53.8	43.6	56.4
8	20	95	5	95	5	100	0	100	0	40	60	40	60
9	20	100	0	100	0	85	15	85	15	30	70	30	70
10	25	84	16	88	12	100	0	96	4	28	72	36	64
11	19	89.5	10.5	89.5	10.5	100	0	94.7	5.3	42.1	57.9	26.3	68.4
12	16	93.8	6.3	100	0	100	0	87.5	12.5	37.5	62.5	43.8	56.3
Boys													
4	4	100	0	100	0	100	0	100	0	75	25	75	25
5	10	80	20	80	20	80	20	90	10	50	50	50	50
6	18	100	0	100	0	88.9	11.1	83.3	16.7	50	50	44.4	55.6
7	37	89.2	10.8	94.6	5.4	91.9	8.1	94.6	5.4	40.5	59.5	45.9	54.1
8	22	100	0	100	0	95.5	4.5	95.5	4.5	27.3	72.7	72.7	27.3
9	12	90.9	9.1	100	0	100	0	90.9	9.1	45.5	54.5	63.6	36.4
10	27	96.3	3.7	96.3	3.7	100	0	96.3	3.7	25.9	74.1	33.3	66.7
11	27	85.2	14.8	92.6	7.4	96.3	3.7	96.3	3.7	33.3	66.7	22.2	77.8
12	20	90	10	90	10	95	5	95	5	40	60	65	35

L – left foot, R – right foot. % c – correct foot, % d – defective foot.

Source: own calculations.

Table 4. Percentage distribution of feet profile kind among the examined children													
Boys						age	Girls						
Ky L			Ky R				Ky L			Ky R			
% h	% n	% f	% h	% n	% f		% h	% n	% f	% h	% n	% f	
50	25	25	25	50	25	4	33	66	0	33	66	0	
50	30	20	30	40	30	5	33.3	41.7	25	25	50	25	
27.8	66.7	5.6	33.3	66.7	0	6	40.7	51.9	7.4	33.3	59.3	7.4	
37.8	48.6	13.5	45.9	43.2	10.8	7	69.2	28.2	2.6	64.1	30.8	5.1	
68.2	31.8	0	50	50	0	8	70	30	0	65	30	5	
54.5	27.3	18.2	54.5	36.4	9.1	9	80	20	0	80	20	0	
74.1	25.9	0	74.1	25.9	0	10	68	32	0	72	28	0	
51.9	44.4	3.7	48.1	48.1	3.7	11	52.6	47.4	0	52.6	47.7	0	
35	55	10	45	40	15	12	56.3	43.8	0	56.3	43.8	0	

L – left foot, R – right foot. % h – hollow foot, % f – flat foot, % n – normal foot.

Source: own calculations.

the authors of this article. In this research a considerable percentage of hollow feet (60,4%) in relation to the properly profiled feet (36,8%). The lowest percentage values for the group examined were gained for the flat foot (2,8%). In the group examined, the differences between the sexes were separated: in the group of girls there were more cases of hollow foot (64,8%), but with the lack of

flat foot (0% left foot, 0,8% right foot). In the group of boys there were more properly profiled feet (38,4% left foot, 39,2% right foot) and lower profile feet (5,6% left foot, 4,8% right foot). However, hollow foot was still the most common defect (56%). The biggest percentage of hollow foot occurring in the group of girls can be associated with the progressing weight loss of girls con-

nected with their development and finished with the puberty leap, which drew attention of Chrzanowska and Gołąb et al. [11].

The above research results show an early sex dimorphism in the group examined, which was also proved in earlier research by Lizis [12]. Any significant differences between both feet for boys and girls were not observed.

In the group examined the foot profile differences were observed in the respective age categories. The highest percentage of hollow foot occurred among 9 year-old girls and 10 year-old boys. Girls aged 6 had the properly profiled feet most commonly. Flat foot was diagnosed among 6 year-old girls and 7–9 year-old boys.

Among the children examined the other pathologies like hallux valgus and digitus varus were very rare, which is accordant to the thesis by Fixsen [13]. The main reason for these defects in

incorrect footwear and this problem often concerns grown-ups. They are also genetically conditioned which is also a reason for the small number of those defects among children.

Conclusions

1. The least common pathology of feet profile among the children was flat foot.
2. Hollow foot is the most common pathology among the girls aged 8. Is it pathology or a desired feature?
3. In the group of examined children between 4–12 a small percentage of incorrect orientation of toes I and V.
4. Over a half of children show the heel angle value over the norm.

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Address for correspondence:

Dr n. o kult. fiz. Aneta Bac
AWF im. B. Czecha
Al. Jana Pawła II 78
31-571 Kraków
Tel. 603 88 67 67
E-mail: aneta.bac@awf.krakow.pl

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PRACE ORYGINALNE • ORIGINAL PAPERS

Trauma in children due to child abuse – own experience

Urazy u dzieci a zespół maltretowanego dziecka – doświadczenia własne

HANNA BUŁHAK-GUZA^{A, C-F}, MARIA KLIMANEK-SYGNET^{B, D}, ANNA TACZALSKA^{B, E},
PIOTR SZYMOR^{B*}, ANDRZEJ CHILARSKI^{A, G}

Department of Paediatric Surgery and Urology, Polish Mother's Health Institute

Head: Prof. Andrzej Chilarski MD, PhD

* Student of Medical University of Lodz

A – Study Design, **B** – Data Collection, **C** – Statistical Analysis, **D** – Data Interpretation,
E – Manuscript Preparation, **F** – Literature Search, **G** – Funds Collection

Streszczenie **Cel pracy.** Celem pracy była ocena rodzaju obrażeń oraz częstości hospitalizacji dzieci z powodu zespołu maltretowania dziecka (child abuse).

Materiał i metody. W Klinice Chirurgii i Urologii Dziecięcej Instytutu Centrum Zdrowia Matki Polki w latach 2001–2007 z powodu obrażeń ciała powstałych na skutek przemocy w rodzinie hospitalizowano 28 dzieci (12 dziewczynek, 16 chłopców) w wieku od 2 miesięcy do 17 lat. Analizie poddano dokumentację medyczną ofiar przemocy w rodzinie. Oceniano: wiek, rodzaj obrażeń ciała leczonych dzieci oraz sprawcę przemocy.

Wyniki. Od 2004 r. liczba ofiar przemocy spadła, chociaż niepokojący jest fakt dużej liczby małych dzieci do 7. roku życia (13/28). Najczęstszymi urazami były: potłuczenia ogólne i urazy głowy. Aż troje dzieci było molestowanych seksualnie.

Wnioski. 1. Bardzo duża liczba ofiar maltretowania w rodzinie to dzieci małe, poniżej 7. roku życia. 2. Bardzo niepokojący jest fakt molestowania seksualnego małych dzieci.

Słowa kluczowe: dziecko krzywdzone, agresja w rodzinie.

Summary **Objectives.** The aim of study was evaluation of types of trauma and frequency of hospitalization among children due to child abuse.

Material and methods. In the Department of Paediatric Surgery and Urology, Polish Mother's Health Institute, between 2001–2007 28 children (12 girls and 16 boys) aged from 2 months to 17 years were hospitalized due to traumatic lesions resulting from abuse in the family. Medical records of victims were analysed. We evaluated the age of children, types of traumatic lesions in our patients and who was the child abuser.

Results. Since 2004 the number of maltreated children has decreased, however large number of very small children (below 7 years of age) in this group (13/28) is distressing. The most common types of trauma were: generalized trauma and head trauma. Three children were sexually abused.

Conclusions. 1. Among children abused in the family, a large number are very small children, below 7 years of age. 2. Sexual abuse of small children is an alarming fact.

Key words: child abuse, family aggression.

Introduction

Child abuse is the physical, psychological or sexual abuse or neglect of children. While most child abuse happens in the child's home, large numbers of cases of child abuse have been identified within some organizations involving children, such as churches, schools, child care businesses, and residential schools.

Objectives

The aim of study was evaluation of types of trauma and frequency of hospitalization among children due to child abuse.

Material and methods

We analyzed medical records of children hospitalized in the Department of Paediatric Surgery and Urology, Polish Mother's Health Institute, from 2001–2007 due to traumatic lesions resul-

ting from abuse in the family. We evaluated the age of children, types of traumatic lesions and perpetrator of abuse.

Results

In the Department of Paediatric Surgery and Urology, Polish Mother's Health Institute, from 2001–2007 28 children (12 girls and 16 boys) aged from 2 months to 17 years were hospitalized due to traumatic lesions resulting from abuse by a family member or someone entrusted with the care of the child. The number of patients increased from 2001 to 2004 and then decreased slowly (Figure 1).

Most often the abuser was the father or mother's partner ($n = 21$), in other cases the mother ($n = 2$), brother ($n = 2$) or trusted supervisor ($n = 2$) (Figure 2).

The age of battered children ranged from 2 months to 17 years. Twelve battered children were very small (below 7 years of age) (Figure 3).

Table 1 presents types of trauma and affected body areas in victims of abuse in the family. Generalized trauma ($n = 15$) and head trauma ($n = 12$) were most common. In one child trauma was accompanied by brain concussion. Three girls were sexually abused. Two were aged 2 years and one was 9 years old. In two cases the father was the abuser, in one case the trusted supervisor.

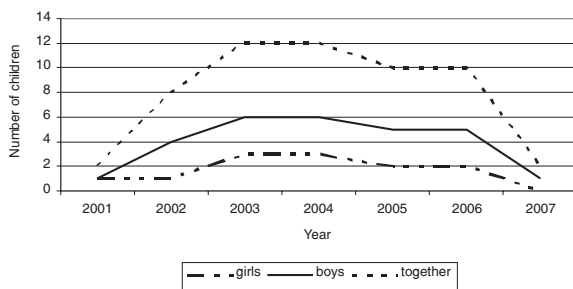


Fig. 1. Number of hospitalized children in years 2001–2007

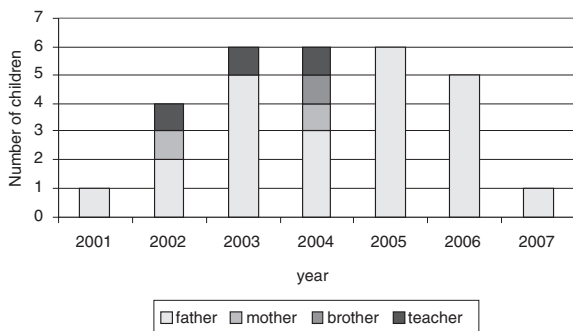


Fig. 2. Number of hospitalized children in years 2001–2007 and the perpetrator

Table 1. Types of trauma in victims of abuse in the family

Types of trauma by body area	Number		
	girls	boys	total
Generalized trauma	2	14	16
Head	3	9	12
Brain concussion	0	1	1
Nose	2	2	4
Chest and abdomen	2	2	4
Extremities	1	1	2
Others:			
knee burns		1	1
buttocks	0	2	2
neck (choking)	1	1	2
sexual abuse	3	0	3
groin	0	1	1
fractured teeth	1	0	1

Discussion

Abuse within the family is present in all environments, regardless of social status or financial condition. This phenomenon is most common in pathological families, broken families and families with an alcohol problem [1–3]. In the majority of cases victims of abuse in the family are children. Despite news media reports (after several drastic acts of abuse in the family which ended fatally) the problem of aggression in the family still seems to be an embarrassing and concealed topic. Often the necessity of hospitalization due to bodily trauma reveals the long standing problem and activates social and national institutions to care for a child abused in his/her own family.

The material presented in this study constitutes only the tip of the iceberg. It does not involve psychological abuse or nurturing neglect, which are parts of abused child syndrome. Victims of abuse, which is reflected in our study group, are usually small children, who cannot speak or cannot understand that the situation is abnormal, or who do not have anybody to ask for help. Older children do not report trauma for fear of retribution or

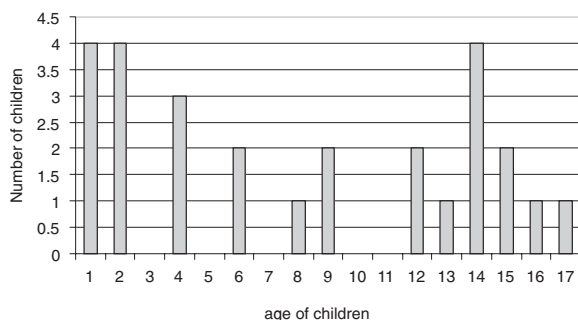


Fig. 3. Age of battered children

embarrassment – they are ashamed of their parents [4].

The abusers in our study group were mostly males (fathers, mother's partners, brothers), only in two cases it was the mother.

Although the number of children hospitalized in our department decreased, it does not reflect a decrease in the problem itself.

Injuries in victims of familial abuse involved almost all body areas. In our material these were usually superficial lesions, bruises, excoriations. Second most common were head trauma cases, in one patient with signs of brain concussion. Three girls from this small group were sexually abused, two of them were below 2 years of age [1, 5, 6].

In this study we did not analyze the duration of treatment, as it did not reflect the severity of trauma, and resulted from the necessity of investigating the social conditions of the child. All chil-

dren hospitalized in our department due to abuse are reported to our social worker, who analyzed the situation of the child and took appropriate steps to prevent further acts of aggression.

In a civilized society there should be no situations requiring hospitalization of a child due to abuse, but in order to achieve this, everyone: teachers and family physicians in particular, need to be vigilant and take action towards even smallest signs of familial abuse to children [1, 5–8].

Conclusions

1. Among children abused in the family, a large number are very small children, below 7 years of age.
2. Sexual abuse of small children is an alarming fact.

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Address for correspondence:

Dr n. med. Hanna Bułhak-Guz
Klinika Chirurgii i Urologii Dziecięcej ICZMP
ul. Rzgowska 281/289
93-338 Łódź
Tel./fax: (48) (042) 271-13-58
E-mail: hbulhak@wp.pl

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PRACE ORYGINALNE • ORIGINAL PAPERS

The incidence of malignant nonmelanoma skin cancer in the inhabitants of the silesian voivodeship

Zachorowalność na nieczerniakowe nowotwory złośliwe skóry populacji zamieszkującej województwo śląskie

MAŁGORZATA JUSZKO-PIEKUT^{1, A-D, G, F}, ZOFIA KOŁOSZA^{2, A-D},
ALEKSANDRA MOŹDZIERZ^{1, A, D-F}, BRUNON F.P. ZEMŁA^{2, A, B, D}, JERZY STOJKO^{1, A, B, D}

¹ Medical University of Silesia in Katowice, Poland

School of Pharmacy Department of Hygiene, Bioanalysis and Environmental Studies

Director: Prof. Jerzy Stojko MD, PhD

² Center of Oncology of M. Skłodowska-Curie Memorial Institute, Gliwice Branch

Department of Cancer Epidemiology

Head: Prof. Brunon F.P. Zemła MD, PhD

A – Study Design, **B** – Data Collection, **C** – Statistical Analysis, **D** – Data Interpretation,
E – Manuscript Preparation, **F** – Literature Search, **G** – Funds Collection

Streszczenie **Wstęp.** W pracy przedstawiono zachorowalność na nieczerniakowate nowotwory złośliwe skóry mieszkańców woj. śląskiego w latach 1999–2003.

Materiał i metody. Częstość występowania nowotworów oceniono, obliczając współczynniki zachorowalności (częstkowe, surowe i standaryzowane względem „populacji świata”) oraz ryzyko skumulowane.

Wyniki. Na terenie woj. śląskiego stwierdza się ich ciągłą progresję. Średnioroczny wzrost zachorowalności w okresie lat 1999–2003 u mężczyzn wynosił 4,2%, a u kobiet – 4,8%. Szansę zachorowania ma jeden na 67 mężczyzn i jedna na 91 kobiet. Mężczyźni charakteryzują się wyższą zachorowalnością (współczynnik standaryzowany 12,9/100 tys.) w porównaniu z kobietami (współczynnik standaryzowany 9,70/100 tys.). Jest to skutek zwiększonej w porównaniu z kobietami zapadalności mężczyzn od 55 r.ż., a różnica ta wzrasta wraz z wiekiem. Większość zmian nowotworowych występujących na ciele pacjentów była zlokalizowana w obrębie głowy/szyi.

Słowa kluczowe: nieczerniakowe nowotwory złośliwe skóry, zachorowalność, woj. śląskie.

Summary **Background.** Our paper presents the study findings on malignant nonmelanoma skin cancer incidence in the inhabitants of the Silesian Voivodeship over the years 1999–2003.

Material and methods. The incidence rates were estimated by calculating a cumulative risk and the incidence coefficients in partial, raw and standardized form using “the world’s population” as a standard.

Results. It was observed that the coefficient values were increasing continuously in the Silesian Voivodeship. The average annual incidence rate was 4.2% in men and 4.8% in women in 1999–2003, thus one in 67 men and one in 91 women ran the risk of developing the skin cancer. The male population was characterized by higher incidence rate (standardized rate of 12.9/100 000) than the female one (standardized rate of 9.70/100 000), which resulted from increased incidence rates in men since the age of 55. The difference between male and female rates was growing with ageing of the population. Majority of the lesions occurring on the patients’ bodies was localized on the head and neck.

Key words: cutaneous nonmelanoma malignancies, incidence, the Silesian Voivodeship.

Introduction

In recent years, nonmelanoma malignant cancer of the skin has been ranked in the 4th place among the most frequent anatomic sites of the tumor in the inhabitants of the Silesian Voivodeship. Despite high incidence, the prognoses of the cases are good thus the cancer mortality is ranked lower than in the first ten [1]. However,

frequent recurrence and still increasing incidence rates of those cancers are the measure of threat. The authors of the study have already presented epidemiological analyses of the incidence of those cancers [2–4]. Thus the aim of the present study was to continue the evaluation of the incidence rates of nonmelanoma skin cancers in the inhabitants of the Silesian Voivodeship in 1999–2003.

Material and methods

Statistical data of skin cancers other than malignant melanoma (ICD-10 C-44) were analyzed epidemiologically. The data were obtained from Silesia Cancer Registry, Cancer Epidemiology Department, Maria Skłodowska-Curie Memorial Center and Institute of Oncology in Gliwice. The cancer incidence rate was estimated by calculating incidence coefficients in raw and partial form for 5 year age groups. The coefficients were standardized using "the world's population" as a standard. The cumulative risk was also calculated. Furthermore, the incidence rates were estimated by the anatomic sites of the tumor [5].

Results

Constant progression of malignant nonmelanoma skin cancers was recorded in the Upper Silesia. Over the years 1999–2003, the annual incidence rate increased by 4.2% in men and by 4.8% in women. The values of standardized coefficients for men increased since 1999 through 2003 as follows: 10.78/100,000 in 1999, 12.08/100,000 in 2000, 12.30/100,000 in 2001 and 2002, 17.09/100,000 in 2003. Over the years 1999–2003, 1952 cases were recorded in the male population and the raw and standardized coefficients were 16.9/100,000 and 12.9/100,000, respectively. One of 68 men and one of 91 women may develop the cancer before the age of 75. Systematic increase in the incidence rate values was recorded in older age groups. The cancers were diagnosed in 15 year old patients but young women developed the cancer more frequently than young men. In general, 2103 skin cancer cases were recorded in the female population, where the raw and standardized coefficients were 17.1/100,000 and 9.7/100,000, respectively. In the following years, i.e. since 1999 through 2003, the values of standardized coefficients of the incidence (per 100,000 population per year) were higher and higher, namely 7.99 (1999), 8.41 (2000), 9.04 (2001), 10.84 (2002) and 12.14 (2003). The data show that the female incidence rates are lower than the male ones, which results from the higher incidence rates in men from age 55 years, and the difference increases with age. Mortality rates of malignant nonmelanoma skin cancers for both genders are low when compared to the incidence rates (Table 1, Figure 1).

Most of neoplastic lesions were localized on the head and neck, and they comprised 74% and 76% of all lesions in men and women, respectively. The standardized coefficient of nonmelanoma skin cancer incidence for this location was 7.3/100,000 both in men and women. The same values of the standardized coefficient for both

Table 1. Age – specific, crude and age – standardized incidence rates of non-melanoma skin cancer among men and women in the Silesia Voivodship, 1999–2003

Age	Incidence		Mortality	
	Males	Females	Males	Females
0–4	0.00	0.00	0.00	0.00
5–9	0.15	0.00	0.00	0.00
10–14	0.00	0.00	0.00	0.00
15–19	0.10	0.31	0.00	0.00
20–24	0.20	0.52	0.20	0.10
25–29	1.03	1.17	0.69	0.00
30–34	1.41	2.48	0.77	0.00
35–39	1.93	2.92	1.09	0.00
40–44	6.73	5.73	2.35	0.10
45–49	8.10	12.10	2.73	0.10
50–54	18.01	18.46	3.77	0.23
55–59	30.58	23.45	4.84	0.62
60–64	49.33	38.05	6.30	1.11
65–69	73.71	43.86	5.33	1.24
70–74	105.09	72.09	11.54	3.50
75–79	161.41	89.14	13.54	5.39
80–84	190.47	111.01	26.83	18.67
+85	147.41	111.89	17.09	44.49

Age standardized rate for non-melanoma skin cancer by anatomic site				
	Males		Females	
	Number of cases	ASR	Number of cases	ASR
Overall (C44)	1952	12.89	2103	9.70
Head & neck (C44.0-4)	1449	7.36	1597	7.36
Trunk (C44.5)	184	0.81	168	0.81
Arms (C44.6)	79	0.26	52	0.26
Legs (C44.7)	92	0.48	110	0.48
Unspecified (C44.8-9)	147	0.80	176	0.80

ASR-age-standardized rate (World Standard Population).

genders were registered as follows: trunk (0.81/100,000), legs (0.48/100,000) and arms (0.26/100,000) (Figure 2, Table 1).

Discussion

There has been recorded a constant and systematic increase in the skin cancer incidence

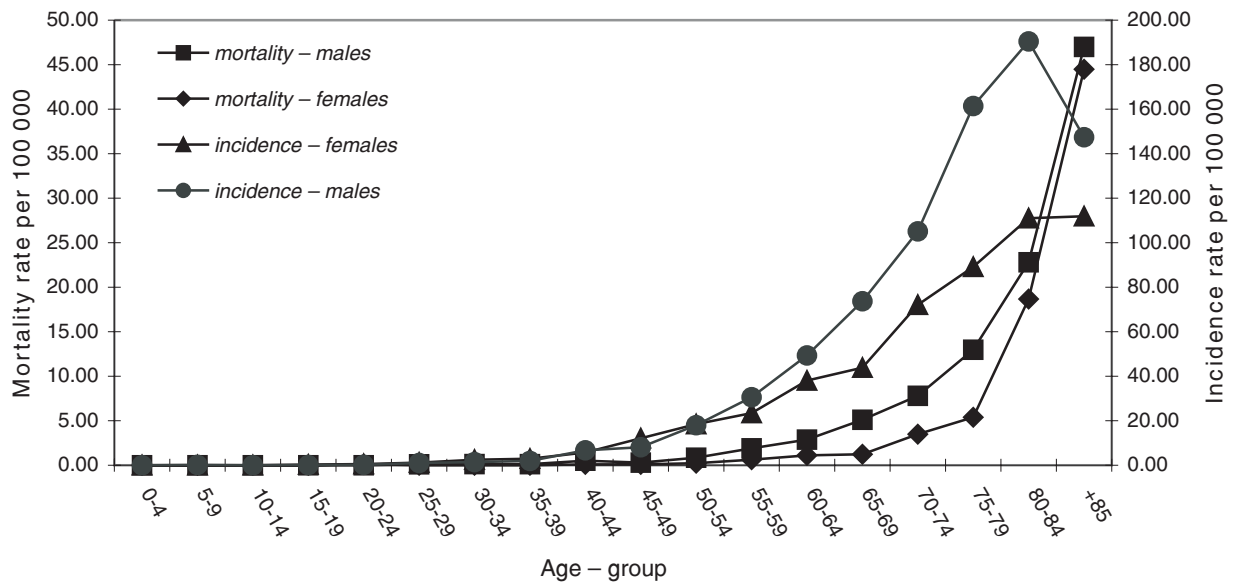


Fig. 1. Age-specific incidence and mortality rate for nonmelanoma skin cancers in male and female inhabitants of Silesia Voivodeship, in 1999–2003.

rates worldwide. In Poland, skin cancers comprise 10% of all malignant cancers, which means that approximately 10,000 new cases are diagnosed yearly [6]. The increase is also evident in the inhabitants of the Silesian Voivodeship. The standardized coefficients from the years 1999–2005 are higher [4] than those recorded in the period included in this study. In the years 1999–2004, the incidence rates increased by 33% and 30% in women and men, respectively [1]. The present analysis showed that in 1999–2003 the rates increased annually by 4.2% and 4.8% in men and women, respectively. Such an increase can be caused by more frequent occurrence of risk factors, e.g., ionizing radiation, thermal burns, oncogenic viruses or immunosuppressive drugs [7–9].

In this case, the key role is played by ultraviolet radiation, and the basal cell carcinoma incidence rate increases linearly with the UV intensity [9]. The increase in the UV radiation which reaches the earth surface is explained by the fact of constant and significant reduction of the ozone layer. In Australia and the USA, the skin cancer incidence rates are higher than in Northern, Central and Eastern Europe since sun exposure is proportionally higher there than in the rest of the European continent [6].

In the Silesian Voivodeship, an increase in the cancer incidence rates was observed both in females and males, however the values in the male population are higher especially when the data for squamous cell carcinoma are compared [4]. This may be related to the fact that men more frequently work or do sports outdoors, and are exposed to occupational risk factors due to industrial jobs.

In the 1970s, there was an increase in the

number of people who spent their vacations in the sunny areas of Europe, and nowadays Northern Africa has also become vacation destination. What is more, suntan has been regarded as the symbol of social status, which imposes taking additional doses of UV radiation in solar salons.

In the Upper Silesia, the tendencies of the cumulation of incidence are similar to those recorded worldwide since the incidence rates are high in older age groups, which may result from accumulating over time the effects of risk factors activity and constant increase of lifespan. It is worrying that the skin cancer is developed at ever younger ages, especially in women. The location of the neoplastic lesions, i.e. mainly on the head and neck, is in agreement with worldwide tendencies.

Arsenic is one of the factors of special significance in the pathogenesis of skin cancers related to exposure to industrial activity [10]. In Slovakia, for instance, in Prievidza region, elevated concentration of arsenic in the air and soil near the power plant, where coal is used for heating, increased the incidence of skin cancers [11]. Special attention should be paid to this factor in the Silesian Voivodeship since there are several power plants, thermal-electric power plants and coking plants, where coal is used. Additionally, skin cancer development is induced by groundwater or drugs contaminated by arsenic [8, 9]. It would be interesting to carry out the studies on the threats caused by above listed industrial plants. The results of such studies could help to establish appropriate prophylactic action against skin cancer, which are becoming a social problem.

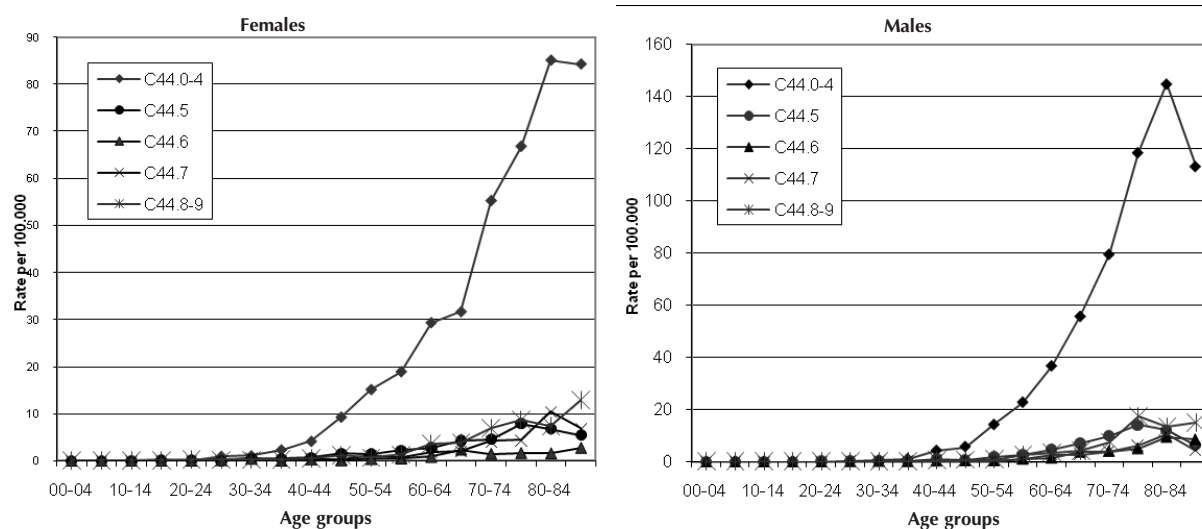


Fig. 2. Age-specific incidence rate for nonmelanoma skin cancer by anatomic site, in the Silesia Voivodship, 1999–2003

Conclusion

Due to the increase in the values of malignant nonmelanoma incidence rates in the inhabitants of the Silesian Voivodship, it is necessary to

implement health education and prophylactic strategies related to solar exposure. What is more, it would be advisable to sensitize doctors to attentively observe patients' skin lesions.

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Address for correspondence:

Dr n. med. Małgorzata Juszko-Piekut

Katedra i Zakład Higieny, Bioanalizy i Badania Środowiska

Wydział Farmaceutyczny i Oddział Medycyny Laboratoryjnej w Sosnowcu

Śląska Akademia Medyczna w Katowicach

40-752 Katowice

ul. Medyków 4

Tel.: (032) 208-86-01

E-mail: bioanaliza@sum.edu.pl

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PRACE ORYGINALNE • ORIGINAL PAPERS

Provision of professional health care for people possessing a decision concerning incapability for independent existence, insured by the Agricultural Social Insurance Fund

Świadczenie opieki profesjonalnej osobom z orzeczoną niezdolnością do samodzielnej egzystencji, ubezpieczonym w Kasie Rolniczego Ubezpieczenia Społecznego

ANNA KSYKIEWICZ-DOROTA^{1, A, C}, ANNA KOZAK-SYKAŁA^{2, A-F}

¹ Chair and Department of Management in Nursing, Faculty of Nursing and Health Sciences, Medical University, Lublin

Head: Prof. Anna Ksykiewicz-Dorota MD, PhD

² Independent Public Health Care Unit in Przeworsk, Department of Neurology with Sub-Ward for Stroke

Director: Józef Więclaw

A – Study Design, B – Data Collection, C – Statistical Analysis, D – Data Interpretation, E – Manuscript Preparation, F – Literature Search, G – Funds Collection

Streszczenie **Wstęp.** Niewiele jest publikacji naukowych dotyczących zjawiska niezdolności do samodzielnej egzystencji w odniesieniu do zapotrzebowania na opiekę, jak i stanu faktycznego w zakresie opieki nad tą grupą osób. **Cel pracy.** Celem pracy była ocena opieki profesjonalnej świadczonej osobom z orzeczoną niezdolnością do samodzielnej egzystencji ubezpieczonych w Kasie Rolniczego Ubezpieczenia Społecznego.

Materiał i metody. Metodą badawczą zastosowaną w niniejszych badaniach były: metoda klasyfikacji pacjentów, sondaż diagnostyczny z techniką wywiadu. Narzędziem badawczym dla potrzeb klasyfikacji oceny sprawności osób niezdolnych do samodzielnej egzystencji był kwestionariusz EASY-care z dodatkowymi pytaniami własnej konstrukcji.

Wyniki. Badania własne potwierdziły brak zorganizowanego systemu opieki nad osobami o znacznej niepełnosprawności. Wizyty lekarskie i pielęgniarskie są okazjonalne, rehabilitacja domowa na terenie wiejskim nie istnieje. Ponadto nauczona wieloletnim doświadczeniem, większość badanych ma bardzo skromne potrzeby i oczekiwania co do pomocy ze strony instytucji zdrowotnych.

Jednak powyższa sytuacja nie zwalnia organizatorów podstawowej opieki zdrowotnej, płatnika świadczeń oraz państwa jako kreatora polityki zdrowotnej krajowej, jak i lokalnej, do wyjścia z inicjatywą zaspokojenia potrzeb opiekuńczych osób niezdolnych do samodzielnej egzystencji.

Słowa kluczowe: opieka profesjonalna, niezdolność do samodzielnej egzystencji, osoby ubezpieczone w Kasie Rolniczego Ubezpieczenia Społecznego (KRUS).

Summary **Background.** In the literature there are few scientific reports concerning the phenomenon of incapability for independent existence from the aspect of the demand for care and, the actual state with respect to care of this population group.

Objectives. The objective of the study was the evaluation of professional care provided for people who possess a decision concerning incapability for independent existence and are insured by the Agricultural Social Insurance Fund (KRUS).

Material and methods. The following research methods were applied in the presented study: patient classification method, and the diagnostic survey with an interview technique. The research tool for the needs of classification of evaluations of the efficiency of people incapable of independent existence was the EASY-care questionnaire, with additional self-designed questions.

Results. The results of own studies confirmed that there is a lack of an organized system of care for people with considerable disability. Doctors and nurses visits are occasional, and home rehabilitation in rural areas does not exist. Moreover, the majority of respondents, through by many-years experience, have modest needs and expectations concerning assistance on the part of health institutions.

The above-mentioned situation, however, does not absolve the organizers of primary health care, the payer of services and the State as the creator of the national and local health policy, from undertaking an initiative to satisfy the care needs of patients incapable for independent existence.

Key words: professional health care, incapability for independent existence, people insured by the Agricultural Social Insurance Fund (KRUS).

Introduction

With respect to the type of care and place of its provision, professional and informal care may be distinguished. Professional care of patients and their families covers the provision of diagnostic, treatment and rehabilitation services offered by the care team, i.e. people with various vocational preparation providing health care services [1]. For example, a care team providing care for an adult disabled person may consist of: a physician, an exercise therapist, nurse, psychologist, social worker, medical analyst, physiotherapist, massage technician, dental technician, pedagogue, dietician and an electroradiologist. The composition of a care team may vary, primarily according to the problems of a patient, but also from the place where care is provided [2].

The objective of professional care at a patient's place of residence are: reduction of the number of hospitalizations of this group of patients due to care-nursing neglect by a family, prevention of complications in immobilized patients, such as: bedsores, chafes, vascular complications and complication on the part of the respiratory system, teaching the family and patient to correctly perform self-nursing and self-care activities, which a patient/family may perform themselves. Psychical support is also important, which a patient should obtain as well as interest in care problems exhibited to the family.

In order to relieve the health system from transferring care from home to hospital, i.e. the most expensive type of care, the 'self-care' system should be supported on the part of physicians and family nurses, long-term nursing care and rehabilitation services, and also by informal caregivers employed by social care units.

A philosophical basis for the activities undertaken by the representatives of care professions is the idea of holism, where the ideas concerning health and the subject of care are biased towards the biopsychosocial model of approach to man and health [2].

The family should be incorporated as an integral part of the care system. Omitting the family in health care would be a serious mistake and would lead to sectional actions, equivalent to neither the holistic nor systemic concept [3]. The objective of the study was the evaluation of professional care provided for patients possessing decisions concerning incapability for independent existence, insured by the Agricultural Social Insurance Fund.

Material and methods

The following research methods were applied in the presented study: patient classification

method, and a diagnostic survey with an interview technique. The research tool for the needs of classification of evaluation of the efficiency of patients incapable for independent existence was the EASY-care questionnaire, version 1999–2000, with 100-score everyday life functions evaluation scale. In addition, 4 own questions were applied, concerning, among other things, the intensity and frequency of using home visits by medical staff and hospitalization within the period of the last 3 months.

At the first stage of the study, 464 decisions were analysed concerning incapability for independent existence issued by physician decision-makers and medical commissions at the KRUS Regional Agency in Przeworsk in 2003.

At the subsequent stage, every fourth person was selected at random from among 464 people listed according to the date of examination; 116 respondents therefore remained for further studies.

The survey was conducted in 2004. The respondents were examined in the consultation room at the KRUS Regional Agency (72 people), and at respondents' homes (44 people). The patients were examined at home in the case of their inability to report to the consultation room. The decision about home examination was made based on medical records or the opinion of the physician in charge of the patient.

The patients lived in the southeastern region of Poland, in the Provinces of Przemyśl, Jarosław, Lubaczów and Przeworsk.

The study covered 116 people – 46 males (39.65%) and 70 females (60.35%).

The mean age of the population examined was 61.86; 66.20 among females and 57.52 among males. The majority of males were aged under 65 (43.47%), whereas females – over 65 (45.54%).

The great majority of respondents lived with their families (91.38%).

Results

A small percentage of the disabled receive institutional assistance from the staff of health care units. Significant differences were noted in the frequency of using medical visits ($p < 0.001$). Most often, these visits were not used (72.42%); one or more visits were reported by only 13.79% of respondents each (Tab. 1); the intensity of using a physician's home visits was not related with gender ($p > 0.05$).

A similar situation was observed with respect to nursing care; nursing visits were not used significantly more often ($p < 0.001$). As many as 104 patients (89.66%) reported that they had had no visits of a nurse within the last 3 months; and 4 people (3.44%) mentioned more than four visits

Table 1. Intensity of using physician's home visits during the last 3 months

Visits		Gender					
		Males		Females		Total	
		L	%	L	%	L	%
Physician	no visits	34	73.92	50	71.42	84	72.42
	one visit	6	13.04	10	14.29	16	13.79
	3–6 visits	6	13.04	10	14.29	16	13.79
Total	46	100.00	70	100.00	116	100.00	

$\chi^2 = 0.086$ (–) $p > 0.05$
frequency of visits $\chi^2 = 79.1$ $p < 0.001$ (***)

Table 2. Intensity of using nurse's home visits during the last 3 months

Visits		Gender					
		Males		Females		Total	
		L	%	L	%	L	%
Nurse	no visits	44	95.65	60	85.71	74	89.66
	1–2 visits	2	4.35	6	8.57	8	6.90
	more than 4 visits	0	0	4	5.92	4	3.44
Total	46	100.00	70	100.00	116	100.00	

$\chi^2 = 3.65$ (–) $p > 0.05$
frequency of visits $\chi^2 = 53.1$ $p < 0.001$ (***)

Table 3. Hospitalizations within the period of 3 months

Hospitalization	Gender					
	Males N = 46		Females N = 70		Total N = 116	
	L	%	L	%	L	%
Yes	8	17.39	10	14.29	24	20.69
No	38	82.61	60	85.71	92	79.31
Total	46	100.00	70	100.00	116	100.00

$\chi^2 = 0.20$ (–) $p > 0.05$
Frequency of hospitalization $\chi^2 = 39.9$ $p < 0.001$ (***)

(Tab. 2). The intensity of using nurse's home visits was also not related with gender ($p > 0.05$).

Within the last three months, 24 patients (20.69%) were hospitalized. Hospital care was significantly more often not used than used (Tab. 3).

More than half of the respondents (58 people) evaluated nurse's visits as sufficient, the frequency of physician's visits was similarly evaluated – no statistically significant differences were noted ($p > 0.05$) (Tab. 4).

While evaluating the demand for visits by a rehabilitation specialist and social worker a significant relationship was observed ($p < 0.001$).

The majority of respondents did not perceive the demand for a rehabilitation specialist (65.52%); however, they mentioned the need for a visit by a social worker (56.90%) (Tab. 5).

Conclusions

Own studies confirmed the lack of an organized system of care of patients with a considerable disability. Physician's and nurse's visits are occasional, and home rehabilitation in rural areas does not exist. During the period of the study,

Table 4. Evaluation of frequency of physician's and nurse's visits by the respondents

Visits	Evaluation of frequency			
	Sufficient		Insufficient	
	L	%	L	%
Physician	54	46.55	62	53.45
Nurse	58	50.00	58	50.00
$\chi^2 = 0.28 (-) p > 0.05$				

Table 5. Evaluation of demand for visits by a rehabilitation specialist and social worker

Visits	Evaluation of demand			
	There is a demand		Does not perceive the demand	
	L	%	L	%
Rehabilitation specialist	40	34.48	76	65.52
Social worker	66	56.90	50	43.10
$\chi^2 = 11.74 (***) p < 0.001$				

over 20% of respondents were hospitalized. This may be explained by a hindered access to primary health care physicians (family physicians in rural areas often cover by care several villages, frequently at a considerable distance from one another), the cancelling of ambulances for home visits, with a simultaneous unwillingness of doctors to use their private cars, especially along roads in a bad state of repair, and the small requirements of patients in relation to medical staff. Based on the results of studies of people incapable for independent existence living in rural areas, it may be presumed that the majority of them have very modest needs and expectations concerning assistance from health institutions. For years they have been accustomed to utilising assistance from a health unit physician or nurse only in situations requiring urgent intervention, and that they must report to health institutions for help, and do not anticipate assistance in the area of care. None of the respondents expressed the desire to use assistance from a rehabilitation specialist (if such assistance would be available in the rural environment).

Similar results were obtained by Latalski, who indicated that expenditures for treatment increase with age and the deterioration of the state of health, which is compensated by the reduction of expenditures for physician, dentist and 'other' expenditures. Simultaneously, a decreased usage of health care services is noted, and an increase in the number of people who do not receive any treatment [5, 9, 10].

The study showed that the number of visits by physicians and nurses was small and concerned a small group of patients (13.79% and 10.34% respectively). These patients were satisfied with the frequency of visits. The remaining respondents did not anticipate assistance with care, neither from medical staff nor informal caregivers (social care worker).

The above presented situation may be explained by the fact that rural inhabitants, who for a long time have had a modest offer on the part of the PHC were realists, and expected no more than what they have been used to. The above-mentioned situation, however, does not absolve the organizers of primary health care, the payer of services and the State as the creator of the national and local health policy, from undertaking an initiative for satisfying the care needs of patients incapable for independent existence. As indicated by the term 'the disabled', these people are not capable for independent functioning and effectively demand such care.

Hence, an offer in the area of institutional, long-term care, rehabilitation, and above all, home care for this group of patients should be increased. Patients from rural areas, in contrast to urban inhabitants, cannot be deprived of long-term and rehabilitation care only because they do not claim it. Moreover, the provision of home long-term care, rehabilitation and informal care is profitable for the budget of the payer of medical services, because it prevents frequent and costly hospitalization of this group of patients. The orga-

nizational solutions of the countries of so-called 'old' European Union indicate the need for the development of long-term home care in order to reduce the general costs designed for health – primarily in the Scandinavian countries, whose experiences may be used [1]. The subjective evaluation by people incapable for independent existence is complementary with the definition of the 'demand for health care', where it is stated that 'demand for care is the reflection of health needs in the social awareness' [7]. Hence, people incapable for independent existence living in rural areas, led by their experiences of the lack of this care even from the PHC and social care workers, do not expect such care.

During the period 1988–2002, a considerable increase was observed in the number of disabled rural inhabitants (by 55.2% in 1988 and 53.9% in 2002). The greatest increase was noted in the group of legally disabled people with a considerable degree of disability (by 135.6%), and in the population of those only biologically disabled and experiencing a serious limitation of efficiency (by 118.9%). These are data from the last Census conducted in 2002 [6], which shows that there is an urgent need for analysing the demand for care among this population group. Medical and care assistance should cover, on the level of a health unit, the health needs reported and also those not expressed by a disabled person.

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Address for correspondence:

Dr n. med. Anna Kozak-Sykała
SP ZOZ Przeworsk
ul. Szpitalna 16
37-200 Przeworsk
Tel.: (016) 649-16-85
E-mail: annasykala@op.pl

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PRACE ORYGINALNE • ORIGINAL PAPERS

Provision of informal health care for people possessing a decision concerning incapability for independent existence, insured by the Agricultural Social Insurance Fund

Świadczenie opieki nieprofesjonalnej osobom z orzeczoną niezdolnością do samodzielnej egzystencji, ubezpieczonym w Kasie Rolniczego Ubezpieczenia Społecznego

ANNA KSYKIEWICZ-DOROTA^{1, A-C}, ANNA KOZAK-SYKAŁA^{2, A-F}

¹ Chair and Department of Management in Nursing, Faculty of Nursing and Health Sciences, Medical University, Lublin

Head: Prof. Anna Ksykiewicz-Dorota MD, PhD

² Independent Public Health Care Unit in Przeworsk, Department of Neurology with Sub-Ward for Stroke

Director: Józef Więclaw

A – Study Design, B – Data Collection, C – Statistical Analysis, D – Data Interpretation, E – Manuscript Preparation, F – Literature Search, G – Funds Collection

Streszczenie **Wstęp.** W piśmiennictwie jest niewiele publikacji naukowych dotyczących zjawiska niezdolności do samodzielnej egzystencji w odniesieniu do zapotrzebowania na opiekę, jak i stanu faktycznego w zakresie opieki nad tą grupą osób.

Cel pracy. Celem pracy była ocena opieki nieprofesjonalnej świadczonej osobom z orzeczoną niezdolnością do samodzielnej egzystencji, ubezpieczonych w Kasie Rolniczego Ubezpieczenia Społecznego.

Materiał i metody. Metodą badawczą zastosowaną w niniejszych badaniach były: metoda klasyfikacji pacjentów, sondaż diagnostyczny z techniką wywiadu. Narzędziem badawczym dla potrzeb klasyfikacji oceny sprawności osób niezdolnych do samodzielnej egzystencji był kwestionariusz EASY-care.

Wyniki. Wszyscy badani byli uzależnieni w zakresie instrumentalnych czynności, ale jednocześnie zdecydowana większość badanych wykazywała uzależnienie również w zakresie czynności podstawowych. Wyniki jednoznacznie potwierdzają, że pomoc badanym niepełnosprawnym świadczą przede wszystkim członkowie rodzin.

Słowa kluczowe: opieka nieprofesjonalna, niezdolność do samodzielnej egzystencji, osoby ubezpieczone w Kasie Rolniczego Ubezpieczenia Społecznego (KRUS).

Summary **Background.** In literature there are few scientific reports concerning the phenomenon of incapability for independent existence from the aspect of the demand for care and the actual state with respect to care of this population group.

Objectives. The objective of the study was the evaluation of informal care provided for people who possess a decision concerning incapability for independent existence insured by the Agricultural Social Insurance Fund (KRUS).

Material and methods. The following research methods were applied in the presented study: patient classification method, and the diagnostic survey with an interview technique. The research tool for the needs of classification of evaluations of the efficiency of people incapable of independent existence was the EASY-care questionnaire.

Results. All respondents were dependent with respect to instrumental activities; however, simultaneously, the great majority of people in the study showed dependence, also with regard to primary activities. The results univocally confirm that assistance for the disabled examined is provided primarily by family members.

Key words: informal health care, incapability for independent existence, people insured by the Agricultural Social Insurance Fund (KRUS).

Introduction

With respect to the type of care and the place of its provision, professional and informal care

may be distinguished. Non-professional care is provided at home by informal care providers (relatives, friends, neighbours). Professional care of a

patient and his/her family covers the provision of diagnostic, treatment, and rehabilitation services offered by a care providing team, i.e. people with various occupational backgrounds, providing health care services [1].

It is presumed that a rational organizational model referring to care of the group of patients incapable of independent existence should be realized in the families of these people [2]. Health care provided in home conditions produces good results with relatively low costs [3]. However, a common conviction of the managers and administrators of health care system concerning the obligation of providing care for the disabled and the elderly by family is conducive to neglect in the care system of the State [2]. Moreover, there are few scientific reports pertaining to the actual demand for care and the description of the present state, with respect to both professional and informal care.

Objectives

The objective of the study was evaluation of informal health care provided for people possessing a decision concerning incapability for independent existence insured by the Agricultural Social Insurance Fund.

Material and methods

The following research methods were applied in the presented study: patient classification method, and a diagnostic survey with an interview technique. The research tool for the needs of classification of evaluation of the efficiency of patients incapable for independent existence was the EASY-care questionnaire, version 1999–2000, with 100-score everyday life functions evaluation scale.

The EASY-care questionnaire is recommended for the evaluation of the functional state of the elderly in primary health care [4]. In the international literature there are many methods of classification and assessment of the state of a patient in various nosological units; however, there are no specific tools for the needs of evaluation with respect to the care of patients incapable of independent existence in home conditions. The EASY-care questionnaire proved to be the most useful tool for this purpose, because care needs of the elderly and those incapable for independent existence, irrespective of age, are close. EASY-care questionnaire consists of several subject modules. The part covering the efficiency of activities of daily life (ADL) covers 17 questions. The following activities were considered as those of an

instrumental type (I-ADL): 1) performing hard housework activities; 2) preparation of meals; 3) shopping; 4) managing own money; 5) using a telephone; 6) taking drugs; 7) mobility outside the home; 8) mobility at home; and 9) walking up and down the stairs.

The following activities were considered as primary (P-ADL): 10) mobility; 11) using toilet; 12) using a bath or shower; 13) care of appearance; 14) dressing; 15) consumption of meals; 16) urine continence; and 17) stool continence.

By means of EASY-care questionnaire, within each category of activities of daily life, the patients were qualified into the following 3 categories of care:

- 1) performing an individual activity without difficulty;
- 2) requiring some assistance from another person;
- 3) incapable of performing an individual activity.

The people who were incapable of performing an individual activity required some assistance or were totally reliant on their care providers, were considered as dependent with respect to this ADL activity.

At the first stage of the study, 464 decisions were analysed concerning incapability for independent existence issued by physician decision-makers and medical commissions at the KRUS Regional Agency in Przeworsk in 2003.

At the subsequent stage, every fourth person was selected at random from among 464 people listed according to the date of examination; 116 respondents therefore remained for further studies.

The survey was conducted in 2004. The respondents were examined in the consultation room at the KRUS Regional Agency (72 people), and at respondents' homes (44 people). The patients were examined at home in the case of their inability to report to the consultation room. The decision about home examination was made based on medical records or the opinion of the physician in charge of the patient. The patients lived in the southeastern region of Poland, in the Provinces of Przemyśl, Jarosław, Lubaczów and Przeworsk.

The study covered 116 people – 46 males (39.65%) and 70 females (60.35%).

The mean age of the population examined was 61.86; 66.20 among females and 57.52 among males. The majority of males were aged under 65 (43.47%), whereas females – over 65 (45.54%). The great majority of respondents lived with their families (91.38%).

Results

All people in the study were dependent with respect to instrumental activities; however, at the

same time, the great majority of respondents showed dependence also with respect to the primary daily life activities (Tab. 1). Table 2 presents the degree of prevalence of disability with respect to the instrumental daily life activities, while Table 3 shows disability with respect to primary activities.

Family members significantly more often provided assistance with all instrumental activities ($p < 0.001$; approx. 60%), followed by spouses (approx. 30%). Assistance from neighbours was

provided considerably more rarely, and concerned all activities except using the telephone and taking drugs. Neighbours most rarely assisted with walking outside the home (2.38%), whereas they most frequently helped with the preparation of meals (6.96%) and household activities (6.90%). Paid help occurred rarely, only in the cases of the necessity for assistance with mobility about outside home (2.38%), with the housework (1.72%) and shopping (1.72%).

Table 1. Efficiency with respect to activities of daily living

Efficiency	Gender					
	Males N = 46		Females N = 70		Total N = 116	
	L	%	L	%	L	%
I-ADL dependent (Requiring assistance with instrumental activities)	46	39.65	70	60.35	116	100.00
I-ADL and P-ADL dependent (Requiring assistance with instrumental and primary activities)	30	30.91	64	68.09	94	100.00

$\chi^2 = 1.35$ (–) $p > 0.05$

Table 2. Dependence with respect to instrumental activities of daily living

Dependent people/ respondents		Frequency of occurrence of dependence %	I-ADL function
1	116/116	100.00	housework activities
2	115/116	99.14	preparation of meals
3	116/116	100.00	shopping
4	84/116	72.41	managing money
5	54/116	46.55	using phone
6	58/116	50.00	taking drugs
7	84/116	72.41	mobility outside home
8	40/116	34.48	mobility at home
9	50/116	43.10	walking up and down stairs

Table 3. Dependence with respect to primary activities of daily living

Dependent people/ respondents		Frequency of occurrence of dependence %	P-ADL function
1	16/116	13.79	mobility
2	36/116	31.03	using toilet
3	88/116	75.86	using bath, shower
4	40/116	34.48	care of appearance
5	80/116	68.97	dressing
6	26/116	22.41	consumption of meals
7	34/116	29.31	urine incontinence
8	14/116	12.07	stool incontinence

Family members and spouses also significantly more frequently provided assistance with primary activities ($p < 0.001$). Neighbours' assistance occurred only in the following percentages: in the case of using the toilet – 5.56%, shower or bath – 2.27%, or with dressing – 2.5%. Paid assistance occurred still more rarely, only in cases of urine incontinence (23.53% – replacement of catheters) and to a small degree (2.5%) with dressing. The results univocally confirm that assistance for the disabled examined was provided mainly by family members.

Significant differences in the frequency of providing assistance by caregivers ($p < 0.001$) were observed with respect to each type of dependence (Tab. 4, 5).

Discussion and results

In Polish tradition, the family fulfils the basic care functions with respect to their disabled closest relatives [5]. The many-generation model of a family concerned the rural rather than the urban population (76% and 57% respectively) [6]. Despite the clear disintegration of a many-generation family, confirmed by 15-year cohort studies of the elderly in Białystok conducted by Kotlarska-Michalska, it is indicated that as many as 87% of the elderly receive nursing care from their families, and only 13% from neighbours and institutions [7, 8].

The study confirmed that the provision of care is the domain of the family. Other family members provided assistance for the disabled two or three

Table 4. Informal care with respect to instrumental activities of daily living

I-ADL function	People providing assistance to those dependent with respect to an individual activity							
	spouse		other family member		neighbour friends		paid assistance	
	L	%	L	%	L	%	L	%
Housework	36	31.03	70	60.34	8	6.90	2	1.72
Preparation of meals	40	33.91	68	59.13	8	6.96	0	0
Shopping	32	27.59	76	65.52	6	5.17	2	1.72
Managing money	32	27.59	48	57.14	4	4.76	0	0
Using phone	16	29.63	38	70.37	0	0	0	0
Taking drugs	20	34.48	38	65.52	0	0	0	0
Mobility outside home	34	40.48	46	54.76	2	2.38	2	2.38
Mobility at home	16	40.00	22	55.00	2	5.00	0	0
Walking up and down stairs	18	36.00	30	60.00	2	4.00	0	0

1. $\chi^2 = 100.0$ $p < 0.001$ (***) 2. $\chi^2 = 100.8$ $p < 0.001$ (***) 3. $\chi^2 = 119.9$ $p < 0.001$ (***)
 4. $\chi^2 = 75.2$ $p < 0.001$ (***) 5. $\chi^2 = 69.4$ $p < 0.001$ (***) 6. $\chi^2 = 66.9$ $p < 0.001$ (***)
 7. $\chi^2 = 72.2$ $p < 0.001$ (***) 8. $\chi^2 = 34.4$ $p < 0.001$ (***) 9. $\chi^2 = 46.5$ $p < 0.001$ (***)

Table 5. Informal care with respect to primary activities of daily living

P-ADL function	People providing assistance to those dependent with respect to an individual activity							
	spouse		other family member		neighbour friends		paid assistance	
	L	%	L	%	L	%	L	%
Mobility	8	50,00	8	50,00	0	0	0	0
Using toilet	18	50.00	16	44.44	2	5.56	0	0
Using bath, shower	30	34.09	56	63.64	2	2.27	0	0
Care of appearance	18	45.00	22	55.00	0	0	0	0
Dressing	32	40.00	44	55.00	2	2,5	2	2,5
Consumption of meals	12	46.15	14	53.85	0	0	0	0
Urine incontinence	10	29.41	16	47.06	0	0	8	23.53
Stool incontinence	12	85.71	2	14.29	0	0	0	0

1. $\chi^2 = 16.0$ $p < 0.001$ (***) 2. $\chi^2 = 28.9$ $p < 0.001$ (***) 3. $\chi^2 = 95.6$ $p < 0.001$ (***)
 4. $\chi^2 = 40.8$ $p < 0.001$ (***) 5. $\chi^2 = 68.4$ $p < 0.001$ (***) 6. $\chi^2 = 24.6$ $p < 0.001$ (***)
 7. $\chi^2 = 14.7$ $p < 0.001$ (***) 8. $\chi^2 = 12.5$ $p < 0.001$ (***)

time more often than spouses. This may be explained by frequently noted widowhood or the old age of a spouse, as well as by the model of the functioning of a rural family, where the provision of care is the domain of women (wives and daughters). A small percentage of respondents using paid care, accompanied by great needs observed, results from the fact that the nursing allowance is a small amount of money, and agricultural health benefits are low-insufficient for the satisfaction of even current needs.

The greatest majority of respondents (91.38%) lived together with their families, and evaluated their housing conditions as mediocre (53.44%), or good (27.58%). This results from the many-generation model of the family, which still functions in rural areas, as confirmed by the studies by Piotrowski [6]; however, this is undoubtedly associated with the necessity of providing frequent, daily care of a disabled person. The poorly developed network of care providing facilities compels care by the family. Economic aspects are also very important. The financial benefits received or even increased by nursing allowance do not cover the cost of a stay in a care institution. In such a situation it would be necessary for families to pay an extra amount of money, which for the majority of home budgets would be a considerable burden. On the other hand, the benefits received by the disabled are frequently the only permanent income of a family. Obviously, an important element is the cultural pattern demanding the family obligation to provide care for the ill and senior members, which still functions in Poland [5].

A family should be incorporated as an integral part of the system of care. Omitting a family in health care would be a serious mistake and would lead to the undertaking of sectional actions, inconsistent with either the holistic or systemic concept [9].

Poździuch, while discussing an optimum model of the structure of health care, presented this model in the form of a triangle [10]. The apex is highly specialist care, the centre of the triangle – specialist care, while the foundation of the triangle is primary health care (PHC). Below the base of the triangle (below PHC) was situated so-called 'pre-primary care (self-care) provided for the disabled within a family. It was symbolically presented that the medical and care support for the families of people requiring assistance and staying at home should be provided by the PHC. It may be assumed that the self-care sector is potentially the largest, non-profit "institution" providing care to family members in need. In order to relieve the health system from transferring home care to hospital care, which is the most expensive type of care, the sector of self-care should be supported on the part of family physicians and nurses, long-term nursing care and rehabilitation services, as well as assistance from informal care providers employed by social care institutions.

Informal care from social care providers is a chance for, at least, the partial relieving of a family from daily activities, enabling the caregivers of the disabled to arrange affairs outside the home and, at least partially, provide them with a minimum amount of time for leisure and regaining strength.

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Address for correspondence:

Dr n. med. Anna Kozak-Sykała
SP ZOZ Przeworsk
ul. Szpitalna 16
37-200 Przeworsk
Tel.: (016) 649-16-85, E-mail: annasykala@op.pl

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PRACE ORYGINALNE • ORIGINAL PAPERS

Usage of nursing allowance by people possessing decision concerning incapability for independent existence insured by the Agricultural Social Insurance Fund (KRUS)

Wykorzystanie dodatku pielęgnacyjnego przez osoby z orzeczoną niezdolnością do samodzielnej egzystencji, ubezpieczone w Kasie Rolniczego Ubezpieczenia Społecznego (KRUS)

ANNA KSYKIEWICZ-DOROTA^{1, A-C}, ANNA KOZAK-SYKAŁA^{2, A-F}

¹ Chair and Department of Management in Nursing, Faculty of Nursing and Health Sciences, Medical University, Lublin

Head: Prof. Anna Ksykiewicz-Dorota MD, PhD

² Independent Public Health Care Unit in Przeworsk, Department of Neurology with Sub-Ward for Stroke

Director: Józef Więclaw

A – Study Design, **B** – Data Collection, **C** – Statistical Analysis, **D** – Data Interpretation, **E** – Manuscript Preparation, **F** – Literature Search, **G** – Funds Collection

Streszczenie **Wstęp.** Dodatek pielęgnacyjny przysługuje osobie uprawnionej do emerytury lub renty, która została uznana za niezdolną do samodzielnej egzystencji.

Cel pracy. Ocena wykorzystania dodatku pielęgnacyjnego przez osoby ubezpieczone w KRUS. Przebadano 116 osób, w tym 46 mężczyzn (39,65%) i 70 kobiet (60,35%).

Wyniki. Badanie wykazało, że dodatek pielęgnacyjny przeznaczany jest głównie na zakup leków i bieżące potrzeby. Znacznie rzadziej osoby niezdolne do samodzielnej egzystencji przeznaczały go na opłacenie usług im potrzebnych, sprzęt medyczny, odżywki i witaminy.

Słowa kluczowe: dodatek pielęgnacyjny, niezdolność do samodzielnej egzystencji, ubezpieczeni w Kasie Rolniczego Ubezpieczenia Społecznego.

Summary **Background.** Nursing allowance is eligible for a person entitled to old age pension or health benefit, who has been considered incapable of independent existence.

Objectives. The objective of the study was evaluation of the usage of the nursing benefit by people insured by the KRUS. The survey covered 116 respondents, including 46 males (39.65%) and 70 females (60.35%).

Results. The study showed that nursing allowance is mainly allocated for the purchase of drugs and current needs. People incapable of independent existence considerably more rarely allocated this benefit for payment of the services needed, medical equipment, nutrients and vitamins.

Key words: nursing allowance, incapability for independent existence, people insured by the Agricultural Social Insurance Fund (KRUS).

Introduction

Nursing allowance is eligible for a person entitled to old age pension or health benefit, who has been considered as incapable for independent existence [1]. Decisions concerning incapability for independent existence are made by medical decision-makers from the KRUS or medical commissions based on physical examination and analysis of medical records submitted. According to the decision-making system by the KRUS the examinations cover patients under

the age of 75. People who possess decisions confirming a considerable degree of disability issued by the Provincial or Regional Teams for the Matters of Making Decisions Concerning Disability – receive nursing benefit [2]. According to the regulations in the Act of 1 December 1994 concerning family, nursing and child benefits in the case of coincidence between the right to nursing allowance with the right to nursing benefit, a nursing allowance is paid in addition to old age pension or health benefit.

According to the legal regulations in effect and the principles of medical decision making, the making of a decision about incapability for independent existence is justified if the following is diagnosed: 'a disturbance of body efficiency to a degree causing necessity for constant or long-term care and assistance from other people in satisfying basic needs of life' [1]. The following needs are taken into consideration: mobility at home, consumption of meals, maintaining personal hygiene, dressing, and fulfilling basic bodily functions.

The decision about incapability for independent existence is also justified in the following persons:

- Bed-ridden patients in whom it is prognosticated that the state of being bed-ridden will be longer than 6 months.
- Patients with mental disorders (including senile changes of dementia character), the intensification of which may create a threat for the patient and danger for the surroundings.
- Patients totally blind or with severe vision impairment, when the acuity of vision – after correction – does not exceed 0.05 in the better eye, or with a considerable narrowing of the field of vision to approx. 20 degree (tunnel vision).
- People who, due to their state of health, are unable to leave their homes, even intermittently.
- Those with the diagnosis of local or generalized relapse of carcinoma remaining outside the possibilities of treatment, both causative and palliative [3].

In the decision-making by the KRUS, when establishing the right to the nursing allowance, the Zubord Scale and Karnofsky Scale are used (Tab. 1 and Tab. 2). According to the Zubord Scale, the decision about incapacity for independent existence is made when the evaluation covers 3 or more scores [3].

The decision concerning incapability for independent existence is also made while evaluating the state of health according to the Karnofsky Scale, when a patient efficiency degree of 50% or less is diagnosed [4].

The amount of the nursing allowance is established every 3 months [1], since 1 March 2007 this amounts to 153.19 zlotys.

Objective of the study

What is the allocation of nursing allowance to people possessing a decision concerning incapability for independent existence insured by the Agricultural Social Insurance Fund?

Table 1. Scale of efficiency acc. to Zubrod

Efficiency degree acc. to Zubrod	
0	Totally efficient patient, care not necessary
1	Patient with efficiency limited to a medium degree, complaints of small intensity, patient does not have to stay in bed
2	Patient incapable for occupational activity, capable of self-care, spends less than 50% of the day in bed
3	Patient incapable for self-care, constant assistance necessary, spends more than 50% of the day in bed
4	Totally disabled patient, constantly remains in bed
5	Death

Source: Adamek-Guzik T. *Outline of medical decision-making*. Kraków: Jagiellonian University Press; 1999: 45.

Material and methods

At the first stage, 464 decisions were analysed concerning incapability for independent existence issued by the medical decision-makers and medical commissions at the KRUS Regional Agency in Przeworsk in 2003.

At the subsequent stage, every fourth person was selected at random from among 464 people listed according to the date of examination; 116 respondents therefore remained for further studies.

The survey was conducted in 2004. The respondents were examined in the consultation room at the KRUS Regional Agency (72 people), and at respondents' homes (44 people). The patients were examined at home in the case of their inability to report to the consultation room. The decision about home examination was made based on medical records or the opinion of the physician in charge of the patient.

The patients lived in the southeastern region of Poland, in the Provinces of: Przemyśl, Jarosław, Lubaczów and Przeworsk. They were people who were covered by insurance from the KRUS Regional Agency in Przeworsk, and had been receiving the nursing allowance for at least 3 months. The survey covered 116 people – 46 males (39.65%) and 70 females (60.35%).

The mean age of the population examined was 61.86 – 66.20 among females and 57.52 among males. The greatest number of males were aged under 65 (43.47%), whereas females – over 65 (45.54%). The most frequent causes of making decisions concerning incapability for independent existence in people insured by the Agricultural Social Insurance Fund were diseases

Table 2. Degree of patient efficiency acc. to Karnofsky Scale

General category	Index	Detailed criteria
Capable of normal activity, no social care necessary.	100	Normal condition, no complaints or traits of disease.
	90	Capable of normal activity, certain pathological symptoms in physical examination and medical history taking.
	80	Normal activity accompanied by some effort, pathological symptoms in physical examination and medical history taking.
Incapable of occupational activity, may stay at home and perform the majority of nursing activities; needs outside assistance of various degrees.	70	May take care of himself/herself; however' incapable of either normal or occupational activity.
	60	Requires periodical outside assistance, but is able to independently satisfy the majority of own needs.
	50	Requires considerable outside assistance and frequent medical check-ups.
Incapable of independent satisfying of own needs, requires hospital care or care of a character similar to hospital, the disease may progress rapidly.	40	Invalidity, requires special care and assistance.
	30	Severe invalidity, hospitalization indicated, no direct life threat.
	20	A very ill patient, hospitalization necessary, supporting treatment indispensable.
	10	A dying person.
	0	Death.

Source: Jabłoński L, Karwat ID, editors. *Essentials of general epidemiology and epidemiology of contagious diseases*. Lublin: Czelej Publishers; 2002: 179.

of the organ of motion and carcinomas. In addition, 85% of respondents had 3 or more diseases mentioned as the cause of disability [4].

Results

Table 3 presents the usage of nursing allowance by people possessing a decision concerning incapability for independent existence.

The greatest majority of respondents reported that they allocated the money received for the purchase of drugs – 70 people (76.34%), and current needs (paying bills) – 20 people (17.24%). In

the case of allocation of nursing allowance to the patients' needs, significant differences in the approach to this problem were noted with respect to the purchasing of drugs, where females used this allowance significantly more often ($p < 0.01$), compared to males (71.43% and 43.48% respectively). Significant differences were also noted with respect to expenditures for medical equipment, where males spend statistically more money ($p < 0.05$) than females (21.74% and 5.71% respectively). As many as 14 respondents (12.08%) allocated the money for the purchase of medical equipment (wheelchairs, canes, etc.). In other cases, no significant differences were

Table 3. Allocation of nursing allowance

Needs	Males N = 46		Females N = 70		Total N = 116	
	L	%	L	%	L	%
Purchase of drugs $\chi^2 = 9.06$ (**) $p < 0.01$	20	43.48	50	71.43	70	76.34
Payment for care $\chi^2 = 1.93$ (–) $p > 0.05$	4	8.70	2	2.86	6	5.17
Current needs $\chi^2 = 0.001$ (–) $p > 0.05$	8	17.39	12	17.14	20	17.24
Medical EQUIPMENT $\chi^2 = 6.72$ (*) $p < 0.05$	10	21.74	4	5.71	14	12.08
Nutrients and vitamins $\chi^2 = 1.93$ (–) $p > 0.05$	4	8.70	2	2.86	6	5.17
Total	46	100.00	70	100.00	116	100.00

observed ($p > 0.05$). Only 6 respondents (5.17%) reported that they used the allowance money to pay for care.

Discussion and results

People possessing a decision concerning incapability for independent existence insured by the Agricultural Social Insurance Fund most frequently allocate nursing allowance for the purchase of drugs and current needs. This is confirmed by the results of studies by other researchers. Latałski showed that expenditures for treatment increase with age and the deterioration of the state of health, which is compensated by the reduction of expenditures for physician, dentist and 'other' expenditures [5]. A small percentage of respondents

using paid care, accompanied by a great demand observed [6], results from the fact that the nursing allowance is a small amount of money, and farmers' health benefits are very low, insufficient even to satisfy current needs. Simultaneously, a decreased usage of health care services is noted, and an increase in the number of people who do not receive any treatment [5, 7, 8].

Conclusion

Nursing allowance is mainly allocated for the purchase of drugs and current needs. People incapable of independent existence significantly less often allocated this allowance to pay for necessary services, medical equipment, nutrients and vitamins.

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Address for correspondence:

Dr n. med. Anna Kozak-Sykała
SP ZOZ Przeworsk
ul. Szpitalna 16
37-200 Przeworsk
Tel.: (016) 649-16-85
E-mail: annasykala@op.pl

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PRACE ORYGINALNE • ORIGINAL PAPERS

Tendencies of changes in the EEG record in relation to developmental age

Tendencje zmian w zapisie EEG w zależności od wieku rozwojowego

BOŻENA EWA MARCINKOWSKA^{1, A-D}, EWA SZCZEPANOWSKA^{2, 3, A, D-G},
TOMASZ PROŚCIŃSKI^{3, 4, E-G}

¹ The Regional Sanitary-Epidemiological Station, Goleniów, Poland

Director: Bożena Ewa Marcinkowska MD, PhD

² The Almamere University of Economics, Faculty of Tourism and Recreation, Chair of Anthropomotrics, Warsaw, Poland

Head: Prof. Wiesław Pilis MD, PhD

³ The Wielkopolska Higher School of Tourism and Management, Poznań, Poland

Head: Prof. Jan Jeszka MD, PhD

⁴ Nonpublic Department of Basic and Specialist Health Care „Hipokrates”, Poznań, Poland
Kierownik: Beata Wojciechowska-Martin MD, PhD

A – Study Design, **B** – Data Collection, **C** – Statistical Analysis, **D** – Data Interpretation,
E – Manuscript Preparation, **F** – Literature Search, **G** – Funds Collection

Streszczenie **Wstęp.** Wiedza o tendencjach zmian w zapisie EEG w zależności od wieku rozwojowego oznacza działanie w kierunku zachowania zdrowia.

Cel pracy. Celem badania była ocena zmian w zapisie EEG w zależności od rozpoznania wstępnej i wieku rozwojowego młodzieży z województwa zachodniopomorskiego, w okresie od 2005 do 2007 r.

Materiał i metody. Badaniami objęto 102 respondentów (66 dziewcząt i 36 chłopców). Ocenie poddano wyniki badań elektroencefalograficznych wykonanych systemem Neuroscan Plus, przeznaczonym do rejestracji i analizy czynności bioelektrycznej mózgu. Do oceny zmian w zapisie EEG zastosowano program Statistica 7.1. Wyniki badań obliczono w zależności od grup wiekowych i grup diagnozy wstępnej. W obliczeniach statystycznych zastosowano: tabele wielozdzielcze, nieparametryczny test χ^2 Pearsona, współczynnik korelacji R (rang) Spearmana.

Wyniki. Uzyskane wyniki świadczą o tym, że lekarze specjaliści kierują na badania EEG w największym stopniu młodzież w wieku od 7 do 18 r.ż. Dla poszczególnych grup w wynikach badań stwierdzono występowanie następujących istotnych różnic: prawidłowy wynik badania EEG – liczba przypadków wśród młodzieży w wieku 14–16 lat jest istotnie wyższa w stosunku do grup 7–13 lat oraz 17–18 lat ($p \leq 0,01$); podejrzenie guza mózgu i padaczki – liczba przypadków wśród młodzieży w wieku 7–13 lat jest istotnie wyższa w stosunku do grupy 14–16 lat ($p \leq 0,05$) oraz w stosunku do grupy 17–18 lat ($p \leq 0,01$); wśród wyników badań rozpatrywanych w zależności od rodzaju wstępnej diagnozy, w grupie „do diagnostyki”, liczba dziewcząt z prawidłowym wynikiem badania EEG przewyższa istotnie chłopców ($p \leq 0,05$), a w grupie „do diagnostyki po urazie głowy” liczba chłopców ze stwierdzonym występowaniem fal ostrych przewyższa istotnie dziewczęta ($p \leq 0,1$).

Słowa kluczowe: zapis EEG, wiek rozwojowy, guz mózgu, padaczka.

Summary **Background.** Knowledge on tendencies to change in the EEG record, in relation to developmental age, means an activity to maintain health.

Objectives. The aim of this study is to evaluate changes in the EEG record, in relation to initial diagnosis and developmental age of youth, from West Pomeranian Province, in 2005 to 2007.

Material and methods. In the research 102 respondents (66 girls and 36 boys) was examined. The evaluation embraces the EEG examinations carried out in years 2005-2007 by the Neuroscan Plus system, designed to registration and analysis of bioelectric function of brain. To compare changes in the EEG record the Statistica 7.1 program is used. Results are calculated in relation to age groups and initial diagnosis. In statistical calculations the following methods are used: multidivision tables, the nonparametric Pearson's χ^2 test, the Spearman's rank correlation – R.

Results. The obtained results show that to EEG examinations physicians refer, in the highest degree, youth of 7–18 y.o. In particular groups there is stated the following significant differences: a normal EEG examination results – a number of cases among youth aged 14–16 is significantly higher, in relation to the group 7–13 and 17–18 y.o. ($p \leq 0,01$); a suspicion of brain tumor and epilepsy – a number of cases among youth 7–13 y.o. is significantly

higher, in relation to the group 14–16 lat ($p \leq 0.05$), and in relation to the group 17–18 ($p \leq 0.01$); among research results considering in relation to a kind of diagnosis, in the group “to diagnostics”, a number of girls with a normal result of EEG outnumbers significantly boys ($p \leq 0.05$), and in the group “to diagnostics after head trauma” a number of boys with an occurrence of sharp waves outnumbers significantly girls ($p \leq 0.1$).

Key words: the EEG record, developmental age, brain tumor, epilepsy.

Introduction

World Health Declaration, accepted by Poland in 1998, at the World Health Congress confirms that health is one of the basic rights of each individual human being. Supporting of development physical and psychosocial health, and also prophylaxis of health and social problems of children and youth are defined as operative purpose No. III.8 and is included in National Health Program for years 2007–2015 [1]. In this declaration it is achieved a success in the translation of brain's electric potentials language to the language of concepts, understood for physiologist and clinician [5].

Objectives

The aim of his study is to evaluate in the EEG record of children and youth at the developmental age 7 to 18 years old a tendency of changes, in relation to age and initial diagnosis, in referral to the EEG laboratory.

Experimental procedures

The evaluation embraces the EEG examinations carried out in years 2005–2007, by the Neuroscan Plus system, designed to registration and analysis of bioelectric function of brain. In the research 102 patients, 66 girls and 36 boys, participate. To compare changes in the EEG record the Statistica 7.1 program is used. Results are calculated in relation to age groups and initial diagnosis. In statistical calculations the following methods are used: multidivision tables, the non-parametric Pearson's χ^2 test, the Spearman's rank correlation.

To make the analysis possible the whole examined population is divided into 3 age groups (a.g.): 1. a.g. – primary school – 7 to 13 y.o., 2. a.g. – gymnasium – 14 to 16 y.o., 3. a.g. – adolescent – 17 to 18 y.o. adequately to physiological changes in body structure. Descriptions of the initial diagnosis of physician referring to the examination are listed into 7 groups of recognition: 1 – to diagnostics, 2 – to sport diagnostics,

3 – to diagnostics after head trauma, 4 – hyperexcitability syndrome, 5 – head pains, 6 – faintings, 7 – a suspicion of epilepsy.

In results of examinations in regard to gender, in turn, particular waves are separated, it means graphoelements, and general results are introduced in four groups: a) those with the normal EEG record are without changes, b) after medicine status is adequate to the beta waves, c) a suspicion of the brain tumor is adequate to the delta waves, and d) a suspicion of brain tumor or/and epilepsy is adequate to the rest of waves.

All subjects gave written informed consent for participation in agreement with the Helsinki Accords prior to the beginning of the study. The research was carried out with the consent of the Regional Commission for Research Ethics. The report is financed with own funds of authors.

Results

At the tab. 1 there is a list of all examination results of children and youth from 7 to 18 y.o., in relation to general criterion – the normal or abnormal EEG record.

It is clear at the base of tab. 1 that girls are more often than boys referred to the EEG examinations, thus their participation (41% of girls) in discovered abnormalities of the EEG record is smaller than boys (47% of boys).

At the tab. 2a, 2b there is a collective list of examination results of children and youth from 7 to 18 y.o., in relation to age group and four criteria – the normal EEG record, after medicine status, a suspicion of brain tumor, a suspicion of brain tumor or/and epilepsy.

In the 1. a.g. (7–13 y.o.) of patients is examined, in the w 2. a.g. (14–16 y.o.) there is the greatest number of patients – 43, and in the 3. a.g. (17–18 y.o.) the lowest number of patients – 22. Generally, children from 7 to 18 y.o. are referred to examinations.

In results of particular age groups the following significant differences are stated:

– a suspicion of brain tumor and epilepsy – a number of cases among youth from the 1. a.g. (7–13 y.o.) is significantly higher than in the

Table 1. Collective research results of the EEG in youth, in relation to gender

Result	Girls			Boys			<i>p</i>	total	% of the line
	<i>n</i>	% of columns	% totally	<i>n</i>	% of columns	% totally			
The EEG record normal or at the limit of norm	40	58.8	37.7	20	52.6	18.9	0.539	60	56.6
The abnormal EEG record	26	41.2	26.4	16	47.4	17.0	0.539	42	43.4
Totally	66	100.0	64.2	36	100.0	35.9		102	100.0

Table 2a. Collective results of the EEG examinations in youth, in relation to age group, a sequel

Age (years)	1 (7–13 y.o.)			2 (14–16 y.o.)			3 (17–18 y.o.)			<i>p</i> 1–2	<i>p</i> 1–3	<i>p</i> 3–4
Result	<i>n</i>	% of columns	% totally	<i>n</i>	% of columns	% totally	<i>n</i>	% of columns	% totally			
The normal EEG	11	29.7	10.4	29	67.4	27.4	12	11.3	11.3	0.002*	0.825	0.004*
After medicine status	2	5.4	1.9	4	9.3	3.8	1	0.9	0.9	0.408	0.562	0.176
A suspicion of brain tumor	2	5.4	1.9	0	0.0	0.0	1	0.9	0.9	0.157	0.562	0.317
A suspicion of brain tumor or / and epilepsy	22	59.5	20.8	10	23.2	9.4	8	7.6	7.6	0.022	0.006*	0.623
Total	37	100.0	34.9	43	100.0	40.6	22	100.0	20.8			

Table 2b. Statistical test values of collective results of the EEG examination in youth, in relation to age group of the whole studied population (three age groups)

Pearson's χ^2 value	df	<i>p</i>	Spearman's rank correlation – <i>R</i>	<i>t</i>	<i>p</i>
27.776	12	0.006**	-0.261	-2.752	0.007*

* – a value highly statistically significant; *n* – number of responses.

** – a value statistically highly significant.

2 a.g. (14–16 y.o.) ($p < 0.05$) and in the 3. a.g. (17–18 y.o.) ($p < 0.01$).

- a normal result of the EEG examination – a number of cases among youth from the 2. a.g. (14–16 y.o.) is significantly higher than in the 1. a.g. (7–13 y.o.) and in the 3. a.g. (17–18 y.o.) ($p < 0.01$).

The EEG examination results differ significantly, in relation to age groups, at the level of significance $p < 0.01$ (tab. 2b).

At the tab. 2b there are shown statistical test values of collective results of the EEG examinations in youth, in relation to age group of the whole studied population (three age groups). Values of the Pearson's test are statistically highly significant ($p = 0.006$) and *R* of the Spearman's rank correlation is statistically significant ($p = 0.007$).

At the tab. 3a, 3b there is a detailed list of the EEG examination results (graphoelements) in children and youth from 7 to 18 y.o., in relation to age group.

The greatest number of abnormal graphoelements (tab. 3a) is in boys in the 1. a.g. (7–13 y.o.) (sharp waves – 15.8%), (theta waves – 7.9%), (beta waves – 5.3%), (sharp-free waves – 5.3%). All these values outstrip significantly a number of graphoelements in girls of the same age group ($p < 0.1$).

In the rest of age groups there are no significant differences in the study results. Among the oldest youth there are also no complex graphoelements (tab. 3b).

At tab. 4a and 4b there is a list of examination results of children and youth from 7 to 18 y.o., in rela-

Table 3a. A comparison of the EEG examination results (graphoelements) in girls and boys, in relation to age groups

Age (years)	1 (7–13 y.o.)				2 (14–16 y.o.)					
Result	girls		boys		<i>p</i>	girls		boys		<i>p</i>
	<i>n</i>	%	<i>n</i>	%		<i>n</i>	%	<i>n</i>	%	
Normal EEG record	5	7.35	6	15.79	0.175	22	32.35	7	18.42	0.126
Beta wave	0	0.00	2	5.26	0.059*	3	4.41	1	2.63	0.646
Delta wave	2	2.94	0	0.00	0.288	0	0.00	0	0.00	1.000
Theta wave	1	1.47	3	7.89	0.099*	1	1.47	0	0.00	0.454
Sharp wave	4	5.88	6	15.79	0.097*	2	2.94	3	7.89	0.251
Sharp-free wave	0	0.00	2	5.26	0.059*	2	2.94	0	0.00	0.288
Free wave	1	1.47	0	0.00	0.454	0	0.00	0	0.00	1.000
Theta wave + sharp-free	0	0.00	1	2.63	0.182	0	0.00	0	0.00	1.000
Theta wave + sharp + sharp-free	1	1.47	0	0.00	0.454	0	0.00	0	0.00	1.000
Needle wave + sharp + sharp-free	0	0.00	0	0.00	1.000	1	1.47	0	0.00	0.454
Sharp wave + sharp-free	1	1.47	1	2.63	0.674	1	1.47	0	0.00	0.454
Sharp wave-free + free	0	0.00	1	2.63	0.182	0	0.00	0	0.00	1.000
Total	15	22.06	22	57.89		32	47.06	11	28.95	

* – a value statistically significant; *n* – number of responses.

Table 3b. A comparison of the EEG examination results (graphoelements) in girls and boys, in relation to age groups, a sequel

Age (years)	3 (17–18 y.o.)				<i>p</i>
Result	girls		boys		
	<i>n</i>	%	<i>n</i>	%	
Normal EEG record	8	11.76	4	10.53	0.847
Beta wave	1	1.47	0	0.00	0.454
Delta wave	1	1.47	0	0.00	0.454
Theta wave	2	2.94	0	0.00	0.288
Wave	4	5.88	1	2.63	0.451
Sharp-free wave	1	1.47	0	0.00	0.454
Total	17	25.00	5	13.16	

n – number of responses.

tion to the group of initial diagnosis and determination by the physician referring to the examination.

Totally, in the EEG examinations, in the greatest way, there are obtained normal results, it means 53 of cases plus 7 results circumscribed as after medicine status which can be recognized as similar to normal results.

In particular groups of the initial diagnosis there are obtained the following results:

- in the group to diagnostics – on 17 of examined patients 6 confirmations of a clinician status;
- in the group to sport diagnostics (practicing of sport) – on 3 of examined patients 2 confirmations of a clinician status;

Table 4a. Collective results of the EEG examinations in youth, in relation to diagnosis

Diagnosis	To diagnostics		To sport diagnostics		To diagnostics after head trauma	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Normal EEG	11	10.38	1	0.94	3	2.83
After medicine status	0	0.00	0	0.00	0	0.00
Suspicion of brain tumor	1	0.94	0	0.00	1	0.94
Suspicion of brain tumor or/and epilepsy	5	4.72	2	1.89	2	1.89
Total	17	16.04	3	2.83	6	5.66

Table 4b. Collective results of the EEG examinations, in relation to diagnosis, a sequel

Diagnosis	Hyperexcitability syndrome		Head pain		Fainting		Suspicion of epilepsy	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Normal EEG	0	0.00	31	29.25	0	0.00	7	6.60
After medicine status	0	0.00	6	5.66	0	0.00	1	0.94
Suspicion of brain tumor	0	0.00	1	0.94	1	0.94	0	0.00
Suspicion of brain tumor or/and epilepsy	3	2.83	17	16.04	2	1.89	11	10.38
Total	3	2.83	55	51.89	3	2.83	19	17.92

n – number of responses.

- in the group to diagnostics after head trauma – on 6 examined patients 3 confirmations of a clinician status;
- in the group of hyperexcitability syndrome – on 3 of examined patients 3 confirmations of a clinician status;
- in the group of head pains – on 55 of examined patients 18 confirmations of a clinician status;
- in the group of faintings – on 3 of examined patients 3 confirmations of a clinician status;
- in the group a suspicion of epilepsy – on 19 of examined patients 11 confirmations of a clinician status.

Discussion

It is clear from the analysis of the EEG examination results, in relation to gender, that majority of patients, referred to examination by specialist physician are girls (64%), and only 36% of them are boys. However, a percentage of boys with discovered abnormalities in the EEG records are higher (47%) than the percentage of girls (41%) (tab. 1). The reason of this statement

is a better emotional contact between parents and daughters and, as a consequence, of more often appealing to physician with problems of their children.

The analysis of collective results of the EEG examinations of youth, in relation to the age group, shows the greatest occurrence (20.8%) of a suspicion of brain tumor and epilepsy in the 1. a.g. (7–13 y.o.). A number of cases among youth of 7–13 y.o. are significantly higher, in relation to the 2. a.g. (14–16 y.o.): 9.4% ($p < 0.05$) and to the 3. a.g. (17–18 y.o.): 7.6% ($p < 0.01$) (tab. 2b). It is shown that at the age of 10–14 y.o. changes in the EEG records start to focus [8, p. 151]. It is also connected with the puberty period of youth.

Totally, among youth below 16 y.o. there is discovered 30.2% of cases as a suspicion of brain tumor and epilepsy.

It is relatively a low result as compare to a declaration of [6, pp. 3–6], which indicates that 50–60% of cases of epilepsy incidence fall on below 16 y.o. In [2, pp. 34–62], in turn, a value of brain tumor etiology is determined as 6%.

The childhood age and graphoelement as a sharp-free wave create probability of rolandic epilepsy occurrence (it is one of the most often

occurred forms of epilepsy), respected by [2, pp. 62–96]; it means that changes in the EEG record have a great diagnostic meaning.

The greatest number of abnormal graphoelements occurs in boys 7–13 y.o. (beta waves – 5.3%, theta waves – 7.9%, sharp waves – 15.8% and sharp-free waves – 5.3%). All these values outstrip significantly a number of graphoelements occurred in girls of the same age group ($p < 0.1$) (tab. 3a). Therefore, a mild rolandic epilepsy occurs more often in boys [2, pp. 62–96]. The reason can be also a strong genetic predisposition, stress, shortage of dream and drinking alcohol, in accordance to [3, pp. 18–19].

Among the oldest youth of 17–18 y.o. it is not stated complex graphoelements. It can result from physiological maturation and an entrance to adult age after the period of puberty.

The obtained in own research, in the age group of 7–13 y.o. (tab. 3a), a normal result of the EEG examination and beta waves (21.1% in boys and 7.4% in girls as a sum; tab. 3a) is similar to the result of 10–20% of beta waves given by [6, p. 58].

The examination results, considered in relation to the initial diagnosis (tab. 4a and 4b), show that totally the greatest number, it means 53 of cases, are normal results of the EEG examinations and 7 results of after medicine treatment status, which can be stated as similar to normal. It is 57% of the total number of patients (a collective result at the tab. 1).

The greatest numbers of referrals (55) to the EEG laboratory get patients with an initial diagnosis – head pains. Among patients with this diagnosis in 18 cases of them examinations confirm a suspicion of brain tumor and a suspicion of brain tumor or/and epilepsy. Among 19 of patients with

an initial diagnosis a suspicion of epilepsy in 11 cases of them examinations confirm a suspicion of brain tumor or/and epilepsy.

In the rest of diagnosis groups the following results are obtained:

- in the group to diagnostics – on 17 of examined patients 6 confirmations of clinician status;
- in the group of hyperexcitability – on 3 of examined patients 3 confirmations of clinician status;
- in the group of faintings – on 3 of examined patients 3 confirmations of clinician status;
- in the group to sport diagnostics (practicing of sport) – on 3 of examined patients 2 confirmations of clinician status.

All stated abnormal results of the EEG examinations require a clinician observation, and in it, in the case of symptoms progress, a more deep diagnostics [3, pp. 26–29; 4, pp. 21–27; 7, pp. 115–126; 8, pp. 191–271; 9, pp. 362–367; 10, pp. 80–84].

Conclusions

1. The obtained results prove that specialist physician refer more often to the EEG examination youth from 7 to 18 y.o. than at the other age.
2. Girls are more often than boys referred to the EEG examinations, thus a number of abnormalities in the EEG record discovered in girls is lower.
3. The greatest occurrence of a suspicion of brain tumor and epilepsy is stated in the age group of 7–13 y.o., and significantly more often in boys than in girls.

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Address for correspondence:

Lek. med. Bożena Ewa Marcinkowska
Powiatowa Stacja Sanitarno-Epidemiologiczna
ul. Pocztowa 36
72-100 Goleniów
Tel. 0509 505-060, E-mail: ewamarcinkowska@onet.eu

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PRACE ORYGINALNE • ORIGINAL PAPERS

ECP concentration and ECP/Eo ratio in children with toxocariasis

Stężenie ECP i wskaźnik ECP/Eo u dzieci z toksokarozą

MAŁGORZATA NIEDWOROK^{1, A-G}, BEATA SORDYL^{1, A, B, D, F}, RYSZARD MAKOSIEJ^{1, A, B, D, F}, ANNA BORECKA^{2, A-C, G}, JAKUB GAWOR^{2, A, B, G}, IZABELA PŁANETA-MAŁECKA^{1, D, G}, EWA MAŁECKA-PANAS^{1, 3, D, E}

¹ Department of Gastroenterology, Polish Mother's Health Center Lodz
Head: Elżbieta Czkwianianc MD, PhD

² Laboratory of Parasitoses of Domestic Animals, Institute of Parasitology, Polish Academy of Sciences, Warsaw

Head: Jakub Gawor PhD

³ Department of Digestive Tract Diseases, Medical University, Lodz
Head: Prof. Ewa Małecka-Panas MD, PhD

A – Study Design, B – Data Collection, C – Statistical Analysis, D – Data Interpretation, E – Manuscript Preparation, F – Literature Search, G – Funds Collection

Streszczenie **Wstęp.** Wysokie stężenie ECP w surowicy jest markerem aktywności procesów patologicznych w astmie oskrzelowej i w przewlekłych chorobach pasożytniczych. W diagnostyce toksokarozy poszukuje się metody, która pozwalałaby odróżnić, kiedy wykrywane przeciwciała przeciw *Toxocara canis* oznaczają aktywne zarażenie od wykrywania przeciwciał pozostałych po zarażeniu i będących skutkiem poliklonalnej stymulacji limfocytów B_{epsilon} oraz pozwalającej monitorować leczenie.

Cel pracy. Celem pracy była ocena możliwości wykorzystania badań markerów aktywności eozynofilów (ECP i ECP/Eo) do określenia aktywności zarażenia *Toxocara canis* i monitorowania leczenia toksokarozy.

Materiał i metody. Badaniami objęto 45 dzieci w wieku od 3 do 18 lat z po raz pierwszy rozpoznany zarażeniem *Toxocara canis*, a grupę porównawczą stanowiło 41 dzieci w wieku od 2 do 18 lat, u których nie stwierdzono przeciwciał przeciwko nicieniom. Zarażenie larwą glisty psiej ustalono na podstawie badania serologicznego, do którego zastosowano test immunoenzymatyczny (ELISA) firmy Bordier Affinity Products. W badaniu serologicznym oznaczano stężenie przeciwciał przeciwko antygenowi ekskrecyjno-sekrecyjnemu E/S larwy *Toxocara canis* w klasie IgG.

Wyniki. Średnie stężenie ECP u dzieci z toksokarozą przed leczeniem wyniosło 30,19 µg/l i było istotnie wyższe niż w grupie porównawczej. Średnia wartość współczynnika ECP/Eo wyniosła 0,067 i nie była istotnie wyższa niż w grupie porównawczej. ECP może być markerem aktywności zarażenia *T. canis* i przydatne podczas monitorowania leczenia toksokarozy. Wyniki wskazują na brak możliwości wykorzystania do tych celów wskaźnika ECP/Eo.

Słowa kluczowe: toksokaroza, *Toxocara*, ECP, stosunek ECP/Eo, dzieci.

Summary **Background.** High serum ECP concentration is a marker of the activity of pathological process in bronchial asthma and in chronic parasitic infections. In the diagnostics of toxocariasis a method is searched for which would allow to differentiate when the detected anti-*Toxocara canis* antibodies mean active infection from postinfectious effect of polyclonal stimulation of B_{epsilon} lymphocytes. In addition there is a strong need to introduce the method allowing to monitor the treatment.

Objectives. The aim of the study was to estimate the possibility of the use of ECP and ECP/Eo ratio for the determination of *T. canis* infection in children and the analysis of their values as the markers of an therapy.

Material and methods. The study comprised 45 children, aged 3–18 years, with the first time diagnosed *Toxocara canis* infection and the control group – 41 children, aged 2–18 years in whom no anti-nematode antibodies were detected. *Toxocara canis* infection was established based on the basis of serological examination with ELISA (Bordier Affinity Products). The concentration of IgG antibody anti-excretory-secretory antigen from *Toxocara canis* larva was determined in serological examination.

Results. Before the therapy ECP mean concentration was 30,19 µg/l in children with toxocariasis. and it was significantly higher than in the control group. Mean value of ECP/Eo ratio was 0,067 and it wasn't significantly higher than in controls. ECP can be a marker of *T. canis* infection activity and it can be useful during toxocariasis therapy monitoring.

Key words: toxocariasis, *Toxocara*, ECP, ECP/Eo ratio, children.

Background

Parasitic infections such as toxocariasis, trichinosis or strongyloidiasis manifest chronic course and the involvement of other defense mechanisms than those observed in case of bacterial and viral infections. Eosinophils play a particular role in parasitic infections [1]. The activated eosinophil cells have in their granules four basic proteins of strong pro-inflammatory activity, eosinophil cationic protein (ECP), eosinophil-derived neurotoxin (EDN), eosinophil peroxidase (EPO) and major basic protein (MBP) [2, 3]. These proteins are responsible for tissue damage, they damage parasites and bronchial epithelium in bronchial asthma. They are specific for eosinophils and treated as the markers of acidophil cells activity. ECP is the most frequently determined marker of eosinophils activity and the calculation of ECP/Eo ratio indirectly points to the activity of a single eosinophil [2].

ECP was for the first time obtained in 1971 from human bone marrow cells, identified as eosinophil granule protein in 1975. ECP is a heterogenic protein of 16–24 kDa molecular weight of strong alkaline reaction (pH 10.8) [3]. The determination of ECP in serum is very useful in diagnostics of allergic diseases, particularly in asthma monitoring [4–6] as well as the monitoring of the effects of specific immunotherapy (sIT) [5]. The determination of eosinophil cationic protein is also important in non-atopic diseases (initial phase of myocardial infarction with eosinopenia and high ECP concentration, ankylosing spondylitis (in which serum ECP is treated as a marker of inflammation) [5]. The presence of ECP has been also detected in intestinal washings of patient with Crohn's disease and ulcerative colitis). Reaction to parasites also results in the increase of ECP concentration and eosinophilia [5].

In the diagnostics of toxocariasis a method is searched for which would allow to differentiate when the detected anti-*Toxocara canis* antibodies mean active infection from postinfectious effect of polyclonal stimulation of B_{epsilon} lymphocytes. In addition there is a strong need to introduce the method allowing to monitor the treatment.

Objectives

The aim of the study was to evaluate the possibility of eosinophil activity markers (ECP and ECP/Eo) use for the determination of *Toxocara canis* infection and its treatment monitoring.

Material and methods

The study comprised 45 children, aged 3–18 years, with the first time diagnosed *Toxocara canis*

infection (14 girls, 31 boys) and the control group – 41 children, aged 2–18 years in whom no anti-nematode antibodies were detected (23 girls, 18 boys). The children were diagnosed and treated at the Department of Gastroenterology, in the Gastroenterological and Allergological Outpatient Clinic, Institute Polish Mother Health Centre. Apart from clinical examinations, peripheral blood cell count was performed eosinophils percentage and with the determination of their absolute number in 1 mcl of blood as well as the concentration of eosinophil cationic protein. The tests were performed immediately after establishing the infection diagnosis and every 3 months after introduction of the therapy. Mebendazole (Vermox) was applied in children with toxocariasis [7]. It was administered every 3 months.

Toxocara canis infection was established based on the basis of serological examination with ELISA (Bordier Affinity Products). The concentration of IgG antibody anti-excretory-secretory antigen from *Toxocara canis* larva was determined in serological examination. Absorbance measurement was performed with spectrophotometer PR 2100 Sanofi (Pasteur) at the wavelength 405 nm. The results of the measurements are negative if the absorbance of the analysed serum is lower than of weak positive control. The results of the measurements are positive when the absorbance of the analysed serum is higher than of weak positive control. To simplify, the results are given in per cent. The values from 0 to 28% are related to the negative control absorbance, from 28 to 32% weak positive and from 32 to 100% positive control. The value from 32 to 100% is considered to be the one confirming *Toxocara canis* infection.

ECP concentration was determined with the use of Immuno CAP ECP test (Pharmacia Diagnostics) with Uni CAP 100 apparatus. In the test anti-ECP antibodies covalently coupled to ImmunoCap bind to ECP protein from the patient's serum. After washing mouse monoclonal anti-ECP antibodies are added. The concentration of enzyme-anti ECP-ECP antibody complexes was determined by fluorescence method. The fluorescence values are read in the form of concentrations with calibration curve. The values are given in µg/l (normal values 0–13.3 µg/l). All measurements were performed at 0, 3, 6 and 9 months after treatment. Wilcoxon signed-rank test and Mann-Whitney U test were used in statistical analysis.

Results

In the group with the first time diagnosed toxocariasis there were significantly fewer –

14 (31.1%) girls than boys – 31 (68.9%) ($p < 0.05$). Covert toxocariasis was diagnosed in all the examined children acc. to the division suggested by Pawłowski [8]. In majority of children abdominal pain was observed – 33 children (77.7%). All children were subjected to ophthalmological examination and no ocular form of this disease was found. In the group of infected children mean titre of anti-*Toxocara* antibodies before introduction of the treatment was 68.57% (from 38% to 100%), 3 months after the treatment it decreased to 56.42%, after 6 months to 39.67%. In 19 children the therapy was repeated for the third time and then the mean titre of antibodies was 33.05%, that is close to normal values. Three months after the therapy introduction in 7 (15.6%) children the titre remained on the same level as before the therapy, after 6 months – it decreased to nearly normal values in 14 (31.2%) children and in 4 (8.8%) it was higher than before the therapy.

Among children with toxocariasis eosinophilia was observed in 14 (31.1%) before the introduction of the therapy. Mean percentage of eosinophils in peripheral blood in children with toxocariasis was 5.58%. In the controls eosinophilia was detected in 4 (9.75%) children, on the average in the control group eosinophilia was 2.02% ($p < 0.05$) (Fig. 1).

Mean level of ECP in children with toxocariasis before treatment was 30.19 $\mu\text{g/l}$ and it was significantly higher than in the control group ($p < 0.05$); 6 months after therapy ECP level decreased significantly in children with toxocariasis (17.59 $\mu\text{g/l}$, $p < 0.05$) in relation to the initial value (Fig. 2).

Mean value of ECP/Eo ratio was 0.067 and it was not significantly higher than in the control group. The decrease of the ratio after 3 and 6 months of treatment was not statistically significant in relation to the value before the therapy (Fig. 3).

Discussion

Eosinophilia is observed both in allergic and parasitic diseases. The aim of the study was to assess the usefulness of eosinophil markers (ECP, ECP/Eo) in the determination of the activity of *T. canis* infection. The diagnostics of toxocariasis is based mainly on serological investigation ELISA anti-*Toxocara canis* ES antigen which gives the possibility to confirm the activity of the infection. Thus, a question arises, when the presence of anti-*Toxocara* antibodies represents active infection when the symptoms are not specific. *Toxocara* infection induces a complex immune, humoral and cellular response. In laboratory tests eosinophilia was found to be among the most frequent unspecific changes [9].

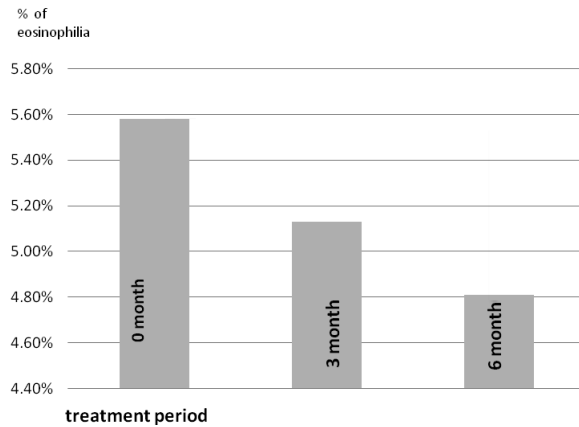


Fig. 1. Mean value eosinophilia in children with toxocariasis.

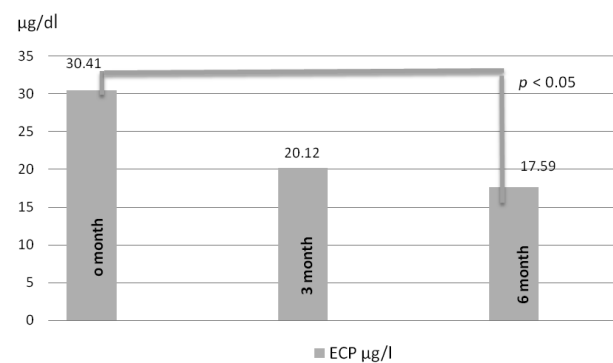


Fig. 2. Mean value of ECP in children with toxocariasis.

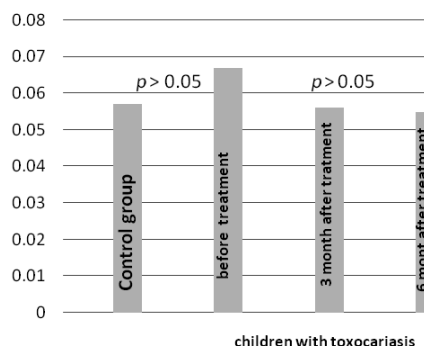


Fig. 3. Mean value of ECP/Eo ratio

In the group of patients with anti-*Toxocara* antibodies IgG class the titre was determined at 3, 6 and in part at 9 months after the therapy. In 30 children (66.6%) significant decrease was observed of mean titre of antibodies after this period. In part of children (11 children, 24.5%) the antibody titre remained at the level from before the therapy and in 4 (8.8%) it increased in relation to the initial values. However, the titre of the antibodies in IgG class does not seem to be a good marker of recovery from the infection. Similarly, the determination of antibodies in IgE and IgG₄ class does not seem to fulfil such a role.

In the studies of Magnaval et al. the IgG class-specific antibody titre correlated with the concentration of total IgE [10, 11].

In experimental studies on toxocariasis in Primates a possibility was demonstrated of an active larva survival in tissues for over 10 years despite the decrease of antibody titre [12]. Moreover, *Toxocara canis* larva displays the defense mechanisms against host immune system in the form of the so called "disguising" consisting in the production and inclusion of glycolipid human blood group antigens in the composition of its cuticle which results in inhibition of the production of antibodies against parasite antigen [13]. Thus, the decrease of anti-*Toxocara canis* antibodies cannot be the only sign of *Toxocara canis* larva elimination from the host's organism.

Eosinophilia has been observed in blood and tissues infected with *Toxocara canis* since the description of toxocariasis in the fifties of the previous century. It has also been also found out that only 5 eggs of *Toxocara canis* is required to develop hypereosinophilia in experimental toxocariasis in mice. However, the percentage of acidophil cells decreases with the duration of the infection [14]. In the group of children with anti-*Toxocara canis* antibodies significant differences were observed in the percentage of eosinophilic cells in relation to the control group. Six months after treatment a significant decrease of eosinophilia was detected in relation to the period before the therapy which can point to smaller stimulation of eosinophilic cells production together with the decrease of anti-*T. canis* antibody titre.

In the group of children with toxocariasis we found elevated mean concentration of eosinophil cationic protein as compared to the control group. Dominguez-Ortega J. et al., who demonstrated elevated serum ECP level in the infections

with strongyloidiasis, ancylostoma and human ascaris, obtained similar results [15]. Other authors confirmed high activity of eosinophils indirectly by elevated ECP in schistosomiasis. Tischendorf et al. detected that higher ECP level accompanies chronic parasitic infections [16]. In our study 6 months after the therapy a statistically significant decrease of ECP was observed which can help to assess the effectiveness of the therapy. Similar phenomenon of ECP decrease with the decrease of the number and activity of eosinophils is manifested in allergic inflammatory reaction [17–20].

Stelmach et al. demonstrated that ECP/Eo ratio is a better and more useful indicator of bronchial asthma severity in children than ECP and Eo separately [20]. Similiary Fujitaka et al. observed a correlation between ECP/Eo ratio and asthma severity [18]. In the case of a parasitic disease – in our studies we did not find higher values of ECP/Eo ratio in relation to the control group. There were no differences 3 and 6 months after the introduction of therapy as compared to the values before the therapy. The differences in the behaviour of eosinophil activity markers in allergic and parasitic diseases may result from different ways of eosinophil activation: in atopic pathologies the known pathway Th2 associated with cytokines IL5, IL4 and IL13 and in parasitic infections the so called internal pathway associated with IL1, TNF and GM-CSF [17, 19].

Conclusion

ECP can be a marker of *T. canis* infection activity and it can be useful during toxocariasis therapy monitoring. The results point to the impossibility of using ECP/Eo ratio for these purposes.

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Address for correspondence:

Dr n. med. Małgorzata Niedworok

Klinika Gastroenterologii ICZMP

ul. Rzgowska 281/289

93-338 Łódź

Tel. (042) 271-20-64

E-mail: duszkan64@onet.eu

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