ANNALES UNIVERSITATIS MARIAE CURIE-SKŁODOWSKA LUBLIN - POLONIA SECTIO D

VOL. LIV, 65

1999

Katedra i Zakład Mikrobiologii Lekarskiej Akademii Medycznej w Lublinie

Zakład Mikrobiologii Klinicznej. Centralne Laboratorium Surowic i Szczepionek w Warszawie

ALINA CHUDNICKA, JAROSŁAW WALORY

A presentation of immunity against diphtheria in various age groups of Lublin population

Charakterystyka oporności przeciwbłoniczej u mieszkańców Lublina w różnych grupach wiekowych

In the second half of the last century diphtheria was a common infectious epidemic and it often had a complicated course. The epidemiological wave of diphtheria rose during the Second World War, particularly in those countries where military activities were held. In those years 3 million people died of diphtheria in Europe, most of them being infants and children up to four years of age.

In Poland, passive immunisation against diphtheria, i.e. vaccination, was introduced on a small scale in 1930. After the war had ended in 1945, large scale vaccinations throughout the whole country were being organised. At first, they included children between 4 months and 7 years. However, the epidemiological situation significantly improved only after compulsory preventive vaccination had been introduced in 1954/1955 (2). 1,008 cases of diphtheria were recorded between 1956 and 1964, 25 of them terminal. All the 25 terminal cases concerned those who had not been vaccinated (5). It is believed now that due to long term preventive vaccination the problem of diphtheria in Poland has disappeared. Unfortunately, the spread of the disease in the former Soviet Union has caused several cases of diphtheria also in our country. In 1993 10 people were recorded to suffer from diphtheria, all of them lived in eastern Poland (8).

Due to the fact that many citizens of the countries east of Poland come to Lublin and other places, it is necessary to establish the level of immunity against diphtheria among Lublin population, i.e. to assess the efficiency of preventive vaccination.

MATERIAL AND METHODS

662 persons were included in the research. They were divided into eight age groups: I - from 1 to 10 years, II - from 10.5 to 20 years, III - from 21 to 30 years, IV - from 31 to 40 years, V - from 41 to 50 years, VI – from 51 to 60 years, VII – from 61 to 70 years, VIII – from 71 to 80 years. In the serum, the level of specific antibodies against diphtheria was determined through passive hemaglutination.

In the passive hemaglutination reaction (3, 6, 7) there were used ram tanine red blood cells coated in Diphtheria-toxoid (Seruminstitut – Copenhagen), the control being serum solution examined with non-allergic blood cells. The protective level was established at 0.1 IU/ml (1, 3, 6, 7).

RESULTS

The research concerning the level of anti-diphtheria antibodies shows that the antibodies have different values in various age groups (Tab.1). The highest protective level was observed in persons below 20 years of age (groups I and II) who constituted 2.60 - 7.62 % of the examined persons. The lowest protective levels, on the other had, were characteristic of persons above 30 years of age (IV–-VIII). The percentage of persons with decreasing protective level increased from 39.13% (31 to 40 years) up to 62.50% (71 to 80 years).

Group number	Age group (years)	Average antibodies level	% of the examined persons with the antibodies level below the protective level
Ι	0 – 10	13.52	2.60
П	10.5 – 20	13.62	7.62
Ш	21 - 30	9.62	15.62
IV	31 - 40	3.45	39.13
V	41 - 50	2.67	45.10
VI	51 - 60	3.61	40.35
VII	61 – 70	2.65	42.06
VIII	71 – 80	1.78	62.50

Tab.1. Percentage of the examined Lublin population with anti-diphtheria antibodies level below the protective level

Fig.1 compares the percentage share of persons from each of the examined groups, with the antibodies level above and below the protective level. It can be seen from the diagram that the percentage of persons with the protective level decreases together with increasing age of the examined persons.

RESULTS AND DISCUSSION

The research showed that persons below 30 years of age constitute a group of the lowest illness risk, which corresponds to the history of vaccination. This groups is correctly protected and does not require additional vaccination. In this group, children up to 10 years constitute by far the greatest percentage of persons with protective level.

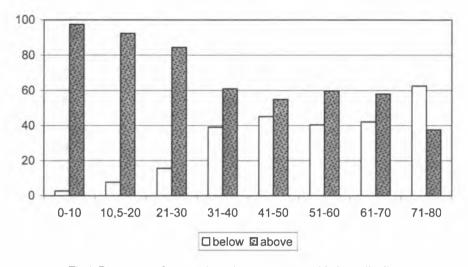


Fig. 1. Percentage of persons in various age groups with the antibodies level below and above the protective level

The fact that immunity level decreases with age is alarming. This decrease can be observed in the examined persons above 30 years.

Research led in other countries confirms the unsatisfactory immunity level. A neutralisation test carried out in Germany showed that 46% of persons between 19 and 54 years lacks the required protective level of antibodies (4). In Russia, 44% of the population is below the protective level (8).

The population of eastern Poland that neighbours the diphtherial areas is particularly exposed to the disease, which makes controls of protective vaccination efficiency among this population particularly necessary.

CONCLUSIONS

Due to the lowering level of immunity against diphtheria over 30 years of age, additional vaccination in this age group should be taken into consideration, especially where particular cases of the disease were observed.

It is also important that epidemiological research estimating protective vaccination efficiency and accurate register of all cases of suspected diphtheria be held. Particular attention should be paid to big cities and eastern parts of Poland.

REFERENCES

- Cellesi C. et al.: Imunity to diphtheria in a sample of adult population from central Italy, 7, 417, 1989.
- 2. Debiec B., Magdzik W.: Szczepienia ochronne. PZWL, 159, Warszawa 1991.

- Gałązka A., Sporzyńska Z.: Odczyn biernej hemaglutynacji. Wyd. Met. PZH, Warszawa 1975.
- Hassalhorn H.M. et al.: Diphtheria booster immunization for adults. Dtsch. Med. Wochenschr. Mar., 7, 122, 281, 1997.
- 5. Kassur B., Wołoszczuk I., Adamczyk J.: Zmiany elektrokardiagraficzne w przebiegu błonicy u chorych szczepionych i nieszczepionych. Przegl. Epid., 19, 365, 1965.
- 6. Thorley J.D., et al.: Passive transfer of antibodies of maternal origin from blood to cerebrospinal fluid in infants. Lancet, 1, 651, 1975.
- 7. Walory J.: Diagnostyka serologiczna błonicy. Microbiol. Med., 16, 13, 1998.
- Walory J., Grzesiowski P., Hryniewicz W.: Stan uodpornienia mieszkańców Polski przeciw błonicy. Nowa Medyc., 6, 17, 1999.

Otrz.: 1999.11.22

STRESZCZENIE

Ze względu na pojawiające się we wschodniej części Polski przypadki błonicy przeprowadzono ocenę odporności przeciwbłoniczej u mieszkańców Lublina w 8 grupach wiekowych do 80 lat. Poziom przeciwciał oznaczono metodą biernej hemaglutynacji. Stwierdzono, że najmniejszą grupę ryzyka zachorowania na błonicę stanowią osoby w wieku do 30 lat, największy odsetek osób w tej grupie z mianem ochronnym to dzieci do 10 lat. Niepokojącym faktem jest obniżający się wraz z wiekiem stan uodpornienia, dlatego po 30 roku życia należy rozważyć, szczególnie na terenach występowania przypadków błonicy, szczepienia uzupełniające. Ważne jest również prowadzenie badań epidemiologicznych oceniających skuteczność szczepień ochronnych i dokładnej rejestracji wszystkich przypadków podejrzenia o błonicę.