

ORIGINAL ARTICLE

Anti-Influenza Antibody Level After Vaccination In North Of Iran

ABBASI A*, MORADI A** , MANSOURIAN A R***, RAJAEI S****

ABSTRACT

Objective:Influenza is a highly transmitted disease and about 10% of the world's population is affected by this disease annually. The aim of this research was to study the variation of serum antibody levels among subjects who had already been vaccinated against influenza.

Methods And Materials:This descriptive-analytical study was carried out on 196 subjects who had influenza vaccination (influvac 2005/2006) and on 200 subjects who were matched with the vaccinated subjects by their ages in Gorgan which is located in the northeast of Iran. The subject's sera were prepared seven weeks after the influenza vaccination. Their serum antibody levels were determined by the hemagglutination inhibition test.

Results:The antibody titre in 81 subjects of the vaccinated group and in 175 subjects of the control group was less than 1/40. The mean antibody titre of the vaccinated subjects and the control group was 143.4 ± 10.89 and 18.34 ± 3.2 , respectively. The difference was statistically significant (P value=0.000).

Conclusion:The findings showed that the mean titre of the antibodies in the vaccinated and control groups was statistically different. This means that the influenza vaccine has good efficacy in our population.

Key Word:Flu vaccine, Influenza, Iran

*(MD), Asso. prof. of Infectious Diseases, Golestan research Center of Infectious disease and parasitology, **(Ph.D),Asso. Prof. of virology, Golestan research Center of Gastroenterology and Hepatology, *** (Ph.D),Asso prof of Biochemistry, Golestan Research Center of Biochemistry and Metabolic disorders ****, ****(MD),Asst. prof of surgery, Golestan University of Medical Sciences

Corresponding Author

Abdolvahab Moradi (PhD)

Dept. of virology, Golestan University of Medical Sciences, Gorgan city, Golestan province, (Iran)

E-mail: abmoradi@yahoo.com

Introduction

Influenza is a highly transmitted disease and about 10% of the world's population is affected by this disease annually. Influenza is the sixth reason of death in the world and the fourth reason of death in old people.

The virus is continuously undergoing antigenic changes and thus, it can bypass the host's acquired immunity to influenza [1].

The virus causing the disease is transmitted easily by coughing and sneezing, from person to person and spreads very fast in the society. Infection by

the influenza virus without signs and symptoms may cause severe diseases or even death.

Almost 30 to 50 percent of the people infected by the virus do not have special signs and symptoms, but they can transmit the disease to others. The best way of prevention is vaccination.

Elderly individuals not only demonstrate a greater risk of morbidity and mortality due to influenza than the young, but also have a greater difficulty in mounting a protective response to the influenza vaccine [2].

The Disease Control Center of America reports that vaccination of people prevents them from getting the disease (70 to 90% of the cases in people under 60 years and 30 to 40% of the cases in people above 60 years old). According to a study in America, in all the 88 subjects who were vaccinated against influenza by the Haemagglutination inhibition test (HI), an increase in antibody levels was observed [3].

Increase in antibody titre was observed in 5000 subjects from different ages who were vaccinated

against influenza in Poland using the Haemagglutination inhibition test (HI) [4].

In a study in France, 21 out of 285 subjects who were vaccinated against influenza showed changes in the levels of antibody serum [5].

In England, changes in the levels of antibody serum were observed in only 18.2% of the 137 subjects who were vaccinated and they were above 82 years old [6]. In an observed study in Turkey in which the subjects were vaccinated against influenza, an increase in the antibody titre in the vaccinated group was observed [7]. In a study in Norway, 19 subjects were vaccinated against influenza and an increase in the levels of antibody serum was observed in all the subjects [8]. This study was designed in order to investigate the changes in the levels of antibody serum in the vaccinated subjects as compared to the unvaccinated ones and to specify the ratio of the increase in the antibody titre up to the level of prevention.

Materials and Methods

In this descriptive analytical research, 196 subjects were vaccinated against influenza by the vaccine "influ vac 2005/2006" which is made in Netherlands. The vaccine included 45 micrograms of Haemagglutination and Noraminidaz proteins and was extracted from the following viruses. After 7 weeks, they took transfusions of 5 millilitres and their serum were collected and preserved under 20 °C until the experiment was carried out.

The Vaccine Virus Included

- 1-A/California/7/2/2004(H3N2)-Like strain (A/New York/55/2004 NYMC X-157)
- 2-A/New Caledonia/20/99 (H1N1)-Like strain (A/New Caledonia/20/99 IVR-116)
- 3-B/Shanghai/361/2002-Like strain (B/Jiangsu/10/2003)

200 subjects who were as old as the vaccinated subjects were selected from blood donor samples and the serum was prepared. At the time of getting the sample, 196 subjects filled out the information collection from which demographic information was obtained. All of the vaccinated subjects and the control group were tested by the Haemagglutination inhibition test to determine the anti-influenza antibody levels, by methods which were previously described [9],[10]. A titre above 40 units of agglutination was considered by the preventive antibody Haemagglutination inhibition test [11].

The data of the antibody titration in serum and the demographic information was entered into the computer and the mean of the antibody titre of the studied groups (vaccinated and unvaccinated subjects) was compared with appropriate statistical tests such as the T-test. The Chi-Square test was used to investigate the relationship between groups of different ages, genders and the existence of the preventive antibody in the subjects.

Results

In this study, 396 subjects were included. In the case group, the male to female ratio was 0.9 and in the control group it was 0.8. The mean age of the vaccinated group was 52.2 ± 11 years and in the control group it was 48.6 ± 5.1 years.

Preventive levels of antibodies against influenza was found in 115 (58.7%) out of the 196 vaccinated subjects and in the control group, it was found in 15 subjects (7.5%).

Immunity levels against the influenza virus in the vaccinated subjects and controls according to the age groups is shown in [Table/Fig 1].

(Table/Fig 1) Frequency of antibody titer against influenza in vaccinated and control age groups

Variables		Control		Vaccinated	
		antibody titre > 1/40	antibody titre < 1/40	antibody titre > 1/40	antibody titre < 1/40
Age Groups	30-40 years	-	26(100%)	26 (68/4%)	12 (31/6%)
	40-50 years	9(6/4%)	131(93/6%)	28 (51/9%)	26 (41/8%)
	50-60 years	6(18/8%)	26(81/3%)	36 (59%)	25 (41%)
	>60 years	-	2(100%)	25 (58/1%)	18 (41/1%)
Total		15(7/5%)	185(92/5%)	115(58/7%)	81 (41/3%)

The mean antibody titre in the vaccinated and control groups were compared by the T-test, which showed a significant difference them(CI=95% :102.91-144.22; P value=0.000) [Table/Fig 2].

(Table/Fig 2) Antibody titre distribution in vaccinated and control groups

Variables		Number	Antibody titer mean	Standard Variation	Standard Error
Groups	196	143/4	152/58	10/86	Vaccinated
	200	18/34	45/51	3/2	Control

The comparison between the mean antibody titre between the two genders in the vaccinated group didn't show a significant difference by the T-test.

Discussion

In this study, it was shown that the vaccine was efficient in the vaccinated group and moreover, the existence of these levels of the preventive antibody in 7.5% of the control group showed the circulation of the vaccine viruses among the Gorgan population; especially in one percent of these people, an antibody titre above 512 units of Haemagglutination was found.

A study in America showed that vaccination of subjects under 65 years is preventive in 70 to 90% of the cases and doesn't have any similarities to the results of our study, but for people above 65 years, the preventive level was found to be between 30 to 45% [5].

In our study, the preventive level was about 58.1% in the subjects between 60-80 years. A study in Turkey showed that in vaccinated subjects, the increase in the anti-influenza antibody titre was significant as compared to the control group and is similar to the results of our study [5].

The result of a study in Norway has shown an increase in the anti-influenza antibody titre in all vaccinated subjects [8].

In our study, this level included 58.7% of the vaccinated subjects, for which the reason might be the environmental and background factors involved in the vaccinated subjects. Another study has also reported antibody levels of 72%, which doesn't have any similarities to our study [12]. A study carried out in France reported a changing level of antibody titre in the vaccinated subjects to 7.4% [13].

A study carried out in Iran on 32370 Hajjis, out of which 3465 of them were vaccinated with the influenza vaccine, prevented them from getting influenza like diseases in 52% of the cases as compared to the unvaccinated group [14].

This is similar to the results of our study. But these results depend on the conditions of choosing the samples, techniques for searching for the antibodies and underlying factors of the vaccinated subjects, environmental factors and especially, different age ranges of the subjects under investigation.

The mean antibody titre in the vaccinated subjects was 143.4 with an SE equal to 10.86 and in the control group, it was 18.34 with an SE equal to 3.2, that were statistically significantly different

and these are similar to the results of the study which was carried out in Turkey [7].

One of the limitations of the research was the lack of measurement of the levels of the antibody titre against each specific injected vaccine viruses.

Finally, according to the results of the study, it is recommended that in the regions or countries where influenza is epidemic, vaccination against the influenza virus must be done, which is preventive in more than 50% of these subjects and prevent them from severe influenza and the side effects resulting from it.

References

- [1] Cox RJ, Brostad KA, Ogra P. Influenza virus: immunity and vaccination strategies. Comparison of the immune response to inactivated and live, attenuated influenza vaccines. *Scand J Immunol.* 2004; Jan; 59(1):1-15.
- [2] Bernstein E, Kaye D, Abrutyn E, Gross P, Dorfman M, Murasko DM. Immune response to influenza vaccination in a large healthy elderly population. *Vaccine* 1999; 17: :82-94.
- [3] Gardner EM, Bernstein ED, Popoff KA, Abrutyn E, Gross P, Murasko DM. Immune response to influenza vaccine in healthy elderly: lack of association with plasma beta-carotene, retinol, alpha-tocopherol, or zinc. *Mech Ageing Dev.* 2000; 117(1-3):29-45. [PMID: 10958921]
- [4] Brydak L, Rudnicka H, Gut W, Magdzik W, Kańtoch M Seroconversion after vaccine with trivalent influenza vaccine during the epidemic season 1990/1 in Poland. *Przegl Epidemiol.* 1992;46(3):221-9. [PMID: 1296247]
- [5] Odelin MF, Pozzetto B, Aymard M, Defayolle M, Jolly-Million J. Role of influenza vaccination in the elderly during an epidemic of A/H1N1 virus in 1988-1989: clinical and serological data. *Gerontology.* 1993;39(2):109-16 [PMID: 8514200]
- [6] Potter JM, O'Donnel B, Carman WF, Roberts MA, Stott DJ. Serological response to influenza vaccination and nutritional and functional status of patients in geriatric medical long-term care. *Age Ageing.* 1999;28(2):141-5 [PMID: 10350410]
- [7] Cavdar C, Sayan M, Sifil A, Artuk C, Yilmaz N, Bahar H, et al. The comparison of antibody response to influenza vaccination in continuous ambulatory peritoneal dialysis, hemodialysis and renal transplantation patients. *Scand J Urol Nephrol.* 2003;37(1):71. [DOI: 10.1080/00365590310008749]
- [8] Brokstad KA, Cox RJ, Major D, Wood JM, Haaheim LR. Cross-reaction but no avidity change of the serum antibody response after influenza vaccination. *Vaccine.* 1995; 13(16):1522-8. [PMID: 8578836]
- [9] Arnold NL, Slade BA, Jones MM, Popovsky MA. Donor follow-up of influenza vaccine-related multiple viral enzyme immunoassay reactivity. *Vox Sang.* 1994;67(2):191-4. [PMID: 7801610]
- [10] Mokhtari-Azad T, Mohammadi H, Moosavi A, Saadatmand Z and Nategh R. Influenza surveillance in the Islamic Republic of Iran from

- 1991 to 2001. *Eastern Mediterranean Health Journal*. 2004; 10(3):315 - 321. [PMID: 16212207]
- [11] Yang Y, Verkuilen J, Rosengren KS, Mariani RA, Reed M, Grubisich SA, Woods JA. Effects of a Taiji and Qigong intervention on the antibody response to influenza vaccine in older adults. *Am J Chin Med*. 2007;35(4):597-607
[DOI:10.1142/S0192415X07005090]
- [12] Barbara M, Hilde P, Samuel C, Fernande Y, Toon S, Sofie S, et al. The effect of giving influenza vaccination to general practitioners: a controlled trial. *BMC Medicine* 2006; 4(17):3-10. (DOI: 10.1186/1741-7015-4-17)
- [13] Castilla J, Arrequi L, Baleztena J. Incidence of Influenza and Influenza vaccine effectiveness in the 2004-2005 seasons. *An Sist Sanit Navar*. 2006; 29(1):97-106. [PMID: 16670732]
- [14] Razavi M, Sadeghi-Hasanabadi M and Salamati P. The comparison of Influenza vaccine efficacy on respiratory disease among Iranian pilgrims in the 2003 and 2004 hajj seasons. *Acta Medica Iranica* 2005;43(4):279-281.