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Review

A systematic review and meta-analysis of seroprevalence of varicella zoster virus: A nationwide population-based study

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ABSTRACT

Varicella zoster virus (VZV) causes chicken pox as a primary infection following which it becomes latent in neurons. It may then reactivate to cause shingles (herpes zoster). Severity of lesions and VZV pathogenicity are depended on the host's immune response and variant in VZV Dr Athina Myrto ChioniIdentification of VZV seroprevalance rate in general population may lead to develop new health strategic managements such as vaccination. Therefore, we aimed to provide a systematic review of the seroprevalence of VZV infection among Iranian population and estimate age- and gender- specific prevalence of VZV.

Keywords "seroprevalence"; "varicella zoster virus" and "Iran"; were searched in international electronic databases and also in national Persian databases. Twenty two pooled studies among 262 total studies containing (240 published articles; 18 dissertations; and 4 proceedings abstracts) from 1992 to 2014 with total sample size of 7867 individuals were included in the final review. Data was analyzed using random effect method. The heterogeneity was calculated using I-square statistics

The overall IgG seroprevalence rate of VZV infection in general population of Iran was 78.50% (95% CI; 77.74%–79.25%). There was significant heterogeneity among the studies ($P < 0.0001$; $I^2 = 99.4\%$). Furthermore, the relative risk of VZV infection is high in females (80.47%, 95% CI; 79.40%–81.54%) and older adults (95.30%, 95% CI; 94.11% –96.48%).

Our results may represent a true background and estimation of VZV infection in Iran and generate the cost-benefits immunization program. Moreover, the ensuing data suggests further attention on disease seroprevalence in order to obtain efficient data for therapeutic intervention targeted against VZV.

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1. Introduction

Varicella zoster virus (VZV) is a double-stranded DNA genome from alpha-herpes virus family. VZV is a persistent human pathogen causing chicken pox in the early stages of infection. VZV establish a latent infection within the spinal cord ganglia (dorsal root/sensory ganglia) during the primary infection that can be reactivated and cause herpes zoster (shingles) followed by secondary viremia [8,19]. Also clinical presentation of varicella is differed from chickenpox. In varicella, skin vesicles mostly distribute on the head but in chickenpox; vesicles, pustules, and scabs may be present at the same time on any part of skin [18]. Although VZV has host specificity and shows less DNA-sequence diversity, but few *in vitro* and *in vivo* reports demonstrated differences in pathogenic potential of VZV [18].

The primary infection mostly manifested as macular rash, then formed papules and vesicular eruption, fever, while reactivation of dormant virus is involved in the severe form of the disease in adults [39]. Herpes zoster (HZ) is characterized by the painful blistering rash along the dermatomes [46]. Although herpes zoster (HZ) is not limited to any age, the risk of HZ is increased by age and also with advanced immune-suppression [29].

The incidence of this highly contagious infection increases markedly by the age [61]. There are some potential consequences of VZV infection; serious complications such as skin lesions, pneumonia, encephalitis, and hepatitis that threaten adolescents [8]. This may lead to mortality in some cases [7]. Moreover, pregnant women are another group infected by varicella with high risk of transmission to fetus and newborns [40]. Embryos suffer from congenital varicella syndrome and congenital malformation due to transplacental infection of maternal varicella [50]. Chorioretinitis, cerebral cortical atrophy, hydronephrosis, and cutaneous and bony leg defects, often presenting as a partial limb reduction are some examples of fetal deformations of varicella infection [6].

Since different age groups of people are susceptible to HZ, the morbidity and mortality of zoster infection must be reduced by effective management and anti-viral therapy. Vaccination is one of the most appropriate protective ways used to increase immunity against varicella. As VZV vaccine is not a part of routine immunization schedule in Iran, data on the incidence of VZV are essential to schedule the effective vaccination programs. Seroprevalence studies can be counted as valuable approach to gain precise estimation of susceptible patients [59]. The most of the studies on prevalence rate of VZV infection in Iran have focused on high risk groups such as pregnant women, healthcare workers, and medical and paramedical students. On the other hand, there is no comprehensive information on the seroprevalence rate of VZV infection in overall population of Iran. To achieve this we employed a comprehensive systematic review on the seroprevalence of VZV and its risk factors association in general population in order to improve better health control policies. Here we highlight the necessity of vaccination program that may well lead to a faster resolution of VZV infection with obvious advantages for all VZV affected patients.

2. Methods

2.1. Search strategy

Databases such as PubMed, Web of knowledge, Scopus, Science Direct, Google Scholar, DOAJ, Embase, and national Persian databases (Magiran, Scientific Information Database [SID], Iran Medex, and Iran Doc), as well as conference proceedings were used to conduct comprehensive search of studies in the field of VZV infection. All studies from 1992 to 2014 were included using the search term of (Varicella zoster OR varicella zoster virus OR herpes zoster) AND (seroprevalence OR seroepidemiology OR epidemiological study OR immunity OR antibody) AND (Iran OR Islamic Republic of Iran).

2.2. Study selection

All cross sectional studies which aimed on IgG seroprevalence or seroepidemiology of VZV infection in the Iranian population were included. Of the total publications, duplicate and similar ones were identified and excluded. Since both English and Persian publications were included, publications with same data but different languages were removed in the next step. They were then reviewed by the two independent and blinded expert reviewers. The information was recorded on particularly designed sheets. Reviewers checked all potentially relevant studies and reached a consensus on all items. The evaluation was performed on the title and abstracts for the selection of studies. Any disagreement between the two reviewers was resolved after discussion and consultation with a third reviewer. Data were recorded on special designed forms containing general information about each article: author names, publication date, population size, regional target, age, and method of evaluation. The relevant studies were identified in to two stages: (1) all titles, abstracts and keywords were manually screened in order to find publications consistent with the main aim of the study; (2) full-text was downloaded and reviewed by the authors for further identification and confirmation of previous finding.