



Herpes Zoster in Immunosuppressed Patients

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Authors' contributions

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

Article Information

DOI: 10.9734/JPRI/2021/v33i60A34531

Open Peer Review History:

This journal follows the Advanced Open Peer Review policy. Identity of the Reviewers, Editor(s) and additional Reviewers, peer review comments, different versions of the manuscript, comments of the editors, etc are available here: <https://www.sdiarticle5.com/review-history/79601>

Review Article

Received 14 October 2021
Accepted 19 December 2021
Published 20 December 2021

ABSTRACT

Herpes zoster (HZ) is a disease caused by the activation of the virus in the latent phase. The name of the virus is varicella-zoster virus (VZV). This virus remains in the dorsal root ganglia, the collection of neuronal cell bodies. It is known as reactivation because it is a secondary infection. The main or the old infection is chickenpox; it generally occurs in the early stages of life. This secondary infection is caused in the later stages of life in old age patients; if the patient is immunocompromised, this type of infection can cause death or make the patient unconscious. But in the world, many people have a variety of standard or uncommon signs and symptoms of this disease based on their body, diet, area, or even genetic features.

This Herpes Zoster acts on the immune response called cell-mediated immunity and decreases it rapidly with the advance of age of the person. In the coming years, the incidences of this disease are gradually increasing because of the weakening of the immune system. The incidences also happened in people with defective immunity of cell-mediated type or due to the abuse of certain drugs.

The herpes zoster is caused to the immunosuppressed patient more quickly than the average population. As there is no immune system to defend the body, some secondary infections can also be induced in these conditions and lead to death. This multiple infection can make a differential diagnosis.

This review explains and understands the herpes zoster virus causing different complications in the body and other clinical things related to immunocompromised patients.

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Keywords: Varicella-zoster virus; secondary infection; immunosuppressed patients.

1. WHAT IS THE HERPES ZOSTER VIRUS?

Herpes zoster virus comes from the family of the Herpesviridae. Where in there is the subfamily alphaherpesvirinae. The virus of herpes zoster varicella-zoster virus is morphologically like the herpes simplex virus. They have the icosahedral shape containing the linear double-stranded DNA. These viruses do not grow in lab animals; they need human fibroblast, human amnion, or HeLa cells to grow [1].

2. CLINICAL MANIFESTATIONS

2.1 Varicella-Zoster (Chickenpox)

In the early stages of life, i.e., 1-9 years of children, the VZV causes chickenpox [2]. The primary infection is expected in the children but can be more severe and complicated during adulthood. The disease can come up with many other things, such as interstitial pneumonia. The favorable season for the disease to increase is in winter or spring. This can also be part of the epidemics of the region [3][4].

The clinical representation of the patient of this disease is:

- 1) Pain in the head
- 2) Discomfort
- 3) Restlessness
- 4) Infective rashes
- 5) Small spots on all over body
- 6) Lesions
- 7) Neurological symptoms in rare cases like meningitis, etc

The body lesions contain a high amount of infective viruses and are highly transmissible with the touch of a person [5].

2.2 Herpes Zoster

The HZV in the late stages of life, i.e., after 50-55 years of adult, causes the reactivation. The HZV starts from the low levels of symptoms like:

- 1) normal pain
- 2) irritating skin
- 3) loss of the touch sense (numbness) or
- 4) different weird sensations or
- 5) highly sensitive to feel/touch

2.3 High-Level Symptoms

- 1) postherpetic neuralgia
- 2) VZV vasculopathy
- 3) VZV myelopathy
- 4) retinal necrosis
- 5) zoster sine herpette

The macules are scabbed in a few days, and the lesions are not infectious. The dorsal root ganglia and the sensory nerves develop some abnormalities and can be seen in the MRI [6].

3. EPIDEMIOLOGY OF HERPES ZOSTER IN IMMUNOCOMPROMISED PATIENTS

In 2014 the report for the number of patients of HZV in a year was out, and the statistics were 3-5/1000-person-year: - North America, Europe, and Asia-Pacific.

The herpes zoster can vary yearly and does not have specific conditions for these variations.

3.1 According to Age

The HZV is generally related to the old age group with low immunity and has some immunocompromised conditions.

The ratio of the incidences occurring in adulthood to childhood is significant and even increases as the age increases. i.e., 15.5:1, where the age of an adult is 70-79 years of age.

3.2 Gender Role

According to the different articles and surveys, gender affects the number of herpes zoster patients. The conclusion was that females are at higher risk of getting the herpes zoster than males. This is because the women's immunity becomes weak against the dormant virus present in the body.

3.3 Seasonal Factor

There is no particular or significant difference in the patients' seasons change, and the numbers are stable [7].

4. VARIOUS RISK FACTORS FOR HERPES ZOSTER

4.1 Tumors

- Tumours of the lymphoreticular system: Patients with Hodgkin's disease become

immunocompromised because of the treatment. Most of the treatment is radioactive and chemical-induced. According to the research, Hodgkin's disease is more prone to the causing HZ than the non-Hodgkin's tumor. Whereas it is seen that patients with solid mass tumors cannot get HZ. This is because the treatment for such tumors is localized radiations that do not affect the immune system causing immunosuppression in these patients. Examples of solid mass tumors are tumors in the testis or salivary gland, especially parotid. The HZ is more seen / active in the tumors of the breathing organs, i.e., lungs

- Tumours of blood-related components: the most common blood-related tumor is leukemia. These patients who are lymphocytic or chronic are more likely to get the HZ than patients with myelocytic or acute tumors

4.2 Bone Marrow Transplantation

- In the Morden world, the treatment of many diseases related to the immune system or WBCs can be cured with the help of bone marrow transplantation. But for that, the old bone marrow should be destroyed, which should be followed by again formation of the cells. There is a need for immunosuppression of the body to protect the new bone marrow and reduce the possibility of rejection of the transplant. So at this time, patients become more prone to the disease.

4.3 Organ Transplant

- The donor organ is a foreign part for the patient, and the immune system will reject it. Hence the immune system should be suppressed.

4.4 Human Immunodeficiency Virus

- The HZ is found more in these patients and has a very high rate of causing HZ than ordinary people.

4.5 Other

- When the patient is on immunosuppressive drugs and skin disease [8].

5. CAN COVID-19 INCREASE THE RISK OF THE HERPES ZOSTER

Herpes (HZ) is related to significant morbidity. It's caused by reactivation of the latent varicella-zoster virus (VZV) following a decline in cellular immunity that is commonly age-related. However, that also happens in individuals with the illness and conditions underneath immunological disorder medical aid. Since coronavirus illness (COVID19), caused by infection with acute metabolic process syndrome coronavirus a pair of (SARSCoV2), has been related to lymphocyte immune dysfunction and shingles have been rumored in COVID19 patients, we tend to conduct a review of the prevailing literature to see if COVID19 will trigger cycle per second. we tend to know twenty-seven cases of post-COVID19 shingles, most ordinarily occurring among twelve weeks of COVID19, and the majority of cases were typical. Atypical manifestations of herpes are noted significantly in patients with a blood disease. VZV reactivation has been hypothesized to occur thanks to T-cell dysfunction (including blood disease and lymph cell depletion) in COVID19 patients. Supported current proof, restricted to case reports and case series, it's impracticable to see whether COVID19 will increase the chance of shingles. Practitioners should remember the possible redoubled risk of herpes throughout an outbreak and take prompt treatment and hindrance measures against it [9].

6. PATHOGENESIS OF HERPES ZOSTER IN IMMUNOCOMPROMISED PATIENTS

Cutaneous lesions of herpes shingles prove Varicella-zoster virus-specific T-cell proliferation, whereas the assembly of antiviral alfa finally ends up inside the resolution of herpes shingles. In immunocompetent patients, specific antibodies (IgG, IgM, and IgA) seem sooner and reach higher titters throughout reactivation (herpes zoster) than throughout the first infection inflicting durable, enhanced, cell-mediated immunity to the varicella-zoster virus.

The medicine involvement is centripetal and follows an instrument. In most cases, the half and cervical roots square measure concerned, whereas motor involvement is rare. The infection is contagious to people. UN agencies don't have any previous immunity to varicella-zoster; however, the rates of transmission square measure low. The virus might be transmitted

either via direct skin contact or by snorting infected droplets [10].

Differential diagnosis:

- 1) Chickenpox
- 2) Cowpox disease
- 3) Bites by the insect
- 4) Inflammation of hair follicles
- 5) Inflammation of cells
- 6) Ulcerative pyoderma of the skin
- 7) Fungal infections [10]

7. TREATMENT AND PROGNOSIS OF HERPES ZOSTER IN IMMUNOCOMPROMISED PATIENTS

7.1 Antiviral Agents

Systemic antiviral medicine will scale back rash seriousness and limit acute pain. However, the decrease in PHN incidence remains beneath debate¹. In the USA, three antiviral medicines are approved for the treatment of HZ: medication, valacyclovir, and famciclovir. the employment of that antiviral medicine is usually recommended in patients older than fifty years United Nations agency ca cycle while not complications among the primary seventy-two hours of symptom onset to raise treatment profit, and just in case now the amount is exceeded, treatment ought to be additionally initiated in those that at the instant of consultation exhibit new lesions, which suggests there's infectious agent replication. The practical use is additionally suggested in agitated patients or post-transplantation, even seventy-two hours when symptom onset. within the cases of disseminated shingles, the patient ought to be hospitalized to receive blood vessel treatment with medication. There aren't any contraindications for the employment of those medicine in aged subjects. However, doses should be adjusted consistently with directly or indirectly calculated urinary organ function¹. attributable to the convenience of a lower range of doses per day (owing to its high availability), less frequency of drug-drug and drug-disease interactions and adverse reactions, the employment of valacyclovir or famciclovir is most well-liked as compared with medication. Treatment choice ought to be additionally influenced by its value. Table two shows antiviral medicine's totally different properties. Use of corticosteroids general corticosteroids administered among the primary seventy-two hours of rash onset have incontestable vital profit

in treating acute pain, apart from PHN. Their use together with medication has been shown to boost the standard of lifetime of healthy adults older than fifty years with localized cycle, since they decrease pain quicker throughout the acute part and improve interrupted sleep, facilitate patients to come back sooner to their daily activities and need victimization analgesics for a shorter time. However, there aren't any variations within the malady evolution vi months when initial rash prevalence. within the presence of rubor or tissue layer inflammation in the ophthalmic cycle, ophthalmic together with oral steroids, got to be prescribed by the specialist. potential adverse effects got to be thought of once steroids square measure utilized in the elderly: cardiovascular disease, aldohexose intolerance, pathology, and secondary microorganism infection, among others. potential comorbidity gift within the population additionally must be taken under consideration and counsel their use (diabetes mellitus, cardiovascular disease, pathology, glaucoma). Treatment of pain the selection of analgesic treatment for acute hurting or PHN within the aged must take comorbidity, use of alternative medications, and pain severity under consideration. Tylenol should be started in patients with mild pain, either alone or together (if extremely necessary) with some narcotic (codeine or tramadol). the employment of non-steroid medication medicine should be restricted to short periods of your time because of their nephrotoxicity and potential duct injury. Adverse effects of either short or long narcotic analgesics embrace temporary state, psychological feature deceleration, nausea, constipation and itching, which can often occur within the elderly⁴⁹. they ought to be used cautiously in patients with addictions. There are square seasonally different pain treatment choices in PHN attributable to the absence of response discovered in some cases: antidepressant drug antidepressants, gabapentin, pregabalin, and local anaesthetic or chemical irritant patches. antidepressant drug antidepressants are used for the treatment of PHN. the foremost usually used is a tricyclic antidepressant drug, though there are reports on the employment of nortriptylin and desipramine, each the latter with fewer adverse effects. Amitriptyline-associated adverse effects embrace postural hypotension, sedation, xerostomia, retentivity, arrhythmias (A-V block), and medical instrument abnormalities (QT prolongation), limit whicists use in aged adults subjects. Anticonvulsants like gabapentin and pregabalin are rumored to decrease pain severity in PHN. there's no customary dose for gabapentin;

however, studies counsel that young patients may be started with a dose of 900 mg/day, increasing to up to 1800 mg/day (in 7-10 days) solely in case of lack of response. Gabapentin is typically well tolerated by aged patients. Its adverse effects embrace temporary state, symptom, and peripheral edema; additionally, it will increase gait and balance alterations in aged patients, particularly in those that square measure frail. The initial dose ought to be 0.5 than that for young patients and will be bit by bit multiplied (dose-response). Pregabalin has few drug interactions. However, its use with benzodiazepines produces symptoms, some tiredness issues to concentrate, and judgment and thought alterations. In some studies, a dose of 150-600 mg/day in young subjects is efficacious by reducing pain in PHN. terribly cautious use is usually recommended within the aged since it's similar adverse effects to those of gabapentin, but it offers quicker clinical result than gabapentin. each gabapentin and pregabalin should be adjusted in patients with shrivelled urinary organ performance. Topical analgesics square measure usually prescribed for the treatment of PHN. The local anaesthetic patch five-hitter will have an analgesic result for PHN lasting up to twelve hours, with mild or no adverse effects, once it's effective. Topical chemical irritant in zero.025% cream applied up to fourfold daily has been rumored to be ready to decrease pain. However, it's tolerated solely by half-hour of patients attributable to intolerable pain, just like a burn, it should manufacture, which limits its quality. One choice may be the chemical irritant V-day patch formulation, applied for hr, which has been rumored to decrease pain in up to half an hour of patients with PHN. Combination medical care might have the following advantages: increase of single medications partial response multiplied rapidness once a medicine that needs time to succeed in effective dose is employed, and higher physiological condition at lower doses. However, potential disadvantages of combined medical care in aged patients embrace a rise within the risk for adverse effects with a multiplied range of medicines, that even makes it troublesome to grasp that one amongst them is inflicting the adverse effects, additionally to increasing the price of treatment [11].

7.2 Non-Pharmacological Treatment

There are different choices for PHN treatment that also need more study to demonstrate their effectiveness. These choices include:

Invasive techniques like nerve blocks and native anesthetics or intrathecal glucocorticoid administration.

- neurolysin group A application.
- Surgery: neural structure electrical stimulation, anterolateral cordotomy, and dorsal roots electrocoagulation.
- Others: percutaneous electrical nerve stimulation (TENS), stylostixis, cryotherapy, psychological medical care, transdermal electrical nerve stimulation [11].

8. PREVENTIONS OF HERPES ZOSTER IN IMMUNOCOMPROMISED PATIENTS

Herpes shingles and postherpetic pain area unit vaccine-preventable. On Gregorian calendar month twenty-three, 2017, the U.S. Food Associate in Nursing Drug Administration approved an adjuvant recombinant VZV vaccine (Shingrix) for the bar of shingles. The incidence of herpes shingles in those receiving the vaccine decreased by ninety-six (95% CI, ninetieth to 98%) compared with placebo. It's well-tolerated, and since its effectiveness isn't age-dependent and doesn't carry the chance of causing herpes shingles, it's been suggested by the consultative Committee on immunization Practices because the most popular technique of preventing herpes shingles and postherpetic neuralgia. The vaccine is usually recommended for adults fifty years and older, together with those who already had the live VZV vaccine (Zostavax). It's administered in 2 doses, with the second dose given 2 to 6 months once the primary. Before the arrival of the recombinant VZV vaccine, the live VZV vaccine was the suggested immunization, approved for adults fifty years and older. The Centres for malady management and Prevention's consultative Committee on immunization Practices had suggested a vaccination for adults sixty years and older, notwithstanding whether they had the present pox. The live VZV vaccine is contraindicated in immunological disorder persons, those with human immunological disorder viral infection and CD4 white cell counts but two hundred per mm³ (0.20 × 10⁹ per L), patients undergoing cancer treatment, and people with cancer poignant the bones or systema lymphaticum. Vaccine effectiveness is sixty-nine within the 1st year. However, it wanes to four-dimensional within the eighth year; there aren't any recommendations for revaccinating persons UN agency receives the vaccine at sixty years or older.

Although the live VZV vaccine is effective, it's underused, possibly partially attributable to the value. Price will probably be an element within the uptake of the new vaccine, mainly because it's given in 2 doses rather than one. In 2013, the VZV vaccination rate was solely twenty-four. 2% among adults sixty years and older. White adults receive the vaccine at virtually three times the speed of blacks and Hispanics. Patient education will increase vaccination rates by serving to patients perceive the advantages and ways during which patients are also ready to work with insurance firms to seek out a reasonable means of getting it [12-17].

9. CONCLUSION

From this review, we can conclude that the herpes zoster virus has a very high rate in patients with suppressed immunity. The leading age group of people getting the disease is old age (above 55). The reasons and the diagnosis conclude that cell-mediated immunity played a significant role in preventing this disease. But the HZV can be treated and prevented with the vaccines.

CONSENT

It is not applicable.

ETHICAL APPROVAL

It is not applicable.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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Peer-review history:
The peer review history for this paper can be accessed here:
<https://www.sdiarticle5.com/review-history/79601>