Recent Trends in the Study of Herpes Zoster Virus Causing Diseases and Cancer in Human

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ABSTRACT
Varicella zoster virus causes chickenpox and shingles (herpes zoster) in human. Some of the disease manifestations of herpes zoster are noted as post herpetic neuralgia, optic neuritis and encephalitis including cancer. Though, herpes zoster with the development of cancer in human has a murky relationship, recently it has been proved that herpes zoster develops a variety of cancer in human too. On the contrary, studies have also shown the patients with haematological or solid tumor cancer had a much higher risk of having herpes zoster than those with no cancer detection. The present paper is an attempt to discuss the researches done so far in the field of herpes zoster virus developing diseases and cancer in human.

KEYWORDS: Varicella zoster, chickenpox, Herpes zoster, Risk of cancer

INTRODUCTION
One of the eight herpesviruses known to infect humans is Varicella zoster virus (VNV), herpes zoster or human alphaherpesvirus type 3. It usually causes chickenpox and shingles in children and geriatric persons respectively. Shingles is an outcome of reactivation of the virus hidden in the nerve cells (Mahale et al. 2015)[1]. But, how the virus survives in the body or subsequently reactivated is not yet fully known. In recent past, researches revealed that the appearance of shingles as a marker in elderly have been linked to the development of cancers in future (Buntix et al. 2005, Chiu et al. 2013, Cotton et al. 2013, Mahale et al. 2015 and Herbecke et al. 2020)[1-5]. The present paper deals with the study of Varicella zoster virus causing chickenpox, shingles and cancer in the human body.

Clinical Presentation
Varicella zoster is a virus belonging to the subfamily Alfaherpesvirinae causing several human infections with various clinical manifestations. Varicella chickenpox infection as such is a mild disease and it recovers without any serious complications. But, sometimes bacterial parainfections may occur as pneumonia, bacteremia, sepsis and cerebellar ataxia in most of the infants and immunocompromised individuals. Herpes zoster or shingles is caused by the Varicella zoster virus, the same virus that causes chickenpox, but a little bit in a different way (Gilden et al. 2012)[6]. Furthermore, as VZV remains lifelong in the human body, shingles developed only after chickenpox. And, it all happens when the virus is reactivated usually in later half of life (Fawziah et al. 2020)[7]. Shingles is marked by the development of pink or red, itchy and painful maculopapular rashes with fluid filled skin on one side of the body. In addition, there are some internal shingles of eyes, lungs, nervous system and brain causing headaches, cough, fever, abdominal pain, optic neuritis, post herpetic neuralgia and encephalitis (Broucker et al. 2012, Mallick et al. 2016, Kennedy and Gershon 2018, Thomas et al. 2018 and Laura et al. 2020)[8-12]. Similarly, VZV has also been reported to cause fetal abnormalities during pregnancies (Ahn et al. 2016)[13].

Oncology of the Virus
There are several reports that documented the role of shingles in the development of cancer in human. A kind of study says that patients with any kind of cancer diagnosed have usually been found to be associated with high risk of developing shingles. The patients suffering from solid tumor cancers of head and neck, brain, breast, lungs, prostate, kidney, bladder, stomach or ovarian or other organs of the body had a 30 to 40 % increased risk of developing shingles than people without cancer (Mina et al. 2012, Yu et al. 2012, Cotton et al. 2013, Laurel et al. 2013, Mahale et al. 2015, Qian et al. 2019 and Mikolaj et al. 2020)[1,4,14-18]. Similarly, the hematological blood or lymph cancer patients suffering from Hodgkin and non Hodgkin lymphoma and leukemia are also at substantially increased risk of developing herpes zoster (Laurel et al. 2013)[19]. While on the other hand the patients developing shingles have also been found to be associated with the development of cancer in future (Figure 1). It

Varicella zoster virus is a medically important worldwide human herpesvirus whose infections are extremely common. Humans are the only reservoir of VZV causing diseases in human. This is composed of a double stranded D.N.A. enveloped in capsid (Depledge et al. 2010){[28-30], VZV modulated neuronal and non neuronal cells via apoptosis (Bailer et al. 2004, Pugazhenthi et al. 2011 and Yu et al. 2013){[22-24]. It induces apoptosis in immune cells like T cells, B cells and monocytes (Steain et al. 2014, Sen and Arvin 2016 and Kennedy et al. 2019){[25-27]. Varicella zoster virus has got ability to modulate the function of these cells. It alters the transcriptional profile of apoptotic gene of neuronal cells (Konig et al. 2003, Pugazhenthi et al. 2009 and Braeau et al. 2010){[28-30]. The inhibition of apoptosis is critical for maintenance, latency and reactivation of the virus (Hood et al. 2006 James et al. 2012 and Gerada et al. 2018){[31-33]. However, additional studies are still required to understand the exact mechanism of infection in human.

Summarizing all these facts as stated above in the light of recent researches done so far in the same field, in a nutshell the following facts may be derived as under:
- shingles is rarely developed in persons having latent herpes zoster virus in their sensory ganglia (Kenneth et al. 2013){[34],
- these viruses are usually reactivated as shingles in persons suffering from any type of cancer, immunocompromised or in chemotherapeutic patients (Mahale et al. 2015){[31],
- shingles have been hypothesized as a marker for cancer development and diagnosis in future (Buntix et al. 2005, Chiu et al. 2013, Cotton et al. 2013, Igler et al. 2013 and Nikhil et al. 2020){[23,3,35,36].}

PREVENTION OF INFECTION
Chickenpox is highly contagious. The people who have neither been infected nor vaccinated with chickenpox earlier are at higher risk of developing the disease. The disease is more commonly spread through tiny droplets of saliva released into the air via talking, sneezing and coughing of the infected person. A good hygienic condition can only keep us away from infection. The vaccines are safe and effective measure in preventing the smallpox as well as shingles (Macartney et al. 2014 and Fawziah et al. 2020){[7,37].

TREATMENT OF DISEASE
Currently, there are two FDA approved vaccines available for the prevention of these infections. Both of them are live attenuated Oka strain of VZV; Varivax, for the prevention of Varicella and Zostavax, for the prevention of Herpes zoster (Krisen & Messaoudi 2013 and Macartney et al. 2014){[37,38]. Similarly, the treatment with some antivirals like acyclovir (zovirax), valacyclovir (valtrex) and famcyclovir (famvir) are released into the air via talking, sneezing and coughing of the infected person. A good hygienic condition can only keep us away from infection. The vaccines are safe and effective measure in preventing the smallpox as well as shingles (Macartney et al. 2014 and Fawziah et al. 2020){[7,37].

CONCLUSION
Varicella zoster is a virus causing chickenpox and shingles in human. After an initial infection Varicella zoster virus establishes lifelong latency in sensory ganglia and reactivates to produce cancer in the human body. But the link between shingles developing cancer in human is not enough to establish the fact. And, it appears that they are in a juvenile stage. Therefore, more researches are still required to prove the hypothesis proposed (Yu et al. 2012, Cotton et al. 2013, Qian et al. 2019 and Fawziah et al. 2020){[4,7,15,17].

ACKNOWLEDGEMENTS
This piece of research work is dedicated to the memory of my elder sisters’ father-in-law Marhoom Haji Mohammad Sadiq Mansoori. The authors are also deeply appreciating the institutions concerned for providing us necessary facilities during the course of this research work.

FINANCIAL SUPPORT
No financial supports were granted for the same research work.

CONFLICTS OF INTEREST
There are no conflicts of interest. The authors have approved the final version of the manuscript contributing equally.

REFERENCES


Nikhil K. M., Sharma M and Spinner R. J. (2020). Primary peripheral nerve tumors associated with nerv-


