## Original Article

# Association of Herpes Simplex Virus Infection and Bell's Palsy

Muhammad Ayub Musani,[1] Abu Noem Farooqui,[2] Asad Usman,[3] Sabeen Atif,[4] Salman Afaq,[5] Yousuf Khambaty,[6] Layeeq Ahmed[7]

ENT Department,[1-6] Department of Medicine,[7] Abbasi Shaheed Hospital and KMDC, Karachi.

## Abstract

**Objective:** To determine the association of the Herpes Simplex virus Type-1 infection and Bell's Palsy in patients treated at the outpatient department of a tertiary care center.

**Methods:** A prospective, observational study was carried out at the outpatient department of Medical and ENT units of Abbasi Shaheed Hospital, Karachi. Fifty patients were enrolled in the study with their informed and written consent, between 2006-2007. All were >12 years of age. They were diagnosed as having Bell's palsy and were investigated for serologic evidence of Herpes simplex virus (HSV). The IgG and IgM antibodies for HSV were identified in the blood samples at the Aga Khan University hospital's laboratory.

**Result:** Of the 50 patients enrolled, 35 (70%) patients were IgG/IgM positive for the HSV stressing the etiological association of HSV with Bell's palsy.

**Conclusion:** The study suggests that a relationship exists between HSV infection and Bell's palsy. The information might prove helpful in hastening the recovery by modifying management guidelines in view of the results of this study (JPMA 59:823; 2009).

## Introduction

Bell's palsy is one of the most common causes of facial paralysis worldwide, with an incidence of 20-30 cases per 100,000 persons. It accounts for 60-75 % of all cases of unilateral facial paralysis.[1] It is an abrupt, unilateral facial paralysis causing aesthetic, functional and psychological disturbance. The median age at onset is 40 years but it may occur at any age. The incidence is lowest in children under 10 years, increases from ages 10-29 years, remains stable at 30-69 years of age and is highest in people over 70 years.[2] Most recover completely but some may be left with a permanent disfiguring facial weakness. The minimum diagnostic criteria as given by Taverner[3] for the diagnosis of Bell's palsy is: paralysis or paresis of all the facial muscles of expression of one side of the face, sudden onset, absence of signs of central nervous system disease and absence of signs of ear or posterior cranial fossa disease.

The aetiology of Bells Palsy remains unclear.[4] Over the years four theories have been suggested to explain this disorder: vascular (the oldest one), immunological, compressive and viral.[5] Among these the viral theory has gained a lot of popularity and since McCormick[6] who postulated in 1972 that reactivation of Herpes simplex virus might be associated with the Bell's palsy, lots of investigators have published growing evidence that has given credence to this theory. Various investigations employed for the identification of the virus includes autopsy analysis of the cranial nerve ganglion, serological surveys, histopathological analysis and MRI scans.[7] However, the most compelling evidence comes from polymerase chain reaction (PCR) studies of the affected patients.[8]

No local study is available to show viral aetiology for Bell's Palsy in our local population. The objective of this study was an attempt determine an association of Herpes Simplex virus Type 1 and Bell's Palsy.

## Patients and Methods

A total of 50 patients with acute facial paralysis were enrolled from the outpatient department of the Medical and ENT units at Abbasi Shaheed Hospital, Karachi. Patients with age more than 12 years with the symptoms and signs of a lower motor neuronal type of facial palsy were included after their informed and written consent. Patients under 12 years of age and facial palsy that developed because of some known factor like: road traffic accidents (RTA), neurological disease, otological disease, were excluded.

Patients were diagnosed with the Bell's palsy and the serum titres for IgG and IgM against the Herpes simplex virus (HSV) was sent to a well reputed laboratory and the results documented.

## Results

In our study 50 patients were enrolled after their informed and written consent and were investigated for the serum titres of IgG and IgM for the HSV. Among them the females were 32 (64%) and males 18 (36%). From amongst them 35 (70%) were found to have positive titres of IgG and IgM in their sera while the remaining were found to be

negative for both i.e. 15 (30%). In the positive group the females were 25 and the males 10. Our study suggests a strong association between the Bell's palsy and HSV.

## Discussion

Acute lower motor neuronal facial paralysis is a diagnostic challenge and every effort should be made to determine its aetiology, as Bell's palsy is a diagnosis of exclusion. However, May and Coworkers[9] emphasized that based on clinical features the diagnosis, can be confirmed.

After McCormick[6] growing evidence has accumulated over the years, has shown the association of HSV with Bell's palsy. Autopsy PCR analyses of human geniculate ganglia have shown evidence of latent HSV type 1 DNA infection in the majority of the individuals studied.[10-12] Serology, however, has shown that only 3.7% of the patients seroconvert to HSV in association with an episode of Bell's palsy.[13] A number of case reports have linked recent primary oral HSV infection with unilateral[14] or bilateral[15] facial paralysis thus adding support to the viral aetiology. In one study carried out at Ehime University of school of medicine, Japan, viral genomes of HSV, Varicella zoster virus (VZV) and Epstein bar virus (EBV) were analyzed in the clinical samples of facial nerve's endoneural fluid and post auricular muscle using PCR followed by hybridization with Southern Blot analysis. This study concluded that HSV-1 infection in the facial nerve is directly related to the pathogenesis of Bell's palsy and is the major cause for it.[16] In his study Murakami S, found HSV-1 genomy in 79% patients with Bells Palsy but not in patients with Ramsay Hunt syndrome or in controls.[4] While, in a study conducted by Wakisaka and colleagues it was concluded that facial nerve paralysis was caused by the demyelination of the nerve by virus.[17]

Animal models have also been used to study this association and a mouse model developed in which HSV-1 innoculated into the skin of the posterior pinna or the mucous membranes of anterior part of the tongue lead to development of an acute, transient unilateral facial paralysis that mimics Bell's palsy in humans[18] again supporting the role of HSV in causing Bell's palsy.

However, there are studies which cannot associate the sole presence of HSV genomic DNA within the sensory ganglion along the facial nerve and its direct association with Bell's palsy.[19] Likewise a study by Kanvera M et al[20] suggested no significant detection of viral genome in cerebrospinal fluid of Bell's palsy patients. Another study by Stjernquist DA et al did not find HSV-1/ VZV polymerase chain reaction on muscle biopsy or in CSF, which is a method of choice for rapid etiological diagnosis in the acute phase of Bells Palsy.[21]

In our study, the evidence is in accordance with international studies conducted by Chida K. and Takase S.[22] which showed antibody titres in accordance with disease progression and also by Jhonson L. and colleagues[23] which have shown the mean titres of IgG antibodies against HSV-1 higher (46%) in the acute and convalescent stages of the disease compared with controls.

At present there is general agreement that Bells Palsy follows reactivation of latent infection with HSV, localized to facial nerve.[5] In another study, HSV-DNA was detected by PCR in the tear fluid of 35% of patients with Bells Palsy and only in 5% of control.[24] In a study, recently done by Khine H, an association was found between HSV-1 infection and Bells Palsy in children.[25]

Despite, controversies regarding the aetiology of Bells Palsy, our study, concludes that there is a strong association of HSV-1 and the Bells Palsy and the same is reflected in various international studies. Therefore, antiviral treatment should be considered in the early phase of Bells Palsy to achieve rapid and complete clinical recovery.

## Conclusion

The association of HSV infection in recent past is almost established, as a very low percentage of cases are negative for HSV. The knowledge of aetiology may prove helpful in managing the cases and result in early recovery. A rapid and economical diagnostic test for the HSV infection is needed for an early diagnosis.

## References


1. Adour KK, Byl FM, Hilsinger RL Jr., Kahn ZM, Sheldon MI. The true nature of Bell's palsy: analysis of 1000 consecutive patients. Laryngoscope 1978; 88: 787-801.
2. Gilden DH. Clinical practice. Bell's Palsy. N Engl J Med 2004; 351: 1323-31.
3. Taverner D. Cortisone treatment of Bell's palsy. Lancet 1954; 267: 1052-4.
4. Bibias T, Jinang D and Glesson M.J. Disorder of facial nerve. Scott Brown Otolaryngology & Head and Neck surgery, Hodder Arnold. 7th ed. 2008; Vol 3: 3870-94.
5. de Diego JI, Prim MP, Gavilan J. Aetiopathogenesis of Bell's idiopathic peripheral facial palsy. Rev Neurol 2001; 32: 1055-9.
6. McCormick DP. Herpes simplex virus as a cause of Bell's palsy. Lancet 1972; 1: 937-9.
7. Kinoshita T, Ishii K, Okitsu T, Okudara T, Ogawa T. Facial nerve palsy: evaluation by contrast-enhanced MR imaging. Clin Rediol 2001; 56: 926-32.
8. Gilbert SC. Bell's palsy and herpesviruses. Herpes 2002; 9: 70-3.
9. May M, Harvey JE, Marovitz WF, Stroud M. The prognostic accuracy of the maximal stimulation test compared to that of nerve excitability test in Bell's palsy. Laryngoscope 1971; 81: 931-8.
10. Schulz P, Arbusow A, Strupp M, Dieterich M, Rauch E, Brandt T. Highly variable distribution of HSV-1 specific DNA in human geniculate, vestibular and spiral ganglia. Neurosci Lett 1998; 252: 139-42.
11. Takasu T, Furuta Y, Sato KC, Fukuda S, Inuyama Y, Nagashima K. Detection of latent herpes simplex virus DNA and RNA in human geniculate ganglia by the polymerase chain reaction. Acta Otolaryngol 1992; 112: 1004-11.
12. Burgess RC, Micheals L, Bale JF, Smith RJ. Polymerase chain reaction amplification of herpes simplex viral DNA from the geniculate gagnlion of a patient with Bell's palsy. Ann Otol Rhinol Laryngol 1994; 103: 775-9.
13. Morgan M, Nathwari D. Facial palsy and infection: the unfolding story. Clin

Infect Dis 1992; 14: 263-71.
14. Smith MD, Scott GM, Rom S, Patou G. Herpes simplex virus and facial palsy. J Infect 1987; 15: 259-61.
15. Santos DQ, Adour KK. Bilateral facial paralysis related to sexually transmitted herpes simplex: clinical course and MRI findings. Otolaryngol Head Neck Surg 1993; 108: 298-303.
16. Murakami S, Mizobuchi M, Nakashiro Y, Doi T, Hato N, Yanagihara N. Bell palsy and Herpes simplex virus: identification of viral DNA in endoneural fluid and muscle. Ann Int Med1996; 124: 27-30.
17. Wakisaka H, Hato N, Honda N, Takahsahi H, Kisaki H, Murakami S, et al. Demyelination associated with HSV-1 induced facial paralysis. Exp Neurol 2002; 178: 68-79.
18. Sugita T, Murakami S, Yanagihara N, Fujiwara y, Hirata Y, Kurata T. Facial nerve paralysis induced by herpes simplex virus in mice: an animal model of acute and transient facial paralysis. Ann Otol Rhinol Laryngol 1995; 104: 574-81.
19. Linder T, Bossart W, Bodmer D. Bell's palsy and Herpes simplex virus: fact or mystery? Otol Neurotol 2005; 26: 109-13.
20. Kanvera M, Mannonen L, Pilparinen H, Peltomaa M, Vaheri A, Pitkaranta A, et al. Search for Herpesviruses in cerebrospinal fluid of facial palsy patients by PCR. Acta Otolaryngol 2007; 127: 775-9.
21. Stjernquist-Desatnik A, Skoog E, Aurelius E. Detection of herpes simplex and varicella-zoster viruses in patient in Bells palsy by the polymerase chain reaction technique. Ann Otol Rhinoal Laryngol 2006; 115: 306-11.
22. Chida K, Takase S. Serological diagnostic trial of the causative virus of Bell's palsy by anti-herpes virus antibodies in the paired sera. Rhinsho Shinkeigaku 2000; 40: 791-6.
23. Johnson L, Sundqvist VA, Thomander L. Anti-herpes IgG and IgG subclass antibodies in Bell's palsy. Acta Otolaryngol 1988; 106: 1-9.
24. Khine H, MayersM, Avner JR, Fox A, Herold B, Goldman DL. Association between herpes simplex virus - 1 infection and idiopathic unilateral facial paralysis in children and adolescent. Pediatr Infect Dis J 2008; 27: 468-9.
25. Pitkaranta A, Piiparinen H, Manoonen L, Vesaluoma M, Vaheri A. Detection of human herpesvirus 6 and varicella-zoster virus in tear fluid of patients with Bell's palsy by PCR. J Clin Microbiol 2000; 38: 2753-5.