Evidence for Seasonal Variation of Bell's Palsy in Germany

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Dear Editor,

Bell's palsy is the most frequent cranial nerve palsy diagnosed by neurologists and general practitioners [1]. Typically, affected patients present with facial asymmetry, which usually resolves within weeks to months. However, in approximately 15% of patients, moderate-to-severe facial asymmetry may persist, frequently impairing quality of life [1]. While the cause of Bell's palsy remains unknown, a reactivation of latent herpes virus infection in the ganglion geniculatum may play an important role in its pathogenesis [2]. This reactivation could be triggered by respiratory infections that occur more frequently during the cold season [3], implying a causative link between seasonally related frequent respiratory infections and reactivation of latent herpes virus infection.

To test this hypothesis epidemiologically, we analyzed our hospital administration data for all presentations at the emergency department of the Charité, Universitätsmedizin Berlin, (Campus

Benjamin Franklin) in Berlin (Germany) from January 1st, 2010, to June 30th, 2017. All cases of Bell's palsy were identified by the main ICD-10 hospital diagnosis (G51.0). All patients with a diagnosis of Bell's palsy were seen by a neurologist and an otorhinolaryngologist at the emergency department. The diagnosis of Bell's palsy was made according to the guideline of the German Neurological Society [4] and required the typical clinical syndrome of unilateral peripheral facial palsy and exclusion of additional neurological or general medical symptoms (headache, severe ear pain, additional cranial neuropathies, clinical signs of infection, and herpes zoster lesions). We routinely performed neuroimaging and a lumbar puncture to exclude symptomatic cases of facial paralysis in patients with additional symptoms. Files of all cases were analyzed to exclude facial paralysis due to varicella zoster virus, *Borrelia burgdorferi*, trauma, or other causes. Numbers of

Bell's palsy cases were calculated per month during the study period. To study whether there is a seasonal pattern, a multivariable generalized linear model for Poisson distributed data was used. A cosine function with variable amplitude and shift for a period of 12 months was incorporated into the model. Analysis was adjusted by days per month and overall trend during the observation period. By means of the resulting model parameters, 2 extreme values for months with the minimum and maximum of observed numbers of Bell's palsy were derived [5]. A likelihood ratio test was used to assess an improvement in model fit compared to a basic model, which includes days per month and overall trend only. Analyses were conducted using SPSS 23.0 and R 3.4.2 [6].

A total of 403,348 patients presented to our emergency department from January 1st, 2010, to June 30th, 2017. Of these, 46,289 patients presented with neurologi-

Fig. 1. Average number of cases of Bell's palsy according to month (a), season (all cases; b), season according to age (c), and season according to sex (d).

cal complaints and a final diagnosis of Bell's palsy was made in 591 cases (1.3% of all neurological presentations; mean age 49.2 years [± 18.8]; 56.2% male). Numbers of Bell's palsy presentations differed significantly according to month (likelihood ratio test, $p = 0.008$), with the highest likelihood in December and the lowest in July (Fig. 1). On average, 9.6 patients presented in December and 5.0 patients presented in July. There was no significant difference of variation of seasonal incidence according to age and sex (Fig. 1).

Our results indicate that environmental factors occurring more frequently in the cold season may play a role in the pathogenesis of Bell's palsy. A candidate environmental factor may be acute respiratory

infection, possibly by reactivating latent herpes virus infection [3]. However, the findings of other studies investigating seasonal variation of Bell's palsy are heterogeneous [1, 7–10], and the discrepancies may be due to the geographic and climatic area where the studies were conducted [3]. Limitations of our study include the hospital-based setting, which may have biased the representativeness of our study population (for example, patients with very mild facial asymmetry may choose not to go to an emergency department). Another limitation is the low number of cases per season, which precluded a statistical analysis of variation of seasonal incidence across the study period. Our study investigating a very large population of neurological pa-

tients shows a higher likelihood of Bell's palsy cases during cold months in the urban population of Berlin, Germany. Further research is needed to clarify the biological basis of this epidemiological observation.

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