

Survey of Environmental Factors in Incidence of Bells Palsy in Ardabil

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Abstract: Bell's Palsy (BP) is a relatively common disease characterized by the sudden onset of unilateral facial paralysis. The facial muscle is paralyzed and patients cannot close the eyes control their saliva. Incidence ratio in world is between 11.5-40.2 patients per 100,000 of population. Factors that affect this disease are not clear. In a cross-sectional study in ARDABIL province and using a centralized system that contains demographic encounter data, the authors estimated rates, trends, and demographic risk of Bell's palsy during a 2-years period. There were 140 incident cases of Bell's palsy among patients referring to private clinic (total 6500 patients). The crude incidence rate was 2.15 . Incidence rates was high in age between 20-30 years and in females and was higher in cold season than warm ones and higher in cold statue and in farmer working in warm month ($p < 0.05$). The results are consistent with hypotheses regarding viral etiologies (e.g., reactivations of herpes simplex) of Bell's palsy that cold can activate this virus.

Key words: Bell's palsy, *facial paralysis*, season, cold, Ardabil

INTRODUCTION

Bell's palsy is the sudden onset of unilateral dysfunction of the seventh cranial nerve that results in the paralysis of the facial muscle on the affected side of the face. Although, bells palsy is a well known and relatively common condition, its epidemiology is unclear. Estimates of the incidence of this disease in the United States ranges from 13 to 34 cases per 100,000 per year (Bleicher *et al.*, 1996); worldwide, estimates range from 11.5 in 40.2 cases per 100,000 per year (Deigo *et al.*, 1999). Most studies have found comparable rates between males and females (Jackson and Doersten, 1999). Several studies have suggested that Bell's palsy is more common among young and middle-aged adults (Morgan and Nathwant, 1992), although others have documented rates that increased with age (Jackson and Doersten, 1999). Findings of associations between the risk of developing Bell's palsy and seasonal (Peiterson, 1992) geographic (Morgan and Nathwant, 1992), racial ethnic (Diego *et al.*, 1999) and environmental factors have he en inconsistent. There is an emerging consensus that mast cases of Bell's palsy are caused by reactivations of latent herpes virus type 1 (HSV 1) infections of geniculate ganglia of facial nerves (Deigo *et al.*, 1999; Jackson and Doersten, 1999; Murakami *et al.*, 1996). These reactivations lead in

inflammation, swelling, compression and ultimately, dysfunction of affected facial nerves. Published studies, estimating the incidence of Bell's palsy, particularly in the United States, have generally focused on state or community samples (Diego *et al.*, 1999; Hauser *et al.*, 1971). To our knowledge, there have been no studies of incidence of incidence of Bell's palsy among the Iranian population or provinces, although these groups can he particularly valuable for descriptive studies of this disease. Accordingly, for this study, we estimated crude incidence rates of Bell's palsy overall. In addition, we estimated the independent effects of climate, latitude, and season on the incidence of the disease in ARDABIL province that located in North West of IRAN. This province has cold weather.

MATERIALS AND METHODS

In this cross-sectional study in Ardabil province, all demographic and medical encounter data were taken from questionnaire and clinical examination. The total patients that suffered from bell palsy were 140 cases. All patients' records were searched to identify visits that resulted in a primary diagnosis of bells palsy between January 2000 and January 2002 during a 2-year period. Incident cases were defined as those patients whose first bells palsy

Table 1: Frequency distribution of disease in age groups ordering

Age groups	<10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	>80	Total
Number	5	23	25	18	13	20	22	12	2	140
Percent	3.57	16.42	17.85	12.85	10.32	14.28	15.71	8.57	1.42	100

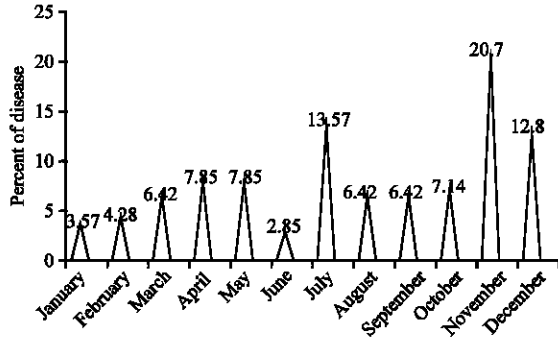


Fig. 1: Comparison of bells palsy incidence in months

diagnosis occurred during the study period. Crude incidence rates were calculated overall. Adjusted incidence rates, controlling for gender, age group and season, relations for climate and season to the incidence of bells palsy, were assessed. Seasonal variations incidence of bells palsy were assessed. Poison regression was used to estimate the independent effects of climate, and season on the incidence of bells palsy while controlling for the potentially confounding effects of demographic characteristics. Analyses were conducted using SPSS software version 11.

RESULTS

There were 140 incident cases of Bell's palsy identified among 6500 patients referred in neurology center during the 2 year surveillance period. The mean age was 42.47 + 21.17 years old in range of 5-88 years old. The crude incidence ratio was 2.15%. The incidence rate of Bell's palsy was slightly higher for females than for males (crude rate ratio = 1.02). The incidence rate was high for those in the youngest age between 20-30 (17.85%) (Table 1). The differences between groups was statistically significant ($p < 0.05$). Incidence rates were higher among patients suffering from stress (85 cases) and increased with age. Finally, crude incidence rates during the colder months of the year (November to October) were consistently higher, while the crude incidence rates during the warmer months of the year (July) were consistently lower. But rate was higher in August (warm month) (Fig. 1). After simultaneous adjustment for demographic characteristics, climate and season, both climate (adjusted rate ratio for arid versus non-arid climate = 1.34) and season (adjusted rate ratio for cold versus warm months = 1.31) were found to be significant independent predictors of Bell's palsy risk.

DISCUSSION

In this study, we observed a Bell's palsy incidence rate of 2.15%. Studies in US populations have reported rates of 13 in 34 cases per 100,000 per years (Bleicher *et al.*, 1996; Deigo *et al.*, 1999). There are several potential explanations for the relatively low rate observed in this study. First, case ascertainment may have been more incomplete in this study than in other studies... Second, we may have included misdiagnosed of other conditions. If most cases of Bell's palsy are indeed caused by reactivated herpes virus infections, then persons with prior HSV-1 infections should be at higher risk of Bell's palsy than others in the same populations. In addition, persons with Bell's palsy should be demographically similar in those with latent HSV-1 infections when populations are uniformly exposed to competent triggers of HSV-1 reactivation. In this study, Bell's palsy rates increased with age; were slightly higher among females than among males. In studies of various populations, prevalence of antibodies to HSV-1 (indicative of prior infections) generally increased with age (Breinig *et al.*, 1990; Austin *et al.*, 1999). Thus, our findings are consistent with the hypothesis that reactivated HSV-1 infections cause Bell's palsy; furthermore, they support the idea that most commonly trigger HSV-1 reactivation are uniformly distributed in general populations. Laboratory and clinical studies have identified several factors that may trigger reactivation of latent HSV-1 infections. These factors include: physical stressors such as cold (Goade *et al.*, 2001), psychological stressors such as stress (Schmidt *et al.*, 1985) and immunosuppressed states such as HIV-1 infection (Sheridan *et al.*, 2000). The findings of this study can be assessed in relation in these categories. Our research indicates that two physical stressors, residence in an arid climate and exposure in cold, are independent predictors of Bell's palsy. Results from other studies that examined relation between facial paralysis and climate (Yanai and Unno, 1988) were inconclusive. Although a study reported an incidence rate that was substantially higher than rates found in most other studies (Degio *et al.*, 1999). Our survey is the first study in IRAN (Islamic Republic of) to show that residence in an arid region is associated with increased risk of Bell's palsy. Low humidity has not been directly associated with herpes virus reactivation. However, breathing cold and dry air has measurable physiologic effects on the respiratory tract (Baile *et al.*, 1987). A study of participants in a military training exercise found that those who trained during hot, humid

weather had significantly less lip damage (including reactivated herpes infections) than did those who trained in hot and dry weather (Shulman *et al.*, 1997). The authors suggested that critical risk factors may be low humidity. The group with the higher injury rate spent more time indoors-and thus had less overall exposure to outdoor air and ultraviolet radiations than did the lower injury group (Goade *et al.*, 2001). The authors hypothesized that prolonged exposure in dry indoor air may be a critical determinant of lip injury risk. The findings of our study suggest that cold, dry air (especially when heated but not humidified for indoor use), such as that in arid areas during winter months, may traumatize mucus membranes of the nasopharynx, which may, in turn, induce reactivation of herpes infections.

In our study, Bell's palsy rates were relatively high during cold seasons of the year. Furthermore, the increased risk associated with cold months was independent of demographic, climate and latitude effects. While results of other studies have been inconsistent in this regard (Diego *et al.*, 1999; Peiterson, 1992) when seasonal variations in Bell's palsy rates were observed, they were generally lower in summer but the rate was in farmer that working in the warm months because they had sweating after working that cause this disease. Exposure to cold may trigger reactivation of HSV-1; however, there is little empirical support for this association. Large variation in day-night temperatures and frequent, sudden and/or prolonged exposures in cold outdoor air may induce vasomotor changes in facial areas, initiate the development of edematous neuritis by ischemia reflex (Lagerholm and Toremalm, 1971) and/or provoke the reactivation of HSV-1 in ganglion cells (Adour *et al.*, 1975).

CONCLUSION

In conclusion, during a 2 year surveillance period, arid climates and cold seasons were significant independent correlates of Bell's palsy risk. The findings are consistent with the hypothesis that reactivation of herpes virus type 1 infections cause most cases of Bell's palsy. Low humidity, cold temperatures, ultraviolet radiation, infections of the supper respiratory tract and dry indoor air should be assessed as possible triggers in this disease.

REFERENCES

Adour, K.K., D.N. Bell and P.L. Hilsinger, Herpes simplex virus in idiopathic facial paralysis. *JAMA.*, 233: 527-530.

- Austin, H., M. Macaluso and A. Nahmias *et al.*, 1999. Correlates of herpes simplex virus seroprevalence among women attending a sexually transmitted disease clinic. *Sex Transm. Dis.*, 26: 329-334.
- Baile, E.M., R.W. Dahlby and B.R. Wiggs *et al.*, 1987. Effect of cold and warm dry air hyperventilation on canine airway blood flow. *J. Applied Physiol.*, 62: 526-532.
- Bleicher, J.N., S. Hamiel and J.S. Gengler, 1996. A survey of facial paralysis: Etiology and incidence. *Ear Nose Throat J.*, 75: 355-358.
- Breinig, M.K., L.A. Kingsley and J.A. Armstrong *et al.*, 1990. Genital herpes in Pittsburgh: Serologic, sexual, and racial correlates of apparent and inapparent herpes simplex infections. *J. Infect. Dis.*, 162: 299-305.
- Goade, D.E., R.A. Nofchissey and D.F. Kusewitt *et al.*, 2001. Ultraviolet light induces reactivation in a murine model of cutaneous herpes simplex virus-1 infection. *Photochem. Photobiol.*, 74: 108-114
- Hauser, W.A., W.E. Karnes and J. Annis *et al.*, 1971. Incidence and prognosis of Bell's palsy in the population of Rochester, Minnesota. *Mayo Clin. Proc.*, 46: 258-264.
- Jackson, C.G. and P.G. von Doersten, 1999. The facial nerve: Current trends in diagnosis, treatment and rehabilitation. *Med. Clin. North Am.*, 83: 179-95.
- Lagerholm, S. and N.G. Toremalm, 1971. Peripheral facial palsy. *Acta Otolaryngol.*, 71: 400-405.
- Morgan, M. and D. Nathwant, 1992. Facial palsy and infection: The unfolding story. *Clin. Infect. Dis.*, 14: 263-271.
- Murakami, S., M. Mizobuchi and Y. Nakashiro *et al.*, 1996. Bell palsy and herpes simplex virus: Identification of viral DNA in endoneurial fluid and muscle. *Ann. Int. Med.*, 124: 27-30.
- Peitersen, P., 1992. Natural history of Bell's palsy. *Acta Otolaryngol.*, 492: 122-124.
- Schmidt, D.D., S. Zyzanski and J. Ellner *et al.*, 1985. Stress as a precipitating factor in subjects with recurrent herpes labialis. *J. Fam. Pract.*, 20: 359-366.
- Sheridan, R.L., J.T. Schulz and J.M. Weber *et al.* 2000. Cutaneous herpetic infections complicating burns. *Burns.*, 26: 621-624.
- Shulman, J.D., D.L. Lewis and W.M. Carpenter, 1997. The prevalence of chapped lips during an army hot weather exercise. *Mil. Med.*, 162: 817-819.
- Yanai, O. and T. Unno, 1988. Relationship between idiopathic peripheral facial paralysis and climate. *Acta Otolaryngol.*, 446: 27-29.