Analysis of Prognostic Factors of Bell's Palsy in a Tertiary Care Centre of Eastern Nepal

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Citation

Paudel D, Chettri ST, Sah BP, Dahal R, Pyakurel P. Analysis of Prognostic Factors of Bell's Palsy in a Tertiary Care Centre of Eastern Nepal. *Kathmandu Univ Med J.* 2021;75(3):325-9.

ABSTRACT

Background

Bell's palsy is the most common cause of acute facial peripheral neuropathy commonly encountered in otolaryngology clinics. Studies regarding epidemiology, risk factors, treatment and prognosis of Bell's palsy are sparse in our settings.

Objective

To analyze the prognostic factors of Bell's palsy in tertiary care Centre of eastern Nepal.

Method

A retrospective chart review of patients diagnosed with Bell's palsy from 1st January 2005 to 31st December 2018 was done. Records of the patients were obtained from medical record section of BP Koirala Institute of Health Sciences.

Result

A Total of 208 patients were included for analysis. After six months 72.6% patients had complete recovery. Patients who presented with lower House Brackmann (HB) grade had significantly better complete recovery than those with high grade (89.1% vs 45.6%). The complete recovery was 80.3%, 73.8%, 63.5% and 50% for the patients of more than 30 yrs, 31-45 years, 46-60 years and more than 60 years respectively and the difference was significant (p= 0.012). Alcohol significantly reduced the complete recovery (p= 0.043). Multivariate analysis showed high HB grade score at presentation to be significant predictor of poor prognosis. (p= 0.001 odds ratio 11.262).

Conclusion

Old age, use of alcohol and the severity of facial nerve palsy at the time of presentation were the bad prognostic factors, severity of the palsy was found to be most significant predictor.

KEY WORDS

Bad prognostic factors, Bell's palsy, House brackmann grade

INTRODUCTION

Bell's palsy is an acute peripheral facial nerve dysfunction of unknown etiology generally involves one side of the face causing weakness of facial musculature.[1] Bell's palsy is a common, controversial disease and diagnosis of exclusion with unknown etiology. Several pathogenesis are proposed for Bell's palsy such as, ischemic neuropathy, autoimmune disorders, and viral infection.[2]

Herpes Simplex Virus (HSV) infection is the most common etiology of Bell's palsy. It elicits autoimmune reaction causing local damage to myelin and inflammation of facial nerve. There are abundance reports identifying herpes simplex virus (HSV) 1-specific DNA in the perineural fluid of patients with Bell's palsy. These findings support the use of additional antiviral therapy in Bell's palsy despite no virus detected in the serum of patients with Bell palsy.[3,4]

Bell's palsy impairs the ability of facial and emotional expression altering the position of the mouth, nostrils, and eyebrows. These cause significant aesthetic and psychological issues leading to facial deformities and social out casting.[2] Outcome of Bell's palsy is not uniform though treatment with corticosteroid improves recovery rates. However 6% to 27% of patients develop sequelae like facial asymmetry, contracture, synkinesis and various other aesthetic conditions.[5]

Factors predicting the prognosis have been explored on several studies based on demography, clinical features, co-morbidities, and imaging.[6,7] However, these type of studies have not been performed in the hospital settings of eastern Nepal where the Bell's palsy is common. Hence, this study will identify the prognostic factors to identify the cause and improve treatment outcome.

METHODS

This is a retrospective cross sectional study and includes, patients diagnosed with Bell's palsy and treated in the department of Otorhinolaryngology of BPKIHS, from 1st January 2005 to 31st December 2018.

Ethical clearance was taken from Institutional Review Board, BPKIHS (IRC Number: 1733/019) Records of the patients were obtained from medical record section by the principal investigator and co-investigator after receiving the permission from the hospital authority. Those patients who had complete records and followed up till complete recovery or followed for at least six months were included in the study. Additionally, patients treated with corticosteroid with or without antiviral and physiotherapy were included in the study. However those patients only on antivirals or physiotherapy were excluded from the study. Patients were divided in to 4 groups based on treatment which includes patients treated with corticosteroid only, corticosteroid and antivirals, corticosteroid, antivirals and physiotherapy and corticosteroid and physiotherapy. Antiviral was only given to the patients who presented within three days of onset of the disease at the dose of 200 mg five times a day for 10 days. Oral prednisolone was given 60 mg per day for 5 days and tapered at the rate of 10 mg/day over next 5 days. Physiotherapy was given as per the protocol of department of physiotherapy on Bell's palsy.

Severity of the facial palsy at the time of presentation and last follow up was assessed on the basis of House-Brackmann scale.[8] By comparing the severity of Bell's palsy between the time of diagnosis and at the last patient's visit, the degree of recovery was divided into 3 groups: complete recovery, partial recovery, and non-recovery. Patients whose House-Brackmann grading was less than the initial grading were grouped into the recovery group and the patients whose final grading was 1 were grouped into the complete-recovery group. Those patient who recovered but the final grade was not 1 were grouped into partial recovery. The non -recovery group had a severity score that did not change or had been worse than that recorded at the time of diagnosis.

Data were collected as per the performa. Data at the time of presentation and after 1, 3, 6 and 12 weeks, and six months of presentation or till full recovery were recorded. Data were entered in the Microsoft Excel 2007 (Microsoft, Redmond, WA, USA) and were analyzed using SPSS (Statistical Package for the Social Sciences) Version 20. Timeliness and Completeness of data were checked periodically by the Principal investigator. Descriptive statistics in the form of frequency, percentage, mean and standard deviation were calculated. Additionally, independent t-test were used to compare the mean of the numerical and categorical variables. Similarly, chi-square test were applied to see the associations between two categorical variables. To evaluate the association between baseline variables, treatment, and outcome of Bell's palsy, multivariable logistic regression analyses were performed and associations were reported as odds ratios (ORs) with 95% confidence interval (CI). P value of < 0.05 was considered as statistically significant.

RESULTS

A total of 332 patient's record reviews were done. Among them 208 patients completed the full follow up. The mean age of the patients was 37.07 years (SD 12.20 years) and ranges from 16-78 years old. Male participants consisted of more than half the population (53.8%). Among the total participants 25.5% were chronic smoker and 37.5% drink alcohol. Regarding underlying medical conditions 18.7% and 9.6% of the people were hypertensive (HTN) and diabetic (DM) respectively. Mean day of presentation after onset of Bell's palsy was 3.97 (SD 1.97) and about 50.5% of patient presented within 3 days of clinical presentation.

People between 31 and 45 years of age were most commonly affected and there was almost equal presentation of Bell's palsy in all seasons (Table 1).

Table 1. Socio-demographic characteristics of patient presented with Bell's palsy (n=208)

Variable	Category	Frequency	Percentage (%)
Sex	Male	112	53.8
	Female	96	46.2
Age group	< 30 years	66	31.7
	31-45 years	84	40.4
	46-60 years	52	25
	> 60 years	6	2.9
Season	Spring	35	16.8
	Summer	52	25
	Autumn	71	34.1
	Winter	50	24
Hypertension	Yes	35	16.8
	No	169	81.2
Diabetes	Yes	20	9.6
	No	188	90.4
Smoking	Yes	53	25.5
	No	155	74.5
Alcohol	Yes	78	37.5
	No	130	62.5
HB grade	Low grade	129	62
	High Grade	79	38
Treatment	Corticosteroid (C)	60	28.8
	Corticosteroid and antiviral	67	32.2
	Corticosteroid, antiviral and physiotherapy	37	17.8
	Corticosteroid and physiotherapy	44	21.2
Sequelae	Yes	7	96.6
	No	201	34.4

Recovery rate was considerably good in our context. Complete recovery at the end of six month was 72.6%. (fig. 1).

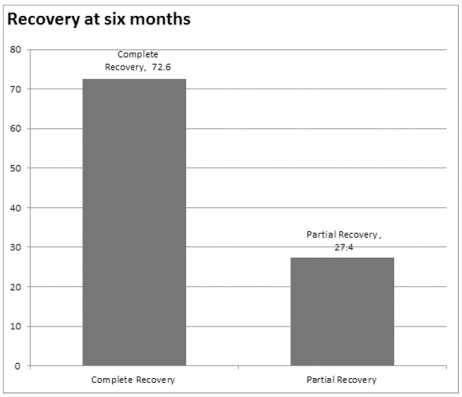

Figure 1. Recovery after six months.

Old age, intake of alcohol, severe facial nerve impairment as measured by HB (grade V and VI) were factors which had significant effect on the complete recovery at the end of six months ($p < 0.05$). However, adding antivirals and/or physiotherapy to corticosteroid had no effect on final recovery of facial nerve functions ($p= 0.27$). Similarly patient with HTN and DM did not differ significantly with those having such comorbidities in term of complete recovery of facial nerve functions (Table 2).

Table 2. Factors affecting recovery at the end of 6 months for patients with Bell's palsy (n= 208)

Variable	Category	Complete Recovery (%)	Partial Recovery (%)	P value
Gender	Male	74.1	25.9	0.108
	Female	70.8	29.2	
Age Group	< 30	80.3	19.7	0.012
	31-45	73.8	26.2	
	46-60	63.5	36.5	
	> 60	50.0	50.0	
Diabetes	Yes	65.0	35.0	0.144
	No	73.4	26.6	
Hypertension	Yes	64.1	35.9	0.132
	No	74.6	25.4	
HB Grade at presentation	Low grade	89.9	10.1	<0.001
	High grade	45.6	54.4	
Day of presentation	< 3 days	73.3	26.7	0.12
	> 3 days	71.8	28.2	
Treatment	C	78.3	21.7	0.278
	CA	76.1	23.9	
	CAP	62.2	37.8	
	CP	68.2	31.8	
Smoking	Yes	71.7	28.3	0.138
	No	72.9	27.1	
Alcohol	Yes	66.7	33.3	0.043
	No	76.2	23.8	

Majority of the patient had smooth recovery. However, 3.6% of total patients had sequelae and all of them had synkinesis. Similarly, 12.28% of patients who partially recovered developed sequelae (Table 1).

Sex, age, HTN, DM, , day of presentation, use of alcohol, smoking and HB grade at presentation had p value score less than 0.2 in bivariate analyses and were included in the multivariate logistic regression analysis. However, only the high HB grade (V and VI) score at presentation was significant predictor of poor prognosis. Odds of complete recovery was highly significant for lower grade (IV or less) palsy than higher (V and VI) (Table 3).

Table 3. **Multivariate analysis of prognostic factors**

Variables	Significance (P value)	Exponential (Odds ratio)	95% Confidence Interval
Sex	0.614	0.831	0.585-2.459
Age	0.462	1.012	0.98-1.043
Day of presentation	0.529	0.946	0.440-1.868
Smoking	0.851	0.923	0.487-2.574
Alcohol	0.277	1.489	0.329-1.383
Diabetes mellitus	0.312	1.865	0.148-1.637
Hypertension	0.188	1.889	0.136-27.334
HB grade at presentation	0.001	11.262	5.129-24.729

DISCUSSION

Generally prognosis of Bell's palsy is good and most of the patients have resolution of symptoms and 84% have near normal function. In our study about 73% of patients had complete recovery after six months and it was consistent with other studies in the literature.[9] Petersen et al. found 84% have near normal facial function and 71% complete resolution, however, only 61% of patients with complete paralysis have complete resolution of palsy. Those who do not recover may be left with persistent facial weakness, synkinesis, or facial contracture.[9] Factors such as age, gender, DM, HTN, and extent of facial deficit at 1 week, electroneuronography, HB grade at presentation, underlying disease like hypertension and diabetes, electrophysiological test findings, and treatment method were proposed to determine the patients with high risk of residual disease.[7] We evaluated the prognostic value of patient's age, gender, underlying medical conditions like diabetes mellitus, and hypertension, smoking, alcohol and grade of facial nerve palsy at presentation as measured by HB grade.

Older age, higher HB (V and VI) grade facial nerve palsy at presentation and use of alcohol were the bad prognostic factors on bivariate analysis. We found that younger people have favorable outcome as compared to old one but there is controversy regarding association between age and outcome of Bell's palsy. Study done by Yoo et al. showed people less than 40 years had favorable outcomes after Bell's palsy however Takemoto et al. and Mont et al. reported no association between age and treatment outcome of Bell's palsy.[10-12]

We did not find any correlation between final outcome and underlying medical conditions (DM and HTN). However there are report stating HTN increased the risk of Bell's palsy among patients aged older than 40 years and patient with uncontrolled HTN where there was higher incidence and poorer outcome of Bell's palsy.[13] Le et al. showed adequate treatment and controlling HTN in Bell's palsy improves the outcome.[14] Moreover DM has adverse effects on recovery of facial nerve functions due to vascular insufficiency, diabetic polyneuropathy and long-term hyperglycemia affecting facial nerve fibers. However, in our set-up majority of the DM and HTN patients have good adherence and compliance to their medications, hence we observe no effect on the outcome of Bell's palsy.[11,15,16]

Although our study did not have the objective to compare the outcome of different treatment protocol we did not find any benefits of adding antiviral or physiotherapy to corticosteroid. Oral corticosteroids are believed to decrease inflammation and edema, and treatment within 72 hours of onset of symptoms shown to have clinically significant benefit on facial functions.[17,18] American Academy of Otolaryngology and Head and Neck Surgery (AAO-HNSF) strongly recommends the administration of oral corticosteroids within 72 hours of onset of symptoms in patients that are greater than 16 years old. But adding antiviral therapy has been controversial and physician has to decide either to add antivirals to oral corticosteroid within 72 hours of onset of symptoms.[19]

Our study showed use of alcohol impairs the recovery of facial nerve function. However, to our surprise there was lower risk of Bell's palsy in patient taking alcohol and had better outcome after treatment.[21] It is suggested that neuroprotective and cardioprotective effects of mild to moderate alcohol consumption may be linked to a reduced risk of Bell's palsy.[20,21] We measured the severity of the facial nerve palsy with HB scale as it is the most commonly used scale to assess the degree of facial function. In our study patients with lower HB grade (IV or less) had significantly better recovery rate as compared to high grade (V or VI) facial nerve palsy both in bivariate and multivariate analysis. In fact in multivariate analysis it was the only factor which predicted the complete recovery of the patients. Mantsopoulos et al. reported that the most important factor determining the outcome of Bell's palsy was the initial severity of facial nerve weakness. However, Fujiwara et al. reported that the facial grading score at 1 week after treatment was associated with an unfavorable outcome of Bell palsy at 6 months. The reason being grading score at the first visit may not be specific as facial palsy can progress even after the start of the treatment.[12,22]

The study is novel as there was no significant relationship between the onset of treatment and the prognosis in Bell's palsy. The result should not be misunderstood as earlier treatment is for the treatment of Bell's palsy, since mean day of presentation was 3.97 days and 51% presented within 72 hours of onset of disease.

Clinical severity and recovery of Bell's palsy varies amongst the individuals. Use of prednisolone improves the recovery rate but even after the timely treatment, 6 to 27% patients developed sequelae like facial contracture, synkinesis of facial muscles, hemifacial spasm.[5] We found that 12.28% of patients who did not recovered completely developed sequelae and all of them had synkinesis. Sullivan et al.

found slight, mild and severe sequelae in 12%, 13% and 4% of the patient respectively.[17] In our study fewer sequelae developed compared to other studies. The reason being we just followed the patients till 6 months, however sequelae usually occurs at 5-8 months after the onset of facial palsy. Another explanation could be that we had strict criteria of complete recovery and even the patient whose final status was HB II were categorized as incomplete recovery and chance of sequelae in mild palsy is very minimum.[23]

We had some limitations, more than 1/3rd of the patient (37%) did not complete the follow up as the natural history of the Bell's palsy is excellent and the treatment is offered only during acute phase. We did not evaluate the finding of electroneuronography as the prognostic factors of Bell's palsy as this facilities are unavailable in our health center. It's a record review and chances of information bias could not be rule out, hence we recommend further prospective studies to be conducted in our settings.

CONCLUSION

Older age, consumption of alcohol and severe or total paralysis at presentation are the bad prognostic factors of Bell's palsy. Among these severe or total paralysis at presentation was found to be highly significant predictor of outcome of Bell's palsy.

ACKNOWLEDGEMENT

I would like to acknowledge medical record section of BPKIHS for keeping the records of the patients and providing us the data, and Dr. Amod Shrestha and Dr. Sunil Singh for helping for data collection.

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