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Original Article

Management of adult diabetic patients of Bell's palsy with and without steroid: experience from a tertiary care hospital

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Abstract:

Background: *Bell's palsy is the most common cause of lower motor neuron type facial nerve palsy and one of the most frequently encountered presentations in Department of Neurology. Initial treatment involves oral corticosteroids, possible antiviral drugs, protection of the eye from desiccation and physiotherapy. But in case of patients with Bell's palsy and diabetes mellitus (DM) decision of prescribing steroid is a major concern due to risk of hyperglycaemia and still a point of conflict. Aim of this study is to observe the outcome of diabetic patients with Bell's palsy with and without steroid therapy.*

Methods: *This retrospective study was conducted from January 2017 to December 2020, in Department of Neurology of BIRDEM General Hospital, Shahbag, Dhaka, Bangladesh. During this period 50 adult diabetic patients with Bell's palsy were recruited retrospectively from hospital records according to inclusion criteria and divided into two groups depending upon the duration of symptoms and prescribing steroid. Group I consisted of patients with Bell's palsy who attended after 72 hours of onset of symptoms and was not prescribed steroid or antiviral drugs, whereas Group II included patients attending within 72 hours of onset of symptoms and received steroid and antiviral drugs. House-Brackmann (H-B) Grading system was used to assess the severity of facial dysfunction. Patients of Grade III and above were recruited in this study and during follow up Grade I and II were considered as recovered. All participants of Group II received prednisolone in divided doses of up to 60 mg for 5 days and then tapered over next 5 days along with the antiviral agents. Patients in the Group I were given supportive care. All patients of both the groups received physiotherapy for facial asymmetry and medication for eye care along with close monitoring and management of diabetes and other comorbidities. H-B Grades at onset, after 10 days, at the end of 1st and at 3rd month after facial paralysis were assessed. Recovery time and the number of patients who demonstrated improvement were compared between the groups.*

Results: *Total 50 adult diabetic patients with Bell's palsy were included. Mean age at presentation was 48.5 ± 13.6 years, 44% were male and 56% female. Hypertension (HTN) was present in 50% cases. A total of 30 patients (60%) received oral steroid with anti-viral drugs and 20 (40%) received only supportive treatment. Significant statistical difference was observed with regard to H-B Grades, recovery time and number of patients between steroid group (Group II) in comparison to patients of non-steroid group (Group I) after 10 days (p 0.007), at 1st month (p <0.001) and at 3rd months (p <0.001) after facial paralysis. Among comorbidities HTN (p 0.021), Glycated haemoglobin (HbA1c) (p 0.033) and High density lipoprotein (HDL) (p 0.005) contributed to the outcome.*

Conclusion: *From the present study it is observed that patients with DM with Bell's palsy, the recovery of facial functions may be satisfactory with steroid therapy.*

Key words: *Bell's palsy, diabetes mellitus, corticosteroids, House-Brackmann Grading.*

Introduction

Bell's palsy (BP) is an acute onset unilateral and the most common type of idiopathic lower motor type facial nerve dysfunction[1]. BP is named after Sir Charles Bell (1774-1842), who described the unilateral involvement as well as the anatomy and function of the facial nerve for the first time.

The most recent literature has reported the annual incidence as 10-40/100,000 in the general population in western country[2-3]. The aetiology of BP has not yet been fully clarified; however, viral infection, vascular ischemia, autoimmune inflammatory disorders and heredity have been proposed as underlying mechanisms[4-6]. The prognosis is good, with 71% of BP patients regain normal function with or without medical therapy, often within 3 weeks and within next 3 to 5 months improves further[7,8]. But up to 30% cases are left with potentially disfiguring facial weakness, involuntary movements and/or persistent lacrimation requiring further interventions[9-11].

Management aims to minimize the possibility of incomplete resolution and reduce the risk of morbid sequelae, which include moderate to severe facial weakness, synkinesis, autonomic dysfunction and contracture of the facial tissues. Current management of peripheral facial palsy is based on three treatment combinations: steroids alone, a combination of steroids and antiviral agents or conservative treatment without steroids or antiviral agents.

Bell's palsy is associated with significant edema and ischemia of the facial nerve as it passes through its bony canal.

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Corticosteroid, the most commonly used agent, seems to reduce inflammation and edema in the nerve sheath. Steroidal treatment for BP has been evaluated extensively over the years. According to several randomized controlled trials, steroid therapy was found to have a beneficial effect in the treatment of Bell's palsy with a high level of evidence when started within 72 hours of symptom onset[12-14]. On the other hand, compelling evidence has not been reported to support antiviral therapy, physical therapy, acupuncture or surgical decompression over placebo in the treatment of BP [15-18]. Another randomized controlled trial showed that patients treated with prednisolone showed better complete recovery rates than did those treated without steroids[19].

Microcirculatory failure of the vasa nervosum due to diabetic microangiopathy indicated diabetes mellitus (DM) as an etiologic and prognostic factor in BP theoretically[20-22]. However, studies investigating the relationship between BP and DM regarding incidence, disease severity and prognosis demonstrated conflicting results in the literature[23-27]. Although corticosteroids have a well-known adverse effect on blood glucose levels, regulation of blood glucose can be ensured with the administration of adequate insulin and close monitoring of blood glucose during steroid therapy[24].

In the present study, we aimed to evaluate the outcome of steroid therapy in the treatment of BP in the patient with diabetes.

Methods:

This retrospective study was conducted in the Department of Neurology, BIRDEM General Hospital, Dhaka, Bangladesh from January 2017 to December 2020, over a period of four years. During this period, 50 adult diabetic patients with BP who met the inclusion criteria were recruited in the study from hospital record. There were two patient groups. Group I (no steroid group) consisted of 20 diabetic patients with BP who attended hospital after 72 hours of onset of symptoms and did not receive steroid or antiviral drugs, whereas Group II (steroid group) considered 30 diabetic patients with BP who came within 72 hours of their symptoms onset and received prednisolone in divided doses of 1 mg/kg up to 60 mg for 5 days and then tapered over next 5 days along with the antiviral agents valacyclovir (1000 mg daily for 5–7 days) or acyclovir (400 mg five times daily for 10 days). Patients in the Group I were given supportive care. All patients of both the groups received physicotherapy for facial asymmetry and medication for eye care. They were under close follow up to regulate blood glucose level and management of other co-morbidities, as required. Blood glucose levels were measured four times a day with finger prick testing and anti-diabetic medications adjusted accordingly.

The diagnosis of DM, presence of hypertension (HTN), glycated haemoglobin (HbA1c) level, lipid profile, serum creatinine value and demographic informations were obtained from the medical records of the patients. H-B grading system was utilized to grade the severity of facial nerve dysfunction in both groups[27]. The House-Brackmann (H-B) system was evaluated at onset, at 10th day, after 1 month and at 3rd month of facial paralysis. According to the final evaluation of facial functions, H-B Grades I and II were considered as a satisfactory recovery. The patients with H-B Grade III and above were included in the study and Grade I, II and patients who attended to the hospital more than seven days from the onset of the symptoms were excluded.

To perform statistical analyses, the collected data were analysed by statistical package for social sciences (SPSS) 20. Data for continuous variables were presented as the mean with standard deviation. Categorical data were expressed as frequency with percentage. Student t tests and the Chi-Square test were used where appropriate. A p-value less than 0.05 was considered statistically significant

Results:

Total patients were 50 divided into two groups. Mean age of 48.4 ± 13.9 years and 48.6 ± 13.6 years were included in Group I and Group II respectively. There was no significant difference in age and gender between the groups. Table I shows baseline profile of the study subjects.

Regarding comorbidities, 70.0% had HTN in Group I and 36.7% in Group II and there was significant difference between Group I and Group II (p 0.021). Serum creatinine, total cholesterol, triglyceride and low density lipoprotein (LDL) levels between the two groups showed no significant differences. But mean high density lipoprotein (HDL) in Group I was 29.4 ± 5.4 and in Group II was 35.5 ± 7.3 which was also statistically significant (p 0.005). Mean HbA1c was 11.64±1.0% in Group I and 10.3±2.52% in Group II and the difference was statistically significant (p 0.033).

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Table I

	Total	Group I	Group II	p-value
Age (years)				
≤40	18 (36.0)	8 (40.0)	10 (33.3)	
>40	32 (64.0)	12 (60.0)	20 (66.7)	
Mean ± SD	48.50 ± 13.6	48.40 ± 13.9	48.6 ± 13.6	0.967
Gender				
Male	22 (44.0)	8 (40.0)	14 (46.7)	0.642
Female	28 (56.0)	12 (60.0)	16 (53.3)	
HTN	25 (50.0)	14 (70.0)	11 (36.7)	0.021
HbA1c (%)	10.94±2.03	11.64±1.0	10.3±2.52	0.033
Total cholesterol (mg/dl)	182.2±49.2	171.3 ± 54.7	190.74 ± 43.74	0.213
Triglyceride (mg/dl)	198.91±111.53	187.3 ± 93.52	207.7 ± 124.61	0.564
HDL (mg/dl)	32.9±7.14	29.4 ± 5.4	35.5 ± 7.3	0.005
LDL (mg/dl)	105.02±43.6	96.00 ± 54.9	111.8 ± 32.43	0.250
Serum creatinine (mg/dl)	1.0±0.3	1.00 ± 0.3	0.93 ± 0.31	0.430

HTN: Hypertension; HbA1c: Glycated haemoglobin; LDL: low density lipoprotein; HDL: high density lipoprotein

According to H-B grading, improvement was significantly better in steroid group (Group II) in comparison to no steroid group (Group I). After 10 days 26.7% patients (p 0.007) and after 1 month 63.3% patients (p-value <0.001) in steroid group (Group II) return to recovery (H-B Grade-I), but none from non-steroid group (Group I). After 3 months of treatment, full recovery was observed 93.3% patients in steroid group (Group I) but in non-steroid group (Group II) only 20.0% patients were recovered fully(p value <0.001). Table II shows H-B grading of the study subjects.

Table II

	H-B grading	Group I	Group II	p-value
First visit	G-III	12 (60.0)	13 (43.3)	0.512
	G-IV	6 (30.0)	13 (43.3)	
	G-V	2 (10.0)	4 (13.3)	
After 10 days	G-I	0 (0.0)	8 (26.7)	0.007
	G-II	0 (0.0)	2 (6.7)	
	G-III	12 (60.0)	5 (16.7)	
	G-IV	6 (30.0)	13 (43.3)	
	G-V	2 (10.0)	2 (6.7)	
After 1 month	G-I	0 (0.0)	19 (63.3)	<0.001
	G-II	2 (10.0)	7 (23.3)	
	G-III	16 (80.0)	4 (13.3)	
	G-V	2 (10.0)	0 (0.0)	
After 3 months	G-I	4 (20.0)	28 (93.3)	<0.001
	G-II	7 (35.0)	2 (6.7)	
	G-III	7 (35.0)	0 (0.0)	
	G-IV	2 (10.0)	0 (0.0)	

Discussion:

The mainstay of pharmacologic therapy for BP or facial nerve palsy is early short-term oral corticosteroid therapy[12-14].But as corticosteroid increases the risk of disrupting glucose control in diabetic patients, treatment of this group of patients is challenging. In diabetic patients with BP corticosteroid therapy has been investigated in several studies with various results in the literature [23-26]. In the study of Kanazawa et al., which involved 19 diabetics and 57 non-diabetic BP patients treated with corticosteroids, the facial movement was found to be significantly poorer in the diabetic group than the non-diabetic group at three and six months after the onset of paralysis[23]. This study also revealed that the recovery rate in the diabetic group was much lower than that in the non-diabetic group. In contrast, Akkuzu et al. reported that DM was not a poor prognostic indicator if treated with corticosteroids in diabetic BP patients[24]. Riga et al. observed full recovery at six months after the onset of facial paralysis in 17 of 20 diabetic patients with BP who were treated with steroid therapy[25]. They stated that pre-existing nerve ischemia may act as a preconditioning nerve lesion and may explain the good recovery of diabetic patients, similar to non-diabetic patients. Saito et al. observed that high dose steroids were highly effective in treating diabetes-accompanied Bell's palsy[26]. The conflicting results in the studies investigating the influence of DM on the severity and prognosis of BP may arise from a number of facts including the differences between the studies in terms of corticosteroid dosing regimens, number of participants and the presence of comorbid diseases such as HTN and multiple predisposing factors (i.e. ischemia of the facial nerve, genetic factors, inflammation and viral infections) relevant to BP, which constitute a challenge in adjusting co-variables.

In the present study, mean age of the patients was 48.50 ± 13.55 years and female (56.0%) was predominant than male (44.0%). In the study of Psillas et al. female was 60.0% and male was 40.0% which is similar to this study but mean age of their patients (65.1 ± 13.4 years) was higher than our study patients[29].

Regarding co-morbidities, HTN was most common among our study patients (50.0%). HTN was present in 59.2% patients in the study of Bayram et al. and 46.4% in the study of Riga et al. which are similar to our study[29, 24]. But in the study of Psillas et al. HTN was only 12.0%[29]. Bivariate analysis in another study showed HTN as a risk factor for developing BP predominantly in DM which is consistent in present study[30]. Research in the adult population with diabetes shows a correlation between poor glycemic control and the development of BP. The more elevated the HbA1c level, the more severe the facial nerve palsy. It is suggested that BP is a syndrome resulting from ischæmia of the facial nerve, in many cases perhaps due to diabetic angiopathy. Vasoconstriction, sludging and thrombosis may also be considered[28]. Statistically significant difference was found in HbA1c level in between two groups in our study as well which signifies the glycemic level as a predictor for developing BP.

In our study, satisfactory recovery (63.3%) were observed after one month in steroid group (Group II) but none in non-steroid group (Group I). After 3 months of treatment, full recovery was observed in 93.3% patients of steroid group but only 20.0% of patients in non-steroid group. These results were similar to the previous studies that showed a beneficial effect of corticosteroids on prognosis in diabetic patients with BP[24-26]. They stated that pre-existing nerve ischemia may act as a preconditioning nerve lesion and may explain the good recovery of diabetic patients, similar to non-diabetic patients. It is also noteworthy that all the study participants of both the groups and patients with HTN received close medical follow-up for controlling blood glucose and blood pressure in our study. As previous study had proved that even short-term amelioration in glycemic control has an additive, independent and durable effect on the restoration of nerve function in patients with diabetic polyneuropathy[32]. Moreover physiotherapy for facial asymmetry and medication for eye care were ensured for all patients. But the recovery rate was significantly different between the two Groups, which may be explained by the fact of potent anti-inflammatory effect of corticosteroid on BP in the background of a pro-inflammatory condition like diabetes.[33-35]

Our study has some limitations. First, due to small no of study population we were not able to adjust all variables such as duration of DM, type of antidiabetic treatment including oral antidiabetic or insulin before the onset of BP. Also, facial nerve functions were evaluated only with the H-B system, which has been criticized for insufficient sensitivity in detecting recovery since the patients with BP may have contrasting degrees of function in different parts of the face[36,37]. Despite the H-B grading system being a simple and reliable method in clinical practice for assessing facial function, electrophysiological studies may provide a quantitative assessment of the degree of facial dysfunction which was not performed in our cases[38].

Conclusion:

In our study, highly satisfactory recovery of facial function is observed with steroid therapy in patients with diabetes and BP. So, diabetic patient with BP can be treated with steroid but physician should pay attention to the control of blood glucose level with regular medical follow up for better outcome as this facial asymmetry is recoverable. Further study in this ground is needed for diabetic patients.

Authors' contribution: DA was involved in drafting and manuscript writing which was critically revised and guided by MRI, MSH, RH and RSBR.

Conflicts of interest: Nothing to declare.

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