CENTRAL ASIAN JOURNAL OF MEDICAL AND NATURAL SCIENCES
https://cajmns.centralasianstudies.org/index.php/CAJMNS
Volume: 06 Issue: 02 | April 2025 ISSN: 2660-4159

Article

Identifying Key Risk Factors for Bell's Palsy and Insights from a Retrospective Analysis

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Abstract: A cross-sectional descriptive study was designed, with all patients diagnosed with Bell's palsy in AL-Nasiriya from January 2022 to December 2024 being included in the study. The study population comprised 110 patients. The House-Brackmann scale, a well-established method for the classification of muscle functions, was utilised for the assessment of patient progression. This scale facilitates the evaluation of facial posture both at rest and during voluntary movement, in addition to the identification of any abnormal movements. The scale categorises dysfunction into six distinct degrees or categories, ranging from normal function to severe disability. The classification system utilised in this study is the House-Brackmann scale, a well-established framework for the categorisation of muscle function. This scale has proven to be a valuable tool for the management of patients, as it enables the evaluation of facial posture both at rest and during voluntary movement, in addition to identifying the presence of any atypical movements. The scale delineates six distinct categories or degrees of dysfunction, as outlined below: 1) Grade I: Normal, 2) Grade II: Mild, 3) Grade III: Moderate, 4) Grade IV: Moderately Severe, 5) Grade V: Severe, 6) Grade VI: Total Paralysis. The findings from this study revealed that individuals between the ages of 30 and 39 exhibited a frequency of 40% and a p-value of 33.33%, while those between the ages of 40 and 49 demonstrated a frequency of 44% and a p-value of 36.67%. 0-60 years: frequency 26, p% 21.67, BMI: 25-28: 30, p% 25.00, 29-31: 50, p% 41.67 and >31for 30 patients and p% 25.00, Sex: male: 60, p% 50, Female: 60, p% 50 Affected side: right: 60, p% 54.5. As demonstrated in Table 3, the logistic regression analysis enabled the identification of risk factors and the determination of the most influential factors. The factors that exhibited the greatest influence were identified as the affected side right CS 2.2 OI 1.55-3.6 with a P-value of <0.001 and the left CS 2.23 OI 1.44-3.44 with a P-value of <0.001. The presence of an interval exceeding two years was observed in 3.4% of cases, categorized as CS 3.4. The observed range of OI was 2.4-4.9, with a P-value of <0.001. The designation of Grade IV signifies severe dysfunction in patients. The mean CS score was 4.1, with an observed range of OI 2.7-6.9 and a P-value of <0.001. The designation of Grade V indicates minimal ability, with a mean score of 4.5 and an observed range of 3.8-6.6, both with a P-value of <0.001.

Keywords: Bell's Palsy, House-Brackmann scale, risk factors, CS score.

Citation: Al-Najim, M. M. Identifying Key Risk Factors for Bell's Palsy and Insights from a Retrospective Analysis. Central Asian Journal of Medical and Natural Science 2025, 6(2), 586-593

Received: 20th Jan 2025
Revised: 24th Jan 2025
Accepted: 30th Jan 2025
Published: 16th Feb 2025

1. Introduction

Bell's palsy, also known as idiopathic facial paralysis, is a form of temporary facial paralysis or weakness on one side of the face. It is the result of a dysfunction of the seventh cranial nerve (the facial nerve) [1], which innervates the muscles on one side of the face, including those that control blinking, closing the eye, and facial expression. [2,3] The facial nerve also transmits nerve impulses to the tear glands, salivary glands, and the muscles of the small bone in the middle of the ear, as well as the sensation of taste from the tongue.

Bell's palsy is the most common cause of facial paralysis, although the exact cause is unknown. [4,5] The cause of Bell's palsy is unknown. The condition is characterized by swelling and inflammation of the seventh cranial nerve, and preliminary studies have indicated that reactivation of a latent viral infection may be a contributing factor. [6] Potential triggers for this disorder have been postulated as including weakened immunity due to stress, sleep deprivation, physical trauma, minor illnesses, or autoimmune syndromes. In response to an infection, the facial nerve undergoes swelling, which is a hallmark feature of Bell's palsy. [7]

The clinical presentation of Bell's palsy is typically unilateral and rapidly progressive, often reaching maximum severity within the first 48 to 72 hours. Patients may present with asymmetric facial droop, inability to close the eye on the affected side, and difficulties speaking or eating due to muscle weakness [8]. Although most patients recover completely, about 10–15% have permanent sequelae such as associated movement or contractures. This condition is the most prevalent cause of unilateral facial paralysis, typically manifesting without an identifiable etiology, [9,10] thereby necessitating a clinical diagnosis and constituting an exception to the norm. The prevalence of Bell's palsy is estimated to be approximately 20–30 cases per 100,000 population per year, with a slightly higher incidence observed in middle-aged adults. The precise etiology of Bell's palsy remains elusive, with the prevailing theory attributing its onset to the reactivation of herpes simplex virus type 1 (HSV-1), which affects the facial nerve. However, this correlation has not been substantiated in all cases, suggesting the potential involvement of other factors, such as varicella-zoster virus, in certain patients. [11]

2. Materials and Methods

We designed a cross-sectional, descriptive study in which all patients with Bell's Palsy in AL-NASIRIYAH were included from January 2022 to December 2024 with 110 patients and were Information was extracted from the patient's clinical records and photographs, and a data capture sheet was entered that included patient demographic variables, etiology of paralysis, affected side, number and type of surgeries. Descriptive analysis of population characteristics was performed using the statistical package SPSS version 25, where categorical variables were reported as percentages and continuous variables as mean (± standard deviation [SD]) or median (interquartile range) according to their distribution.

Idiopathic facial palsy, or Bell's palsy, is the most common form of peripheral facial palsy. With an annual incidence of 20-30 cases per 100,000 population, it accounts for 60-75% of unilateral facial palsy cases1,2. Other causes of facial palsy are listed in Table 13. After Bell's palsy, the most common causes are sequelae of treatment for eighth nerve tumor, head and neck cancer, treatment of diseases, and the auricular band.

In this study, the mode of onset of paralysis was categorised as sudden or gradual. The presence of previous seizures, recent infectious diseases, history of tumours, vascular diseases, heart diseases, and coagulation disorders, as well as the presence of accompanying symptoms, were determined. The severity of paralysis was measured, and the degree of injury to each branch of the facial nerve was evaluated. Additionally, the eye closure and Bell's sign, which is independent of the degree of paralysis and varies from one individual to another, were considered.

The presence of risk factors for cerebrovascular disease (e.g., cardiac disease, clotting disorders, peripheral vascular disease) and advanced age are predisposing factors for central paralysis. Peripheral facial paralysis affects all branches of the nerve, whereas central facial paralysis mostly affects the muscles of the lower face, corresponding to the site of the lesion (Brown et al., 2019). The frontal and orbicularis oculi muscles are usually not affected, or if they are, their effect is minimal. However, there are exceptional cases in which facial paralysis can affect these muscle groups, and in these cases, the following factors must be considered: Periopharyngeal muscle paralysis is usually not as severe as paralysis of the muscles around the mouth. It is essential to study the rest of the cranial

nerves, as well as the motor and sensory function of the rest of the body since central facial paralysis can often be associated with changes at these levels.

3. Results

A research study examined the condition of Bell's palsy in 110 Iraqi patients. The highest number of Bell's palsy cases affected middle-aged adults across the age brackets of 40-49 years and 30-39 years with frequencies of 36.67% and 33.33% respectively. Regulating BMI allowed researchers to find the highest frequency distribution at 29-31 BMI levels (41.67%). This result highlights the potential danger Bell's palsy presents to patients with elevated BMI values. Researchers observed equal involvement between male (50%) and female (50%) patients.

Among the Iraqi patients with Bell's palsy high blood pressure was the most prevalent condition followed by diabetes. The reported symptoms of jaw pain matched those of aches in the head and sense of altered taste at eighteen percent each. The right facial side received more cases than the left side (54.55%).

The results from logistic regression which analyzed risk factors produced statistically significant findings.

Affected Side: Right (CS 2.2, $P < 0.001$), Left (CS 2.23, $P < 0.001$)

Interval >2 Years: CS 3.4, $P < 0.001$

High-grade nerve damage was observed among patients showing Grade IV (CS 4.1 $P < 0.001$) (Grade V (CS 4.5 $P < 0.001$).

Most patients scored in the mild to moderate range of dysfunction on the House-Brackmann scale mainly because their cases were chronic. The data revealed increased Bell's palsy cases during winter months which supports the idea that the virus activates in cold conditions. Research data emphasizes age and BMI together with comorbidities along with seasonal variations as factors that affect the risk profile of Bell's palsy patients thus improving both risk assessments and management approaches.

As shown in Table 1, the demographic characteristics of the patients reveal that the highest number of Bell's palsy cases affected individuals aged 40-49 years, accounting for 36.67% of the sample

Table 1. Determine the demographic characteristics of Iraqi patients

Variable	f	P%
Age		
30-39	40	33.33
40-49	44	36.67
50-60	26	21.67
BMI		
25-28	30	25.00
29-31	50	41.67
>31	30	25.00
sex		
male	60	50
Female	60	50
Comorbidities		
Diabetes	22	18.33
high blood pressure	40	33.33
Heart diseases	20	16.67
Others	28	23.33
Affected Side	f	p
Right	60	54.55
Left	50	45.45
symptoms	f	p
Facial drooping	15	13.64
Drooping of the saliva	12	10.91

Pain around the jaw	22	20.00
Increased sensitivity to sound	16	14.55
Headache	19	17.27
Loss of taste	20	18.18
Changes in the amount of tears and saliva you produce	20	18.18

Table 2 shows the distribution of viral infections associated with Bell's palsy among the patients. The infections listed include cold sores, chickenpox, monocytosis, cytomegalovirus infection, respiratory diseases, mumps, influenza, and a category for undefined causes. Each cause is accompanied by its frequency and percentage of occurrence in the sample.

Table 2. Distribution of causes of disease associated with viral infection among Iraqi patients

Variable	f	P%
Cold sores	10	9.09
Chickenpox	9	8.18
Monocytosis	6	5.45
Cytomegalovirus infection	11	10.00
Respiratory diseases	10	9.09
Mumps	9	8.18
Influenza	8	7.27
not defined	47	42.73

Figure 1 presents a graphical representation of the outcomes of patients based on the House-Brackmann scale, which classifies facial nerve function from normal (Grade I) to total paralysis (Grade VI). The figure shows the distribution of patients across different grades, indicating the severity of facial paralysis observed in the study group.

Figure 1 - Outcomes of patients according to The House-Brackmann scale

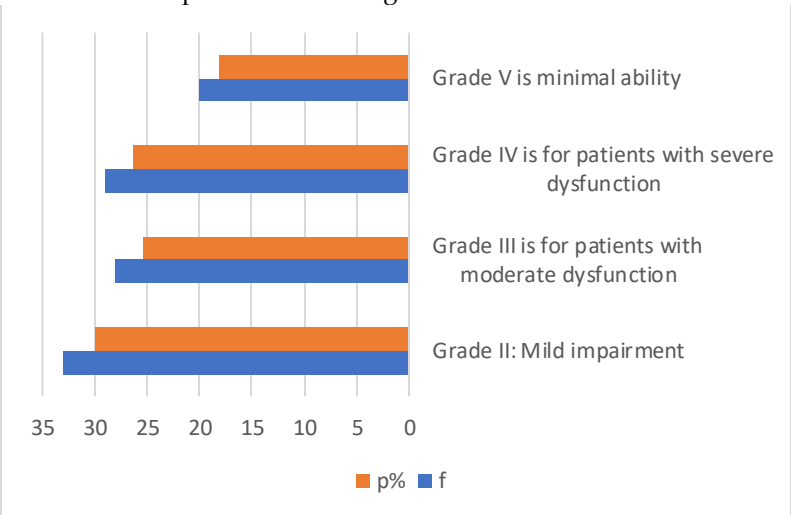

Figure 2 illustrates the seasonal variation in the incidence of Bell's palsy among the patients. It shows the number of cases during different seasons, with an emphasis on the peak of cases observed during the colder months, supporting the hypothesis that the virus activates more frequently in these conditions.

Figure 2- Distribution of patients according to Incidence related to seasons

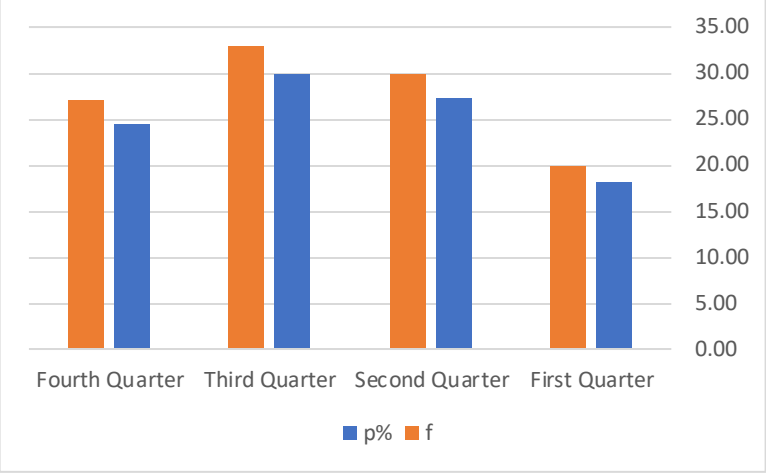

Figure 3 demonstrates the distribution of patients based on the interval time of more than two years. It highlights the number of cases that were observed after this time frame, categorized under different intervals, with a focus on those showing longer durations.

Figure 3- Distribution of patients according to interval time years

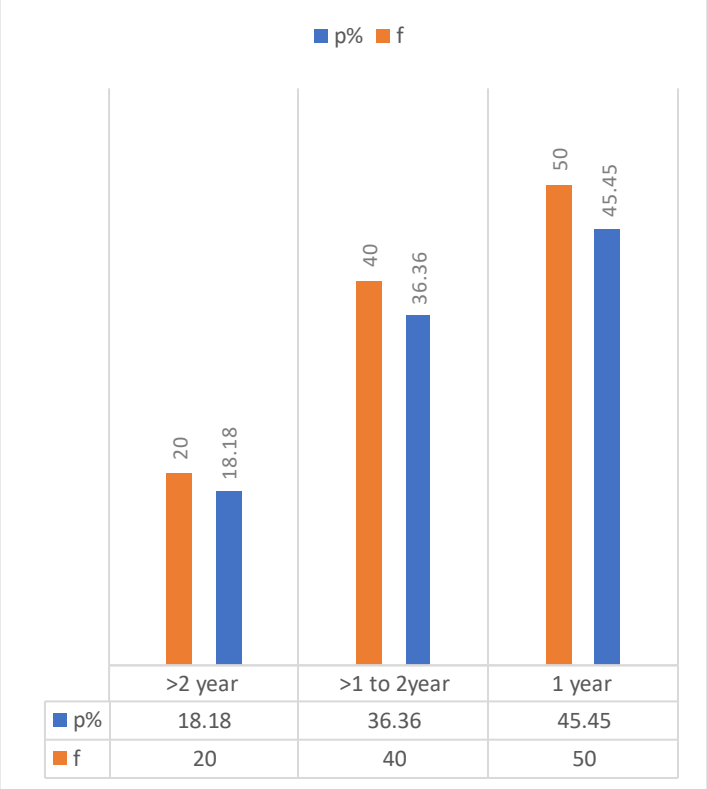

Table 3 presents the results of the logistic regression analysis conducted to identify risk factors affecting Bell's palsy patients. The analysis assesses variables such as age, affected side (right/left), facial drooping, and interval greater than two years. The table provides coefficients (CS), odds intervals (OI), and p-values for each risk factor, highlighting statistically significant findings, especially related to the affected side and facial drooping.

Table 3- Logistic regression to assess risk factors in this study and their impact on patients

Variable	CS	OI	P VALUE
Age	1.33	0.8-1.8	0.068
Affected Side			
Right	2.2	1.55-3.6	<0.001
left	2.23	1.44-3.44	<0.001
Facial drooping	2.1	1.2-2.9	0.043
Drooping of the saliva	1.83	1.11-2.29	0.082
Interval >2 year	3.4	2.4-4.9	<0.001
Grade IV is for patients with severe dysfunction	4.1	2.7-6.9	<0.001
Grade V is minimal ability	4.5	3.8-6.6	<0.001
BMI >31	1.88	0.9-2.6	0.08

4. Discussion.

Bell's palsy is a type of facial nerve paralysis (often meaning that the muscles on one side of the face are temporarily paralyzed. There is some degree of paralysis because the nerves that supply the muscles are damaged in some way. The facial nerve controls the muscles. In addition to controlling facial expressions such as smiling and frowning, many of the facial nerve fibers also control the tear and eye muscles, causing the skin to dry out, and the sweat, salivary glands, and scrotum. The diagnosis of Bell's palsy is based on clinical findings and ruling out other possible causes of facial paralysis; no specific test is available. For example, strokes are caused by. Tests that can be used to confirm the disorder and determine its severity and severity are usually unnecessary. Blood tests are sometimes used to identify the affected nerves to diagnose other complications. Such tests are useful in cases of diabetes and some types of infections. [12]

Bell's palsy occurs when the nerves that control the facial muscles swell and cause facial weakness or paralysis. However, the exact cause of this injury is unknown. Most scientists believe that the disease is caused by a viral infection. [13,14] They believe that the swelling and inflammation of the facial nerves are a reaction to the infection, which causes localized weakness, resulting in pressure in the facial nerve canal, which limits the blood and oxygen supply to the nerve cells (blood flow). [15] The nerves are affected to a lesser extent, and in mild cases, the disease is also thought to be related to chronic middle ear infections, headaches, or flu-like illnesses, tumors, sarcoidosis, diabetes, high blood pressure, infections such as skull fractures or facial injuries, Lyme disease, and trauma. [16,17]

Despite the encouraging results, this review has some limitations. Variability in study designs, sample sizes, and treatment approaches can make generalizability of the results difficult. 20 Furthermore, the lack of high-quality, controlled studies in some modalities, such as electrical stimulation and biofeedback, suggests that more research is needed in these areas. Future research should focus on more robust clinical trials that evaluate the effectiveness of treatment combinations and their impact on patients' quality of life. Furthermore, long-term follow-up of treated patients could provide valuable information about the sustained effectiveness of interventions. [18,19,20]

Currently, thanks to advances in surgical techniques for treating facial paralysis, the main goal of surgical intervention is the restoration of function, symmetrical, voluntary, and eventually spontaneous facial dynamics. Every particular procedure is oriented towards that area that is to be resuscitated: the lower lip, oral commissure, middle part of the face, area of the eye, or frontal. Multidisciplinary and timely treatment has significantly improved the quality of lives of patients. Among syndromic developmental facial paralysis, the major cause for facial paralysis in our study turned out to be Moebius syndrome among the different causes of the syndrome, the variant being the classic or complete one. The above goes contrary to information published in other series and is due to the fact that our hospital is a referral center for the country concerning congenital craniofacial malformations. Retrospective studies reviewing 655 cases of patients with facial paralysis have proven the same results as those of our study: syndromic facial paralysis was the most prevalent cause. Terzis and Konovaus17, in a series of 166 patients with facial paralysis after resection of intracranial tumors, reported that acoustic neuroma was the most common, followed by extra-temporal tumors, such as hemangiomas, and finally, infratemporal tumors, such as cholesteatoma. In our study, resection of intracranial and extracranial tumors was the second most common cause of facial paralysis. Schwannomas were the most common, followed by mastoidectomy for the treatment of cholesteatoma, meningiomas, and acoustic neuromas. The high incidence of facial paralysis post-tumor resection in our center is probably due to the interhospital referral made.

5. Conclusion

The prognosis is generally positive since it has been observed that this entity can spontaneously remit in a large proportion of cases. However, it is also possible for sequelae to develop that have a significant impact on the subject due to their association with facial mimicry. Some of the most important and common are permanent partial paralysis, muscle contractures, and motor or hemiparesis. A thorough study of any aspect related to PB can benefit a large population.

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