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### THE EPIDEMIOLOGY AND CLINICAL OUTCOME OF FACIAL NERVE PARALYSIS IN TERTIARY CARE CENTER.

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#### ABSTRACT

**Background:** Facial Nerve Palsy (FNP) is characterized by weakness in facial muscles with loss of facial movement. The most common causes of facial nerve paralysis are Bell's palsy, infection, inflammation of the facial nerve, stroke, head trauma and head and neck tumor.

**Objectives:** The aim of this research is to estimate the incidence of FNP, explore the most common causes of FNP and evaluate different treatment modalities and outcome in the patients cared in King Abdulaziz University Hospital (KAUH) in Jeddah.

**Methods:** Through a retrospective record based study, the researchers reviewed the medical files for all patients diagnosed with facial nerve palsy in King Abdulaziz University Hospital in the period from 2010 to 2019. Most of the cases had been diagnosed at KAUH tertiary care hospital in Jeddah. Data were analyzed using SPSS version 21; P-value of <0.05 was considered an indication for statistical significance.

**Results:** Out of all FNP cases (n=101); females constituted more than one half (55.4%), with dominance of patients in their adulthood. Most of the cases were unilateral mainly in the right side (92.1%) and according to the House-Brackmann scale, (49.5%) were grade 2. The majority of the inpatients' cases were due to a Cerebrovascular accident (CVA) (40.6%). When we correlate this information with the patients' clinical outcomes, we found that there was a statistically significant association between patient age and patient outcome. We also reviewed different treatment methods which did not found to correlate with the FNP patient outcome.

**Conclusion:** This study revealed information about facial nerve palsy in tertiary (KAUH in Jeddah). We found that the most common cause of inpatients was CVA and it was associated with multiple risk factors especially (Diabetes Mellitus) DM and Hypertension (HTN). We recommend future studies with large sample size and long-term collaborative studies between different centers in Saudi Arabia

**Keywords:** Facial nerve paralysis, most common cause, outcome, risk factor.

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## INTRODUCTION

Facial Nerve Palsy (FNP) is a neurological dysfunction affecting the facial nerve with weakness or paralysis of facial muscles. The facial nerve is the seventh cranial nerve; it consists of a motor part that innervates muscles of the facial expression, cheeks, scalp, stapedius muscle of middle ear, stylohyoid and posterior belly of digastric muscles, and a sensory part that innervates the anterior two-thirds of the tongue, secretomotor parasympathetic part to submandibular, sublingual salivary gland and lacrimal gland [1,2]. The incidence of FNP is more in young adults, but some studies showed an increased rate of FNP in geriatric patients [3,4].

The facial nerve pathway is long and relatively convoluted with a wide range of pathological conditions that could cause FNP. The most common cause of acute FNP is Bell's palsy, which is an idiopathic disease diagnosed only by exclusion. Other causes are either congenital or acquired that include infection, inflammation of the facial nerve, head trauma, head or neck tumors and stroke. The risk factors for FNP include diabetes mellitus, immunocompromised patients, and recent upper respiratory tract infection [1–4]. Recently, multiple studies suggest that the origin of facial nerve paralysis is from the reactivation of herpes simplex virus type 1 concealed in the geniculate ganglion. The reactivation generally starts in the Ramsay Hunt Syndrome, which occurs with acute facial paralysis followed by severe pain associated with vesicular eruptions of the

patient's external auditory meatus; 50% of those diagnosed with this disease had complete recovery [5].

Patients with FNP experience both functional and psychosocial consequences. The patient usually complains from problems in chewing, speaking, swallowing, and the inability to express emotions. Furthermore, it may cause loss of taste over the anterior 2/3 of the tongue, changing tears, inability to close the eye or blink, drooling of saliva, pain, or numbness behind or in front of the ear in the affected side [3,4]. So, it may sometimes lead to social isolation as the face is an important component of beauty and sexual attractiveness [5].

FNP is either unilateral or bilateral and has two types, peripheral (lower motor neuron lesion) causing dropping of the lower eyelid and the angle of the mouth, and a central facial paralysis (upper motor neuron lesion) which limited to the lower part of the face (2,6,8,9). The diagnosis is usually based on clinical judgment (history and neurological examination). The most used grading system for FNP is House-Brackmann (H-B) scale that describes and grades the patients with facial nerve dysfunction, which may give an idea about the outcome. Besides the clinical judgment, there are specific laboratory tests, imaging methods, and additional tests including audiological, otolaryngological, ophthalmological, and neurological tests like Electromyography (EMG) and Electroneuronography (ENoG), that might be used to reach the diagnosis [7,8].

The management of FNP is usually consists of steroids with or without antiviral medication and ocular lubricants or artificial tears for eye protection. In certain cases, they may require surgical treatment, nerve grafting, functional muscle transfer, eyelid correction surgeries and many other techniques to improve their quality of life [7–10]. The prognosis depends mainly on the cause, for example, while congenital traumatic FNP relieved spontaneously in 90 % of cases after 4weeks, blunt head trauma may take longer time to recover, or in rare cases may be permanent [6,8]. The recovery rate of Bell's palsy is good, as 80% of cases had completely recovered [3]. Generally, the recovery rate of FNP is inversely related to the patient's age [12,13].

This study is expected to add informative perspective about the magnitude and risk factors potentiating FNP, thus enabling prevention and early diagnosis of the disease.

## MATERIAL AND METHODS

This Retrospective Descriptive Records Review study conducted at KAUH in Jeddah city between 2010 to 2019. The study was ethically approved. This study included both genders, all age groups diagnosed with facial palsy with a sample size of 101 patients. Data were analyzed by SPSS version 21. P-value <0.05 was considered significant.

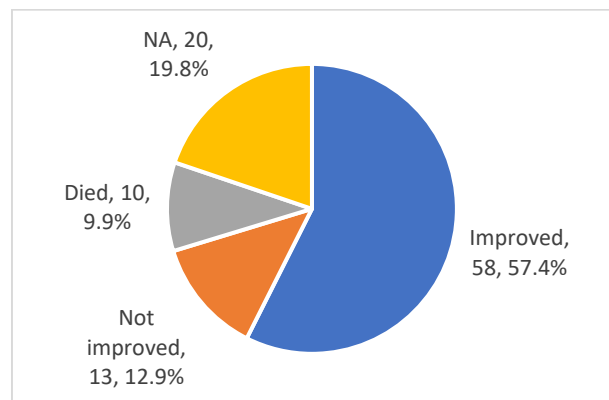
## RESULTS

A total of 101 patients diagnosed with FNP between 2010 and 2019 were included in this retrospective study. There was slight dominance of females (55.6%), with almost equal distribution of Saudis (50.5%) and non-Saudis (49.5%). The cases were mainly in the adult age group (56.4%), who were mostly

married (69.3%) [Table 1]. The great majority of the cases had unilateral affected facial nerve (92.1%) and the rest (7.9%) were bilateral. According to the House-Brackmann scale, almost one half of the cases (49.5%) were classified as grade 2 and 19.8% as grade 3. Most of the cases were due Cerebrovascular Accidents (CVA) (40.6%), then trauma (30.7%) and idiopathic (20.8%), concomitant hypertension was prevalent in 41.6% and diabetes mellitus in 30.7%. Medical treatment was provided for 58.4%, while surgical intervention was applied for 21.8% [Table 2]. Most of the cases showed improvement and full recovery (57.4%) [Figure 1]. There is a statistically significant association between the clinical outcome and age of the patient ( $p < 0.05$ ); however, no significant difference detected regarding the risk factor and treatment methods with the clinical outcome of the patient ( $p > 0.05$ ) [Table 3].

## DISCUSSION

The facial nerve pathway is long and relatively convoluted that makes it more reliable to a wide range of pathological conditions ranging from an idiopathic and middle ear infection to a brain tumor and



**Figure 1:** Outcome for treating facial nerve palsy cases

**Table 1: Socio demographic characteristics of the study group (n=101).**

Sociodemographic Characteristics	No.	Percentage
Gender		
Male	45	44.6
Female	56	55.4
Nationality:		
Saudi	51	50.5
Non Saudi	50	49.5
Age categories:		
Children	14	13.9
Adult	57	56.4
Elderly	30	29.7
Marital status		
Single	24	23.8
Married	70	69.3
Divorced	2	2.0
Widowed	5	5.0

stroke [1,2,5]. So in our study, we aimed to estimate the number of FNP cases, specify the socio-demographic characters, identify frequent causes, show risk factors and evaluate the treatment methods that have been used by investigating the FNP patient's outcome in KAUH. This approach will help us in sizing the magnitude of the problem, and the frequency of occurrence to enable evaluating and improving the hospital care methods and, more importantly, identify patients at risk of developing FNP, and hopefully preventing the disease and supporting the early diagnosis.

One hundred one patients were included in this retrospective study, 55.4% were female, and 44.6% were male. On the contrary, most studies showed that the number of facial nerve palsy cases approximately equal in both genders [16].

Facial nerve palsy affects both adults and children [11,17]. Depending on our age group classification, we found that adults

**Table 2: Clinical features of the facial nerve paralysis cases (n=101).**

Clinical Characteristics	No.	Percentage
Affected side:		
Unilateral	93	92.1
Bilateral	8	7.9
Right side	61	60.4
Left side	48	47.5
Grade:		
Grade 1	1	1.0
Grade 2	50	49.5
Grade 3	20	19.8
Grade 4	13	12.9
Grade 5	8	7.9
Grade 6	9	8.9
Causes or risk factors:		
Cerebrovascular Accident (CVA)	41	40.6
Trauma	31	30.7
Idiopathic	21	20.8
Others	8	7.9
Common associated medical conditions:		
Hypertension	42	41.6
Diabetes mellitus	31	30.7
Others	67	66.3
Treatment modalities		
Medical	59	58.4
Surgical	22	21.8
Physiotherapy	35	34.7

were the most common age group (54.5%), which is like other research in other institutions and hospitals [2]. This might be caused by an inadequate examination of facial nerve paralysis in children [1]. Numerous studies indicated an increment in occurrence with propelling age [18–21].

The right-side was the most affected if compared to the left-side or bilateral FNP; which comes in accordance with what was found in Nigeria and Brazil [22,23]; however, it contrasts what was reported in Spain, where the left side was the dominant [24].

**Table 1: Outcome of treating facial nerve palsy cases according to age and causes or risk factors.**

	Outcome					
Characteristics	Improved	Not improved	Died	NA	X <sup>2</sup>	P*
	N (%)	N (%)	N (%)	N (%)		
Age:					17.708	0.007**
Children	3(5.2)	6(46.2)	3(30.0)	6(46.2)		
Adult	36(62.1)	5(38.5)	4(40.0)	5(38.5)		
Elderly	19(32.8)	2(15.4)	3(30.0)	2(15.4)		
Causes/risk factors:					1.819	0.611
CVA	3(30.0)	25(43.1)	8(40.0)	5(38.5)		
Trauma	3(30.0)	17(29.3)	7(35.0)	4(30.8)		
Idiopathic	4(40.0)	10(17.2)	5(25.0)	2(15.4)		
Others	0(0.0)	6(10.3)	0(0.0)	2(15.4)		

\* Based on Chi Square      \*\* Statistically significant

Several systemic disorders such as diabetes mellitus, hypertension, hyperthyroidism, pregnancy, and autoimmune disorder could be associated with FNP [25]. 72.3% of our FNP patients were hypertensive and/or diabetic. A study conducted in Nigeria found that hypertension was the most common cause of FNP in their research, then diabetes mellitus [26]. In a study from Arar, diabetes mellitus was associated with 12.2% of their FNP patients [6]. However, we found no significant relationship between the risk factors, treatment methods, and the outcome. In general, idiopathic (Bell's palsy) was the predominant cause in most studies [6,27–29]. Contrary to that, in our institution, CVA was the main cause of most inpatient problems (40.6%). While in another study found that CVA was the second most common cause after idiopathic [22]. The higher incidence of FNP due to CVA in our study is explained by a higher incidence of multiple risk factors like hypertension and diabetes mellitus that implicated to cause CVA. Trauma was the second cause in 30.7%, followed by

idiopathic and CTD in 20.8% and 5.9%, respectively. That agrees with another study that found trauma is the second cause after idiopathic FNP [27]. A Study on children reported that infection was more common than other causes (30). Also, a study detected trauma a main cause [26]; while other studies pointed to neoplasia either by itself or by its surgical removal [31,32].

Hypertension and diabetes mellitus are major risk factors for CVA [33–35], and it was correlated with a higher percentage in our results which may explain why CVA represents the upper hand for FNP causes in our research. Similarly, Central FNP was more common than peripheral because CVA represented the main causes for the cases. This is similar to other studies where central FNP was more common than peripheral FNP [26] and not comparable with other works with more common peripheral FNP [27].

Out of all our cases, 58.4 % were managed medically by treating the underlying cause using steroids, antiviral, and antibiotics; which is supported by other researches which

indicated that cases as acute otitis media, mastoiditis, Lyme disease, and those who had a bacterial infection, require antibiotic therapy [36]. Regarding to Bell's Palsy in current management confirmed by a Cochrane review applied on over 1500 patients, recovery improved with early use of steroids, and analgesia [37], while the use of antivirals therapy remains uncertain [38]. However, we found no significant relationship between the treatment methods and the outcome. A study showed that 70% of Bell's palsy patients improved within six months without any treatment [39]. Additionally, they used a combination of steroid therapy, analgesia, and antiviral to treat the Ramsay Hunt syndrome patients [40]. There were 34.7 % of our cases who received physiotherapy. Only a few controlled trials were available on the effectiveness of physical therapy for facial palsy [16]. There are many surgical options to treat acute, chronic and permanent facial palsy; about 21.8% of patients in our study managed by surgical procedures depending on their underlying cause.

Regarding the outcome, we noted that more than one half of the cases improved despite disease etiology, which matches another study where patients mostly improved [41]. In the few cases that did not improve, trauma and CVA cases were the main leading causes. As in a study carried out in Nigeria, where patients who developed FNP after head Injury, only 30% reached a complete recovery [22].

We found a significant relationship between patients' age and the outcome of facial palsy, which is analogous to another study conducted in Greece [15]. Recovery in

adults, about 62.1%, seems to be more favorable than children and the elderly. Other reports demonstrated that the patient's age, paralysis grade, and delay of onset were the most important prognostic factors. They noted that young patients and incomplete palsy have a better prognosis than elderly patients and those with severe weakness, which have a more unsatisfactory outcome [5,15].

Our study's main limitation was the small sample size, and it was not possible to maintain the specific management and the outcome to the facial palsy in detail because of limited documentation and loss of follow-up for patients.

## CONCLUSION

In conclusion, in this study, we have elucidated valuable information about facial nerve palsy incidence, etiology, and clinical outcomes in A tertiary KAUH in Jeddah. We found that among the 101 patients evaluated with FP, CVA was the predominant etiology associated with multiple risk factors, mostly DM and HTN. Most of the patients treated medically and were improved.

Our data correlate with the international literature review regarding facial nerve paralysis. However, this is a retrospective study; we suggest that future studies with a larger sample size be conducted in a prospective pattern to get a complete picture of facial nerve palsy with further long-term collaborative studies between different centers in Saudi Arabia and Gulf countries

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