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Research Article

The Relationship between The Demographic and Clinical Characteristics of Peripheral Facial Paralysis Patients and The Physiotherapy Program

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Abstract

Objective: *What are factors for patients diagnosed with peripheral facial paralysis (PFP) to apply to Physical Medicine and Rehabilitation (PMR) clinic. The aim of this study was to examine the demographic characteristics, stage at the first application, comorbidities, recovery rates, success rates of the treatments given and physiotherapy programs, if applied from the archive data of patients diagnosed with PFP in this study*
Methods: *Our study was obtained using the medical records of patients admitted to clinic for PFP from January 2017 to October 2022.*
Results: *A total of 833 patients with PFP were included in the study. Four hundred eleven (49.3%) were female and 422 were male, and the mean age of the patients was 43.33. One hundred ninety nine (23,9%) patients with a diagnosis of PFP applied to PMR clinic and a physiotherapy program was used to 92 (11%) patients. There was a difference in terms of comorbid diseases and it was more common in female patients (p:0,004); facial paralysis (FP) recurrence was more frequent in female patients (p:0,025). There was a significant correlation between admission to the PMR clinic and having left-sided PFP (p:0.012). There was a positive significant correlation between admission to the PMR clinic and House-Brackman (HB) stage (p:0.000)*
Conclusions: *Ours is the first study which investigated percentage of apply to PMR clinic patients who applied to otolaryngology outpatient clinic diagnesed PFP. We found that patients with PFP on the left side and with high HB stage were more likely to refer to the PMR clinic.*

Key words: *Correlation, House-Brackman stage, Peripheral facial paralysis, Physiotherapy program*

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Introduction

Peripheral facial paralysis (PFP) is a disease characterized by partial or complete paralysis of the facial muscles as a result of compression or cutting of the 7th cranial nerve. Idiopathic peripheral facial nerve palsy or Bell's palsy (BP) is the most common cause of facial nerve palsy (1). The incidence of BP is between 15-30/100.000. It usually occurs between the ages of 15-45, equally in male and female. 9% of the patients have a history of facial paralysis (FP) (2). Although many cases are idiopathic, some are associated with identifiable causes. Whatever the cause, 85% of patients partially regain function, and more than 70% achieve a full recovery (3).

FP not only has a devastating effect on the patient's mood and quality of life, but also puts a serious physiological burden on the person's daily life. Therefore, FP treatment, which includes conventional pharmacological therapy, physical therapy and surgical options, may often require a complex multidisciplinary approach (4).

In the prognosis of FP, especially grade of the disease and the time of its onset, as well as the accompanying pathologies, if any, play a major role. The duration of paralysis and accompanying comorbid diseases both regulate the management of the patient's treatment options and play a predictive role in the prognosis, especially with age (5).

PFP remains a common epidemiological problem in otolaryngology practice and is extremely distressing, especially for patients with delayed or partial recovery (6). It is very important to determine which patients will have a poor prognosis of FP, which patient will need physiotherapy and when they should be referred. Twenty one patients who were diagnosed with BP and received a physical therapy program consisting of electrotherapy, infrared and mimic exercises, who received 15 sessions of treatment and 21 patients who received 30 sessions of treatment were examined in a retrospective study conducted in Turkey in 2022; It was reported that 15 sessions of physical therapy provided significant functional improvement in patients with BP receiving physical therapy and that increasing the number of physical therapy sessions to 30 sessions had no additional effect on functionality (7). Randomized controlled trials in which Proprioceptive Neuromuscular Facilitation (PNF) technique was applied to 184 patients with dysfunctions resulting from facial paralysis, and the rate of improvement measured using the House Brackmann Scale and clinical improvement were evaluated in a 2022 review; PNF was used

in combination with other interventions in all of the included studies, and it was reported that PNF showed very low evidence that it was more effective than minimal intervention in the treatment of FP (8). Current physiotherapy approaches in patients with FP were examined in a review conducted in 2024; physical therapy approaches aimed at increasing muscle strength for a better result in all age groups, the importance of combining various methods such as electrical stimulation, massage, PNF, taping and mirror exercise that can be given for BP with traditional medical treatment was emphasized (9). Studies on physiotherapy in patients with PFP are mostly focused on the applied method and its effect (10, 11).

PFP is an important clinical condition that significantly reduces patients' quality of life, causes functional losses and psychosocial problems. Although many studies have been conducted on PFP today, there is no study in the literature how many patients with PFP require physiotherapy, on when it was done and what factors affected this situation. Although treatment protocols and prognosticators have been investigated in studies conducted to date, critical clinical questions, such as defining the patient group requiring physiotherapy, timing of treatment and the effect of comorbidities on the risk of recurrence, remain unanswered. This uncertainty makes it difficult for physicians to personalize the rehabilitation process and prevent complications. For example, it is not known how comorbidities such as diabetes or hypertension affect the response to physiotherapy or at which stage the intervention is most effective. We thought that The FP stage is worse than in those who do not apply, and comorbidities such as Diabetes or Hypertension are more common in PFP patients who apply to the PTR clinic; and the risk of recurrence is higher patients with comorbidities than in those without comorbidities. We aimed to examine the demographic characteristics, stage at the first application, comorbidities, recovery rates, success rates of the treatments given and physiotherapy programs, if applied from the archive data of patients diagnosed with PFP in this study. These findings aim to reduce permanent sequela rates and improve patient outcomes by providing clinicians with early intervention strategies.

Material And Methods

Study design

This retrospective study was undertaken between January 2017 and October 2022. The study protocol was approved by University the Clinical Research Ethics Committee with decision number 2017-KAEK-189_2022.10.27_04, Provincial

Health Directorate's Scientific Research Commission and adhered to the principles of the Helsinki Declaration.

Patients selection

The study included patients who were examined in the City Hospital Ear Nose Throat, Head and Neck Surgery (OHNS) and Physical Medicine and Rehabilitation (PMR) clinics.

Inclusion criteria for patients:

- Patients between the ages of 18-65,
- Having been diagnosed with PFP,
- Having accessible communication, demographic, imaging, clinical information in the hospital data system
- Patients who regularly attend their follow-ups

Patients whose contact information could not be accessed in the hospital data system, who did not come for regular check-ups, who had incomplete file information, who had middle ear and central nervous system pathology detected using methods such as computerized tomography (CT) and magnetic resonance imaging (MRI), and who had FP due to trauma were excluded from the study.

Patients' age, gender, comorbidity, duration of admission, side of direction of paralysis, stage of paralysis at the first application, and whether a application to the PMR clinic, whether a physiotherapy program was applied, and whether FP is recurrent or not, were taken from hospital archive records.

FP physiotherapy was applied to the patients in the form of physiotherapy consisting of mimic exercises, therapeutic electrical stimulation, facial muscle massage, and mirror therapy, with an average of 20-30 sessions in total, each session lasting approximately 1 hour on a weekday.

The House-Brackmann (HB) staging system

HB is the most commonly used subjective staging system in practice to evaluate facial nerve function. Moreover, HB is the facial nerve staging system officially accepted by the American Academy of Otolaryngology-Head and Neck Surgery (4). HB has been considered accurate in describing the patient's facial function and in supervising the patient's status periodically to assess the course of recovery and the effects of treatment[9]. There are 6 stages in total and the number of stages increases as the severity of the disease increases. The stages are listed as stage I-normal, stage II-mild dysfunction, stage III-moderate dysfunction, stage IV-moderate severe dysfunction, stage V-severe dysfunction and stage VI-total paralysis according to HB (Table 1).

Table 1. The House-Brackmann Grading System.

	Grade	**Defined by**
1	Normal	Normal facial function in all areas.
2	Mild dysfunction	The forehead is in normal symmetry at rest; Eye, slight asymmetry, can close with minimal effort; Corner of mouth, slight asymmetry, can move with maximum effort.
3	Moderate dysfunction	There is asymmetry in both halves of the face that does not distort the appearance Forehead movements are mild to moderate The eye can cover it fully with effort A slight mouth movement occurs with maximum effort
4	Moderately severe dysfunction	Obvious weakness and/or disfiguring asymmetry. There is asymmetry in both halves of the face that distorts the appearance There are no forehead movements The eye cannot close completely with effort There is an asymmetrical mouth appearance with maximum effort
5	Severe dysfunction	Only barely perceptible motion. There is asymmetry at rest There are no forehead movements The eye cannot close completely with effort The mouth moves very slightly
6	Total paralysis	There is a very obvious asymmetry There is no muscle movement

Statistical analysis

Before the study, a "Power Analysis" was performed using G-Power 3.1 to ensure that the data obtained from the study could be used and evaluated and it was found that 472 patients should be included in the study with a 95% confidence interval for this study.. All analyses were carried out with SPSS 26.0 (IBM, USA). The findings of the study are expressed as frequency and percentages. Normality analysis was carried out using Kolmogorov-Smirnov test. The variables that did not normally distribute are presented as the median and interquartile range (IQR) with 25-75th percentiles. Descriptive statistics mean and standard deviation (mean±SD) were used for normally distributed variables, mean and minimum-maximum values ere used for non-normally distributed variables. Numeric dependent variables with abnormal distribution were compared with the Mann-Whitney U Test. Categorical variables were compared using the Chi-

Square Test. P value less than 0.05 with a 95% confidence interval was considered to be statistically significant.

Results

A total of 833 patients were included in the study. Of the patients, 411 (49.3%) were female and 422 (50.7%) were male. The mean age of the patients participating in the study was 43.33±0,669. At presentation, the direction of FP was on the right in 344 (41.3%) patients and on the left in 489 (58.7%). The mean days to admission to the outpatient clinic after the onset of symptoms was 1.9 days. According to the HB staging of our patients, the most common admission stage was 404 (48,25%) grade 2. The number of patients with comorbid diseases accompanying the patients was 333 (40%). The most common of these was Hypertension with 30.73% (n:256), followed by 20.28% (n:169) Diabetes Mellitus. 3.8% of patients have recurrent FP. A total of 199 (23.9%) patients diagnosed with PFP applied to the PMR clinic, and 92 (11%) patients received a physiotherapy program with an average of 22.5±3.4 rehabilitation sessions (Table 2).

Table 2. Demographic features and clinical findings of the patients.

Parametres		Patients (n/%)
Gender	Female	411 (%49,3)
	Male	422 (%50,7)
Age	Mean±standard deviation	43,30± 0,669
Facial Paralysis Direction	Right	344 (%41,3)
	Left	489 (%58,7)
The mean days to admission to the outpatient clinic after the onset of symptoms	Mean±standard deviation	1,9± 0,23
HB Classification of Facial Function	1	4 (%0,5)
	2	404 (%48,5)
	3	226 (%27,1)
	4	153 (%18,4)
	5	32 (%3,8)
	6	14 (%1,7)
Comorbid disease	None	500 (%60)
	HT	50 (%6)
	DM	35 (%4,2)
	HT+DM	134 (%16,1)
	HT+CAD	72 (%8,6)
	Others	42 (%5)
Recurrens	No	801 (%96,2)
	Yes	32 (%3,8)

Table 2. Demographic features and clinical findings of the patients (continued).

Application to PMR	Yes	199 (%23,9)
	No	634 (%76,1)
Practice of a Physiotherapy Program	Yes	92 (%11)
	No	741 (%89)
Total number of rehabilitation sessions	Mean±standard	22.5± 3.4

HT: Hypertension, DM: Diabetes Mellitus, CAD: Coronary Artery Disease, PMR: Physical Medicine and Rehabilitation.

When we looked at the distribution of patients by gender, there was a difference in terms of comorbid diseases and it was more common in female patients (p:0,004); FP recurrence was more frequent in female patients (p:0,025) (Table 3).

Table 3. Distribution of data by gender.

		Female Patients (n=411)	**Male Patients (n=422)**	***p***
Facial Paralysis Direction	Right	164	180	0,420*
	Left	247	242	
HB Classification of Facial Function	1	3	1	0,721*
	2	194	210	
	3	109	117	
	4	81	72	
	5	16	16	
	6	8	6	
Co-diseases	none	233	277	**0,004***
	HT	31	19	
	DM	17	18	
	HT+DM	84	50	
	HT+CAD	34	38	
	Others	22	20	
Recurrence	Yes	22	10	**0,025***
	No	389	412	
Application to PMR	Yes	108	91	0,111*
	No	303	331	
Practice of a Physiotherapy Program	Yes	41	51	0,331**
	No	370	371	

PMR: Physical Medicine and Rehabilitation, HB: House-Brackmann, HT: Hypertension, DM: Diabetes Mellitus, CAD: Coronary Artery Disease, p-value <0.05 was considered statistically significant, † **Chi-square Test, ** Mann-Whitney U Test.*

There was a significant correlation between admission to the PMR clinic and having left-sided FP (p:0,012). There was a positive significant correlation between admission to the PMR clinic and HB stage (p:0.000) (Table 4).

Table 4: The relationship of application to PMR clinic and the demographic and clinical characteristics of PFP patients

	Gender	**Facial Paralysis Direction**	**HB grade**	**Comorbid disease**
	p	***P***	***p***	***p***
Application to PMR (+)	0.111 *	**0.012** *	**0.000** *	0.217 *

*PMR: Physical Medicine and Rehabilitation, PFP: Peripheral facial paralysis, HB grade: The House-Brackmann grading system, p-value <0.05 was considered statistically significant, *Chi-square Test.*

Discussion

PFP has an acute onset in patients and presents with asymmetry due to weakness in the mimic muscles of the unilateral face. The most common cause of the disease is BP, known as idiopathic. Its incidence is 17-32/ 100,000 (2). If it is not diagnosed and treated early, it causes negative cosmetic results. However, the rate of recovery can be increased without sequelae with treatments applied in the early period. While the rate of spontaneous recovery was reported as 71-94% in BP cases that were not treated within the first 3 months, it was reported that this rate increased to 82-95% in cases who received any treatmen (12-14). BP treatment should be planned with a multidisciplinary approach. The aim of the treatment is to accelerate the recovery and to heal the disease without leaving any sequelae. The current treatment of BP consists of alternative and complementary treatments such as corticosteroid, antiviral treatment, surgical treatment, electrical stimulation, exercise, massage application, botox application and acupuncture (13).

Kang et al. reported that 54,8% of 250 patients with FP were female and 45,2% were male, and reported that the frequency of their patients peaked between the ages of 50-60 (15). While Garanhani et al. drew attention to the superiority of female gender with a rate of 60,9% in FP patients diagnosed between 1999 and 2003 (16). However, Rowlands et al. reported that there was no significant difference in terms of gender in 2473 patients with Bell's palsy, and the incidence of FP increased significantly in patients with 0 onset age and divided into 15-year periods (17). BP can occur at any age, but it is mostly seen between the ages of 10-40 or 15-45 (18). Similarly, in our study, 49,3% of our patients were female and 53% were male, and the mean age was 43,30± 0,669 years. Valença et al. reported localized paralysis on the left side with a rate of 55,6% in 180 patients with a diagnosis of BP (15). Özdemir et al. found that 54% of the patients had paralysis in the right face half

in their study on 100 patients with PFP (19). Paralysis was found on the left side in 54 of 102 patients with PF (53%), in a study conducted in 2020 (20). There are also studies where the involvement rates of the right and left sides of the face are equal (6, 21). We found that the direction of paralysis was left side in 58% of our patients in our study.

Hypertension and diabetes mellitus are factors that increase the risk of PFP (22). This is likely because diabetic patients are more prone to nerve degeneration. There is a hypothesis that hypertension may cause vasodilation, edema and FP by creating hemorrhage in the facial canal with direct pressure effects. Valenca et al. reported a relationship between 11,7% hypertension and 11,1% DM in 180 patients with a diagnosis of BP localized on the left side with a rate of 55,6% (23) Kang et al. reported 18,8% hypertension, 10.85% DM, and 4,4% cardiovascular diseases in 250 patients diagnosed with FP (15). Eliçora et al concluded that diabetes did not affect the severity, recovery rate from or healing of FP (24). The most common comorbid disease in our patients was Hypertension with 30.73% (n:256), followed by Diabetes Mellitus with 20.28% (n:169). No difference was found in the incidence of comorbid FP according to gender in a review conducted in 2020 (6). There was a difference in terms of comorbid diseases and it was more common in female patients in our study. The reason why comorbid diseases are more common in female patients in our study may be due to the higher average age of female patients.

Recurrent paralysis can be seen in approximately 8% of patients with BP. In recurrent paralysis, the tumor should be ruled out first and it should be evaluated whether facial functions worsen between attacks (25). Cirpaciu et al. found a recurrence rate of 12% in 185 patients with BP that they followed for 10 years (26). Differently when we look at our hospital data, we found that 32 (3,8%) of 833 patients who applied with the diagnosis of PFP during the 69 months of the study had a history of recurrent FP. In our study, we may have found the recurrence frequency to be less because the number of patients was higher and the follow-up period was shorter. Recurrent FP was found more frequently in female patients, similar to our study (6, 27). The reason why FP recurrence was more common in female patients in our study may be that the average age of female patients is higher and comorbid diseases are more common in female patients in our study.

There is no data on how many of the patients who applied to the OHNS outpatient clinic with the diagnosis of PFP

applied to PMR clinics and which patients received physiotherapy according to which factor in the literature, It has been seen that studies in the field of PFP rehabilitation are mostly related to the therapy method applied. Cappeli et al. reported that all physical therapy modalities in PFP applied showed the same results in their cohort study on 33 patients with PFP (28). The effectiveness of facial rehabilitation a non-invasive treatment, was evaluated in 76 patients with chronic facial nerve palsy in a study in 2019; after treatment, all patients showed improvement in the Facial Rating System Scale, and an increased number of therapy sessions, treatment of the right side of the face for chronic facial nerve palsy, and a lower initial Facial Rating System Scale score were seen as favorable prognostic factors (29). The effectiveness of the Mirror Effect PLUS Protocol, the first facial rehabilitation protocol specifically designed for acute Bell's palsy, was examined in ten patients with acute moderate to severe, severe, and total BP in a study in 2020; no difference in recovery was found between the rehabilitation and control groups; however, for the subset of patients with severe paralysis, the Mirror Effect PLUS Protocol was reported to improve and accelerate recovery (30). Twenty one patients who were diagnosed with BP and received a physical therapy program consisting of electrotherapy, infrared and mimic exercises, who received 15 sessions of treatment and 21 patients who received 30 sessions of treatment were examined in a retrospective study conducted in Turkey in 2022; It was reported that 15 sessions of physical therapy provided significant functional improvement in patients with BP receiving physical therapy and that increasing the number of physical therapy sessions to 30 sessions had no additional effect on functionality (7). Randomized controlled trials in which Proprioceptive Neuromuscular Facilitation (PNF) technique was applied to 184 patients with dysfunctions resulting from facial paralysis, and the rate of improvement measured using the House Brackmann Scale and clinical improvement were evaluated in a 2022 review; PNF was used in combination with other interventions in all of the included studies, and it was reported that PNF showed very low evidence that it was more effective than minimal intervention in the treatment of FP (8). Current Physiotherapy Approaches in Patients with FP were examined in a review conducted in 2024; Physical therapy approaches aimed at increasing muscle strength for a better result in all age groups, the importance of combining various methods such as electrical stimulation, massage, PNF, taping and mirror exercise that can be given for BP

with traditional medical treatment was emphasized (9). We applied an average of 22.5 sessions of physiotherapy including exercise, electrical stimulation and mirror therapy to 92 patients in our study as per the recommendation of this review. Similar to the 2019 study, we found that patients on the left side and with a higher stage received physical therapy. The reason why the number of physical therapy sessions was higher compared to the study conducted in Turkey in 2022 may be due to the higher average age and stage of our patients.

There was a positive significant correlation between admission to the PMR clinic and HB stage in our study. Cappelli et al. reported that those with higher HB Stage required more physiotherapy in their cohort study on 33 patients with PFP (28). It was reported that HB Stage was a poor prognostic factor in 47 adult PFP patients evaluated in the rehabilitation department of a tertiary hospital and these patients required more physical therapy sessions in a 2014 study. It was reported that those with a higher HB stage had less recovery after physical therapy in a review evaluating physiotherapy in FP (10). Similar to this review, the effectiveness of physical therapy for patients with PFP was investigated in a review published in 2024; it was reported that physical therapy reduced the rate of non-recovery in patients with PFP and that HB stage was a poor prognostic factor (31). This may explain that in our study, those with worse HB stage applied more to physical therapy. Seventy-six patients patients with chronic facial nerve palsy were examined in a study in 2019; treatment of the right side of the face due to chronic facial nerve palsy and a lower initial Facial Rating System Scale score were seen as favorable prognostic factors (29). Similarly, there was a significant correlation between admission to the PMR clinic and having left-sided FP in our study (p:0,012). This may be caused by the fact that the side of paralysis was on the left side in 58% of the patients with PF and the HB stage was higher on the left side, in our study.

Conclusion

Ours is the first study which investigated percentage of apply to PMR clinic patients who applied to the OHNS outpatient clinic diagnesed PFP and the relationship between this application and demographic and clinical characteristics. We found 23,9% patients with a diagnosis of PFP applied to the PMR clinic and a physiotherapy program was used to 11% patients. We found that patients with FP on the left side and with high HB stage were more likely to refer to the PMR clinic.

More studies are needed to contribute to the recommendation of which patients should be referred to the PMR clinic priority

Limitations

Limitations of our study were that it was retrospective, single-center, possible missing data, medical treatment received by the patients was not evaluated, disease degree could not be reached after physical therapy, and long-term follow-up data was not available.

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