Effect of Rehabilitation Program on Knowledge, Self-care Practices, and Quality of Life among Patients with Bell's Palsy

Amira Sabry Mohammed Mohammed [(1)], Samah Mahmoud Mohamed [(2)], Naglaa Abd Elkareem Moghazy Basuony [(3)]

(1) Lecturer of Medical Surgical Nursing, Faculty of Nursing, Zagazig University, Egypt,
(2) Lecturer of Medical Surgical Nursing, Faculty of Nursing, Zagazig University, Egypt,
(3) Assistant Prof. of Medical Surgical Nursing, Faculty of Nursing, Zagazig University, Egypt

Abstract

Background: Bell's palsy is an acute, idiopathic facial nerve paralysis that can significantly impact patients' physical appearance, communication abilities, and psychological well-being. While spontaneous recovery is possible, structured rehabilitation programs can greatly improve outcomes. ***Study aim:*** Evaluate the effect of the Rehabilitation Program on knowledge, self-care practices, and quality of life among patients with Bell's palsy. ***Design:*** A quasi-experimental design was used. ***Setting:*** Brain and neurologic outpatient clinic and physiotherapy department at Zagazig University Hospitals in the Al Sharkia governorate of Egypt. ***Subject:*** A purposive sample of 48 adult patients with Bell's palsy in the aforementioned setting. ***Tools:*** An interview questionnaire to assess patients' knowledge, a self-care practices observational checklist, and a facial function and quality of life assessment scale. ***Results:*** There was a highly statistically significant improvement and difference in overall patients' knowledge and self-care practices in the post-phase of the rehabilitation program compared to the pre-phase ($p<0.001$), which resulted in improving their facial function and quality of life, as there was a statistically significant positive correlation of facial function and quality of life improvement scores with knowledge and self-care practices through program phases. ***Conclusion:*** The rehabilitation program plays an effective role in improving knowledge, self-care practices, and facial function and quality of life for patients with Bell's palsy and has a positive effect. ***Recommendations: The*** developed rehabilitation program should be implemented on a wide scale in study settings and all similar ones, including all governmental hospitals.

Keywords: Rehabilitation Program, Knowledge, Self- Care Practices, Quality of Life, Bell's palsy.

Introduction:

Bell's palsy is an idiopathic paralysis caused by damage to the seventh cranial nerve that affects about half of the facial muscles **(Ningsih, Widodo & Kusumawati, 2021).** One type of mixed cranial nerve is the face nerve. According to **Ho et al. (2015)**, the seventh cranial nerve (CN VII) regulates the facial muscles and the anterior two-thirds of the tongue's taste buds. Additionally, it regulates the lacrimal and salivary glands **(Ferreira-Penêda et al., 2018).**

The patient complained of chewing problem, being unable to sip water, and a unilateral facial deformity. Furthermore, the patient reported neck stiffness and mastoid pain **(Al Shalawi, 2018).** Additional symptoms include inability to close the eyes because of facial muscular weakness, which can cause dryness and corneal exposure **(Kim, 2016).** From mild to severe, its symptoms can include a lack of wrinkles on the forehead, drooping eyelids on the affected side, uncontrollably tearing the affected side's eye, facial muscle weakness or paralysis, drooping of the affected side's mouth, and impaired taste **(Efraimidis et al., 2021).**

Although the exact origins of Bell's palsy are unknown, it is thought to be related to a number of conditions, including neoplasia, musculoskeletal and neurological lesions, infections, poisoning, hypertension, diabetes, hypercholesterolaemia, and hereditary disorders **(Ramos-Jimenez, 2015).** It could develop over the course of 48 hours and happens abruptly. Those with diabetes, hypertension, pregnancy, obesity, and upper respiratory tract infections are at a higher risk **(Singh & Deshmukh, 2022)**. Additional risk factors for Bell's palsy include neurological disorders like Gullian-Barre syndrome, multiple sclerosis, traumatic head or facial injuries, and bacterial infections such Lyme disease, typhoid fever, syphilis, and tuberculosis **(Dr. Cheppalli et al., 2020).**

Bell's palsy can have a detrimental effect on patients and their families, leading to both physical and psychological issues. Common short-term problems include slurred speech, dysphagia, and dry eyes caused by incomplete lid closure. Contractures and persistent facial muscular weakness are rare long-term complications **(Singh & Deshmukh, 2022).** Psychological conditions such as anxiety, despair, and poor self-esteem, as well as eye dryness and corneal ulcers **(Ciorba et al., 2015).** About 25% of BP patients may get moderate-to-severe facial asymmetry over time, which can have detrimental long-term effects on their psychological health and often lower their quality of life (QoL) **(Zhang et al. 2020).**

Therapies and medical care were aided in symptom relief and speed up healing. In addition to reducing nerve swelling, oral corticosteroids like prednisone may hasten the recovery of facial expressions and activities. According to **Eviston et al. (2015),** these drugs work best when taken within 48 hours after the onset of symptoms. Steroid therapy, antiviral medications, vitamin B12 supplements, analgesics, and eye drops are utilized as medical treatments to lessen nerve oedema **(Agostini et al., 2020).**

Facial nerve paralysis requires rehabilitation, and physical therapy programs using a variety of techniques, including exercise therapy, electrotherapy, massage, lymph drainage, and biofeedback therapy, have been used to treat this condition **(Azuma et al., 2018).** Exercises for the face can help restore facial coordination and build muscle strength after this brief facial paralysis. The majority of the exercises should be performed in brief sessions three or four times a day, with a maximum of thirty repetitions each exercise. A nurse's role is to reassure patients, and one of the most crucial nursing priorities is educating Bell's palsy patients how to take care of themselves at home and do face exercises **(Khan et al., 2022).** The nose, mouth, and face muscles may be exercised during these workouts, which safely produce the finest outcomes **(Heckmann et al., 2019).**

An important part of managing Bell's palsy is health education is to avoid dryness and possible harm, patients should be advised to use eye lubricant on a regular basis. It's also advised to wear sunglasses outside and a patch at night. Exercises for the facial muscles should also be performed by patients in order to aid in their recuperation and lessen facial weakness. In order to prevent chewing difficulties, patients are also encouraged to change their eating habits, such as eating on the side of their mouth that is unaffected. Frequent dental checkups are necessary to avoid any problems that can result from having trouble in closing the mouth. Together, these actions aid in the patient's recuperation and lessen the long-term effects of Bell's palsy **(Haqawi et al., 2023).** Furthermore, nurses' responsibilities include pain management, follow-up appointments, dental hygiene, and the use of warm compress treatment, warm water massage, and music-enhanced exercise to maintain muscle tone and treat facial palsy **(Ho & Markowsky, 2022).**

Significance of the study:

Every year, a large number of people are affected by Bell's palsy, a sudden paralysis of the facial nerve. Patients and their family are greatly affected, which lowers their QoL. Patients with facial palsy benefit greatly from physiotherapy, which is becoming more and more common as a supplementary treatment after medication. Bell's palsy can be effectively treated with rehabilitation techniques and an intensive exercise program. Early rehabilitation greatly accelerates recovery and reduces complications along with increased patient adherence to therapy **(Kaushik, Choudhary & Sethi, 2024).** An intervention based on occupational therapy proved successful in lowering depression, enhancing QoL, and improving facial functions. Improvement appears to be mostly dependent on raising patient awareness and teaching early movements **(Ali & Alam, 2020).** Facial expressions are essential for expressing emotions and promoting social connections, making the human face a crucial component of an individual's identity and uniqueness. Therefore, in addition to physical limitations, any deficit in face muscle function causes psychological and social suffering **(Tonne et al., 2019).**

Aim of the study:

The current study aimed to evaluate the effect of a rehabilitation program on knowledge, self-care practices, and quality of life among patients with Bell's palsy through the following objectives:

- Assess the patients' level of knowledge regarding Bell's palsy.
- Assess the patients' level of self-care practices

regarding Bell's palsy.
- Assess the facial function and quality of life for patients with Bell's palsy.
- Design and implement a rehabilitation program for patients with Bell's palsy
- Evaluate the effect of the rehabilitation program on the knowledge and self-care practices as well as facial function and quality of life of patients with Bell's palsy.

Research hypotheses:

The following research hypotheses were created to reach the study's objective:
- **H1:** It is anticipated that patients with Bell's palsy will have better scores of knowledge and self-care practices post-rehabilitation programs than they had before.
- **H2:** It is anticipated that patients with Bell's palsy will have better scores of facial functions and quality of life post rehabilitation program than they had before it.
- **H3:** A statistically significant correlation will be found between improvement of patients' knowledge, self-care practices, and their facial functions and quality of life post rehabilitation program.

Subjects and Methods:

Research design:

A quasi-experimental research strategy was employed in this study, which involved evaluating one group both before and after the intervention. Finding a cause-and-effect relationship between the independent and dependent variables is the goal of the quasi-experimental study design. The one that is impacted is the dependent variable, whereas the one that is influencing is the independent variable; claim **Loewen and Plonsky (2016).**

Setting:

The study was conducted at Zagazig University Hospitals in the Al Sharkia governorate of Egypt, at two locations: brain and neurologic outpatient clinic and physiotherapy department.

Subjects:

A purposive sample of 48 adult patients with Bell's palsy at the above-mentioned setting met the following sampling inclusion criteria: Adult patients aged 18 and up of both sexes with unilateral paralysis, conscious and able to communicate and are free from any cognitive or mental impairment, while sampling exclusion criteria included bilateral paralysis, severe degrees of bell's palsy, recurrent bell's palsy, patients with cancer that would disable them from safely completing the requirements of the study and patients with mental and behavioral problems.

Sample size:

The sample size was 48 patients to achieve a power of 80% and a level of significance of 5% (two-sided), assuming the standard deviation of the differences to be 2.500 between pairs. The formula for the sample size is:

$$n = (Z\ \alpha/2 \times \sqrt{(2 \times p \times (1 - p))} + Z\ \beta \times \sqrt{(p1 \times (1 - p1) + p2 \times (1 - p2))}\ ^2 / (p1 - p2)^2$$

Where:

n is the required sample size per group

$Z_{\alpha/2}$ is the Z-value corresponding to the desired confidence level

Z_{β} is the Z-value corresponding to the desired power

p1 is the proportion in the pre-intervention group

p2 is the proportion in the post-intervention group

p is the pooled proportion, calculated as (p1 + p2) / 2

Tools of data collection:

Three data collection tools were used:

Tool I: An Interview Questionnaire: It was designed by researchers after an extensive review of pertinent literature **(Patel & Levin, 2015; Somasundara, Sullivan& Cheesbrough, 2017; Takezawa, Townsend& Ghabriel, 2018; Norris et al., 2019; Kafle & Thakur, 2021);** it included 72 items and covered three parts as follows:
- **Part I**: **Patient's demographic characteristics**: This part was concerned with assessing the demographic characteristics of patients with Bell's palsy. It contained seven items covering the age, gender, marital status, residence, education level, occupation, and income of the studied patients.
- **Part II: Medical history of patients:** This part was covered present and past medical history of patients which contained 20 questions as the following: smoking, vaccination, family history, onset of disease, recurrence, bilateral or unilateral side affected, presence of diabetes or hypertension, precipitating factors for Bell's palsy as common cold, flu, exposure to air

currents, head injury or surgery, ear infection, stroke, neurological disease, respiratory disease, heart disease, eye problem or balance problem.

- **Part III: Patient's Knowledge Regarding Bell's palsy:** This part was intended to assess patients' knowledge regarding Bell's palsy. It included 45 items that involved three parts of knowledge: *the first part* covered the patients' knowledge about facial nerve and Bell's palsy, which included "15 items," *the second part* covered the patients' knowledge about complications of Bell's palsy, which included "10 items," and *the third part* included "20 items," which covered the patients' knowledge about home care for Bell's palsy.

- ***Knowledge scoring system:*** Each knowledge item is represented either a true-false question or a multiple-choice question with four possible answers. A correct response earned one point, whereas an incorrect response earned zero. The mean score for each area of knowledge was calculated by adding up the item scores for each area, dividing the total by the number of items. Percent scores were then calculated from these mean values. According to data input and statistical analysis, knowledge scores of 60% or above were considered satisfactory, while scores below 60% were deemed inadequate.

Tool II: Patients' Self-Care Practices Observational Checklist:

This tool was adopted from **(Facial palsy UK, 2024; Flower& Ambardekar, 2024; Geng, 2023; Cronkleton, 2023)** to assess the self-care practices of patients with Bell's palsy. It included 107 items that classified into six areas of self-care practices: *the first area* covered facial exercises (36 steps) such as general guidelines (8 steps), eyebrow exercises (4 steps), eye exercises (6 steps), nose exercises (4 steps), tongue exercises (3 steps), mouth exercises (6 steps), chin and neck exercises (5 steps) ; *the second area* covered eye care (34 steps) such as use lubricating eye drops (10 steps), use eye ointment or gel (6 steps), tape the eye closed (7 steps), using a soft patch (6 steps), protecting and cleaning the skin around the eye (3 steps), protect the eye during the day (1 step), showering and bathing (1 step); *the third area* covered deep breathing and relaxation exercises (13 steps); *the fourth area* covered eating and drinking (13 steps); *the fifth area* covered prevent drooling/ dribbling (7 steps)*; the six area covered* oral hygiene (4 steps).

- ***Practice scoring system:*** Every practice step that was observed to be done was given a score of "1," while those that were not done received a score of "zero." To determine the mean score for each practice area, the sum of the item scores was divided by the total number of items. The percentage scores for these scores were computed. A practice was deemed satisfactory if its percent score was ≥60% and unsatisfactory if it was <60%, based on data entry and statistical analysis.

Tool III: Facial functions and quality of life assessment scale:

The researchers was adopted this scale from **Kahn et al., (2001)** called *FACIAL CLINIMETRIC EVALUATION FACE SCALE (FaCE)* which is a scale developed to assess both impairment and disability associated with facial dysfunction**.** The Facial Clinimetric Evaluation (FaCE) scale has 15 items with a 5-point Likert scale, is the most widely used Patient-reported outcome measure (PROM) for facial palsy. It is composed of six subscales: facial movement, facial comfort, oral function, eye comfort, lacrimal control, and social function. The sum of these subscales represents the overall quality of life associated with facial palsy following facial paralysis. The number of questions that make up each subscale determines how important it is currently in determining the overall score. The significance of the FaCE subscales to the overall quality of life for people with facial palsy has not been examined, nor has the weight of these subscales in the overall score been examined. A scale ranging from 0 (worst) to 100 (best) is used to calculate transformed total and domain scores.

- ***Scoring system of facial function and quality of life scale:*** The FaCE scale that used to assess facial function and quality of life is a scale developed to measure both impairment and disability related to facial dysfunction which consists of 15 questions with a 5-point Likert scale . Generally, it consists of six subscales which sum up to a total score representing overall facial palsy-related quality of life following facial paralysis. The FaCE score is calculated as (FaCE score = [sum of items/maximum possible score] x 100). The higher score represents better facial function

and quality of life for Bell's palsy patients. The function scores were graded as poor, fair, good, and excellent; it considered poor if the score was (<30), fair (30 to 54), good (55 to 79), and excellent (>80) based on the FaCE.

FaCE score Domains	Number	
- Facial movement	3	1, 2, 3
- Facial comfort	3	4, 6, 13
- Oral functions	2	11,12
- Eye comfort	2	5,7
- Lacrimation control	1	8
- Social functions	4	9, 10, 14, 15

Rehabilitation Program:

It was developed by the researchers using information gathered from the patients that were previously evaluated and determined throughout the assessment stage. It was intended to improve the knowledge and self-care practices of patients with Bell's palsy that will be reflect on their facial function and quality of life. The hand book, which is written in plain Arabic, aims to provide information regarding Bell's palsy and the related rehabilitation procedure. It is based on the opinions of experts and a review of pertinent material, including nursing textbooks, periodicals, and online resources. To evaluate the effect of the program, patients' knowledge, self- care practice, and facial function and quality of life were evaluated before (pre-phase) and after (post-phase) rehabilitation program application.

Tools validity and reliability:

Five experts from different nursing and medical specialties reviewed the early iterations of the data collection instruments to determine their content validity. Two neurological professors from Zagazig University Hospital and three medical-surgical nursing professors from the nursing faculty took part in the panel. These experts looked at the instruments' relevance, completeness, understandability, and ease of use. Minor changes were made based on the expert's recommendations. Internal consistency and reliability of each tool item were assessed using a Cronbach's alpha test. The ratings were 0.75, 0.84, and 0.965 respectively, for the patients' knowledge (tool I), self-care practices (tool II) about Bell's palsy, and facial function and quality of life scale (tool III).

Ethical consideration:

Written consent was obtained from the dean of the faculty and the research ethics committee (REC) of Zagazig University's Faculty of Nursing (ID/ZU.Nur.REC://158 -2/6/2024) before the study began. For official approval, the research settings' directors were also consulted. Additionally, to guarantee the highest level of cooperation and to get ready for the participants' presence, an oral agreement was obtained prior to data collection after educating participating patients about the nature, goal, and procedures of the study. Additionally, the participants were made aware that they might leave the research at any moment. All patients were guaranteed that their data would only be used for research, and the trial was conducted under strict confidentiality guidelines.

Pilot study:

The tools were tested on 10% (five patients) of the primary study sample for clarity, relevance, comprehensiveness, comprehension, application, and ease of use. Estimating the amount of time required to complete the forms was another benefit of the pilot research. The real study sample comprised patients who took part in the pilot trial because the instruments were not altered.

Fieldwork:

The study's fulfillment comprised four phases: assessment, planning, implementation, and evaluation.

(1) The assessment phase:

Data for this study was collected between July 1st, 2024, and the end of December, 2024. A month was set aside for the assessment phase, one month for the theoretical sessions, three months for the practical sessions, and one month for the post-phase during the six-month implementation of the rehabilitation program. In order to keep their cooperation during data collection and to create a schedule that would make data collection easier, the researchers visited the study locations, spoke with the directors, and explained the methodology and study purpose. During the assessment phase, the necessary clearances were also secured from the directors of the study and the director of Zagazig University Hospital.

Data was gathered from patients with Bell's palsy who visited the brain and neurological outpatient clinic and physiotherapy department three days a week. The researchers first greeted the patients, gave them an introduction, described the study's goal and the data collection process, and, after informing them of their rights, offered

them the opportunity to participate. Following each patient's consent to participate, the researchers used the data collecting tools to conduct an individual interview with each patient to start the data collection process. Completing the data-gathering tools took 30 to 35 minutes.

(2) The planning phase:

Following the completion of the assessment phase, all data were examined to determine the patients' knowledge and self-care practices regarding Bell's palsy as well as their facial functions and quality of life. The researchers created an Arabic rehabilitation program booklet based on the patients' previously determined needs, consulting pertinent literature and professional judgment.

(3) The implementation phase:

A. The rehabilitation program and booklet were created to help patients improve their quality of life and face function by educating them about Bell's palsy and teaching them self-care practices. Every participant patient received a copy of the rehabilitation program booklet after being provided an explanation of the program and its booklet for each patient in the study. The patients were divided into ten groups of five or smaller, and the researchers arranged the teaching sessions with the patients. In the morning and afternoon shifts, the researchers worked three days a week. Researchers used "12" instructional sessions to conduct the rehabilitation program, with four sessions devoted to theory and eight to practice, as follows:*The theoretical part* was implemented through four sessions; *the first session* covered knowledge about Bell's palsy (anatomy of the cranial nerve, function and control of the facial nerve, definition of Bell's palsy, causes, signs and symptoms, triggers or precipitating factors, risk factors, diagnosis and tests, and the most widely accepted treatment) . *The second session* covered the complications of Bell's palsy (eye complications, signs and symptoms of dry eye, prevention of corneal ulcer and eye infections, oral complications, prevention of oral complications, **taste disturbances,** avoid aspiration. *The third sessions* covered the home care for Bell's palsy (Eye care , oral hygiene , maintain adequate nutrition, safe swallowing techniques, benefits of physical therapy, type of exercises for Bell's palsy, pain management, managing stress and rest, **apply moist heat,** change lifestyle and self-care , facilitate verbal communication, improve body image, coping mechanisms, psychological support and follow up. *The fourth session* covered the rehabilitation process for Bell's palsy (Introduction about rehabilitation and rehabilitative programs, definition of rehabilitation and the rehabilitative program, the goal and stages of the rehabilitation). The theoretical sessions were implemented three days a week; each session took 30–45 minutes.

B- The practical part was implemented through eight practical sessions that covered the self-care practices of patients with Bell's palsy. The first and second sessions covered the facial exercise procedure. The third and fourth sessions covered eye care. The fifth session covered deep breathing and relaxation exercises. The sixth session covered the procedure of eating and drinking. The seventh session covered the drooling/ dribbling prevention procedure. The eighth session covered oral hygiene. The practical sessions were conducted over three months; each practical session took 45–60 minutes.

- The opening few minutes of every new session are often devoted to summarizing the goals and going over the subjects covered in previous ones. The patient was kept motivated throughout the rehabilitation program by being commended and/or acknowledged. Presentations, lectures, and discussions were used for the theoretical portion of a rehabilitation program, while demonstration and re-demonstration were used for the practical portion. In addition to other suitable teaching resources, such colored handouts, pamphlets, posters, and films, each patient received a rehabilitation program booklet at the beginning of the program. The researchers also called the patients to answer any questions and offer more instruction and support.

(4) The evaluation phase:

In order to assess the effect of the rehabilitation program on patients with Bell's palsy, the study patients' knowledge, self-care practices, facial function, and quality of life were evaluated after (post-phase) the rehabilitation program's implementation using the same data collection tools as the pre-test (pre-phase

assessment). The effectiveness of the rehabilitation program was assessed by comparing its pre-phase (baseline evaluation) and post-phase to see if there were any improvements or differences.

Statistical analysis of the data:

With the use of IBM SPSS Statistics for Windows, Version 23.0 (Armonk, NY: IBM Corp. 2015), all data were gathered, tabulated, and statistically examined. Numbers and percentages were used to describe qualitative data, whereas the mean ± SD & (range) was used to express quantitative data. Pairs of variables that were not normally distributed were compared using the Wilcoxon sign rank test. Chi-squared or Fisher exact tests were used to compare the percentage of categorical variables. Pearson's correlation coefficient, also known as spearman's correlation coefficient, was computed to evaluate the relationship between different intervention variables. Direct correlation is indicated by a (+) sign, inverse correlation by a (-) sign, strong correlation is indicated by a value close to 1, and weak correlation is indicated by a value close to 0. It was a two-sided test. Statistical significance was defined as a p-value < 0.05, while statistical non-significant (NS) was defined as a p-value ≥0.05.

Results:

Table 1 clarifies that 52.1% and 54.2%, respectively, of studied patients 'were ≥35 years and male; also, 64.6% and 60.4% were working and married, respectively. Furthermore, 39.6% of patients had diplomas, 75.0% of them from rural areas, and 89.6% of patients did not have enough income.

Table 2 displays that 100% of patients had sudden onset of Bell's palsy with the unilateral side affected, but no one had recurrent Bell's palsy. Also, 45.8% of patients were smokers; only 14.6% had a family history of Bell's palsy, and 25.0% of them were taking vaccinations before suffering from Bell's palsy. Almost of them (93.8%, 91.7%, 93.8%, and 87.5%, respectively) had exposure to cold air currents, viral infection, colds, and the flu before developing Bell's palsy. Regarding the history of chronic diseases, it was found that 29.2% of patients had diabetes and 31.3% had hypertension.

Table 3 indicates that all knowledge dimensions of studied patients were improved post intervention of the rehabilitation program compared with pre-program, as 72.9%, 60.4%, and 75.0%, respectively, of patients post-program had satisfactory knowledge about the facial nerve and Bell's palsy, complications of Bell's palsy, and home care of Bell's palsy, while in the pre-program phase only 8.3%, 10.4%, and 6.3%, respectively, of patients had satisfactory knowledge about the same dimensions. In general there was a statistically significant improvement ($p<0.0001$) in overall patients' knowledge post application of the rehabilitation program by 70.8%.

Table 4 illustrates that all patients' self-care practice dimensions were improved post intervention of the rehabilitation program, where the highest improvement percentage (81.3%) related to patients' self-care practices about eye care, while the least improvement percentage (62.5%) related to patients' self-care practice about facial exercises with a statistically significant difference ($p<0.0001$). Totally, only 10.4% of the studied patients had satisfactory overall self-care practices regarding Bell's palsy pre-intervention of the rehabilitation program, while 81.2% of them had satisfactory practices post-program. There was a highly statistically significant improvement and difference in overall patients' self-care practices post-program compared to pre-program ($p<0.0001$).

Table 5 shows that there was a statistically significant difference in all facial functions and quality of life domains (facial movement, facial comfort, oral function, eye comfort, lacrimation control, and social function) for patients with Bell's palsy pre- and post-intervention of the rehabilitation program ($p<0.0001$). It's an obvious improvement of all QoL parameters post rehabilitation program.

As shown in **Figure 1,** the highest percentage of the patients (64.6%) had fair overall facial functions and QoL pre-rehabilitation program, while more than one-third of patients (35.4%) had poor QoL, and none of them had good or excellent QoL. Conversely, post-rehabilitation program, 87.5% of patients had good facial functions and QoL. In general, at the post-phase of the rehabilitation program, studied patients 'showed a substantial improvement and statistically significant difference from the pre-phase ($p<0.0001$).

Table 6 reveals that there was no statistically significant relation between satisfactory patients'

knowledge level and their demographic data pre-intervention.

Table 7 presents that there was no statistically significant relation between satisfactory patients' self-care practice level and their demographic characteristics pre-intervention program.

Table 8 exhibits that there was a statistically significant relation post intervention of the rehabilitation program between satisfactory patients' knowledge level and their demographic characteristics such as age, marital status, level of education, and residence. It is obvious that patients who benefited greatly from the rehabilitation program and had better knowledge levels post-program were those who were less than <35 years old, single, with high education, and residing in urban areas.

According to **Table 9,** there was no statistically significant relationship between patients' self-care practice level and their demographic characteristics post intervention program.

Table 10 confirms that there was a statistically significant correlation between patients' knowledge and self-care practice scores with facial functions and QoL scores of studied patients pre- and post-intervention.

Table (1): Frequency and Percentage Distribution of Demographic Characteristics for Studied Patients (n=48):

Variables		No.	%
Age group:	<35 years	23	47.9
	≥35 years	25	52.1
	Mean ± SD Median (range)	35 ± 9.86 35(20-50)	
Sex:	Male	26	54.2
	Female	22	45.8
Occupation:	Work	31	64.6
	No work	17	35.4
Marital status:	Single	17	35.4
	Married	29	60.4
	Others	2	4.2
Level of education:	Illiterate	4	8.3
	Read and write	7	14.6
	Diploma	19	39.6
	High	18	37.5
Residence:	Rural	36	75.0
	Urban	12	25.0
Income:	Enough	5	10.4
	not enough	43	89.6

Table (2): Frequency and Percentage Distribution of Medical History for Studied Patients (n = 48):

Variables		No.	%
Onset of disease:	Sudden	48	100.0
Recurrence:	Yes	0	0.0
The side is affected by Bell's palsy:	Unilateral	48	100.0
Smoking:	Yes	22	45.8
Family history about Bell's palsy:	Yes	7	14.6
Taking vaccinations before suffering from Bell's palsy:	Yes	12	25.0
Exposure to cold air currents before Bell's palsy:	Yes	45	93.8
A viral infection before developing Bell's palsy:	Yes	44	91.7
Colds before developing Bell's palsy:	Yes	45	93.8
The flu before developing Bell's palsy:	Yes	42	87.5
Ear inflammations or infections:	Yes	11	22.9
Exposure to a head injury:	Yes	13	27.1
Have diabetes mellitus:	Yes	14	29.2
Have hypertension:	Yes	15	31.3
Have stroke before suffering from Bell's palsy:	Yes	8	16.7
Have neurological disease:	Yes	10	20.8
Have heart diseases or problems:	Yes	6	12.5
Have respiratory diseases or problems:	Yes	5	10.4
Have eye problems:	Yes	9	18.8
Have balance problems:	Yes	11	22.9

Table (3): Frequency and Percentage Distribution of Studied Patients' Knowledge Regarding Bell's palsy Pre- and Post-Rehabilitation Program Intervention Phases (n = 48):

Variables	Phase of study				W	p-value
	Pre intervention		Post intervention			
	No.	%	No.	%		
Patients' knowledge about facial nerve and Bell's palsy disease:						
Satisfactory	4	8.3	35	72.9		
Unsatisfactory	44	91.7	13	27.1		
Mean±SD Median (range)	4.1 ± 3.1 2.5 (1-10)		9.17 ± 1.4 9 (6-12)		5.639	0.0001*
Patients' Knowledge about Bell's palsy complications:						
Satisfactory	5	10.4	29	60.4		
Unsatisfactory	43	89.6	19	39.6		
Mean±SD Median (range)	2.104 ± 1.64 1(1-6)		5.85 ± 0.94 6 (4-9)		6.042	0.0001*
Patients' Knowledge about home care of Bell's palsy:						
Satisfactory	3	6.3	36	75.0		
Unsatisfactory	45	93.8	12	25.0		
Mean±SD Median (range)	3.71 ± 3.68 2 (1-14)		12. 5 ±1.66 12.5 (8-18)		5.898	0.0001*
Overall patients' knowledge:						
Satisfactory	3	6.3	34	70.8		
Unsatisfactory	45	93.8	14	29.2		
Mean±SD Median (range)	8.71 ± 7.96 6 (3-30)		27.25 ± 3.42 27 (20-39)		60.0	0.0001*

Wilcoxon Signed Ranks Test

***p<0.05= statistically significant**

Table (4): Frequency and Percentage Distribution of Studied Patients' Self-Care Practices Regarding Bell's palsy Pre- and Post-Rehabilitation Program Intervention Phases (n = 48):

Variables	Phase of study				W	p-value
	Pre intervention		Post intervention			
	No.	%	No.	%		
Facial exercises:						
Satisfactory	7	14.6	30	62.5		
Unsatisfactory	41	85.4	18	37.5		
Mean±SD Median (range)	6.69 ± 6.87 4 (2-24)		22 ± 1.59 22 (19-25)		5.731	0.0001*
Eye care:						
Satisfactory	5	10.4	39	81.3		
Unsatisfactory	43	89.6	9	18.8		
Mean±SD Median (range)	5.65 ± 6.25 3 (2-22)		21.88 ± 2.19 22 (18-26)		5.980	0.0001*
Deep breathing and relaxation exercises:						
Satisfactory	6	12.5	32	66.7		
Unsatisfactory	42	87.5	16	33.3		
Mean±SD Median (range)	3.02 ± 2.14 2 (1-9)		7.92 ± 0.82 8 (7-10)		5.972	0.0001*
Eating and Drinking:						
Satisfactory	4	8.3	37	77.1		
Unsatisfactory	44	91.7	11	22.9		
Mean±SD Median (range)	3.04 ± 1.99 2 (1-9)		8.38 ± 1.02 8 (7-10)		6.037	0.0001*
Prevent drooling/dribbling:						
Satisfactory	5	10.4	34	70.8		
Unsatisfactory	43	89.6	14	29.2		
Mean±SD Median (range)	2.38 ± 1.23 2 (1-6)		4.77 ± 0.81 5 (3-6)		5.693	0.0001*
Oral hygiene:						
Satisfactory	9	18.8	31	64.6		
Unsatisfactory	39	81.3	17	35.4		
Mean±SD Median (range)	1.83 ± 0.73 2 (1-3)		3.1 ± 0.91 3 (2-4)		5.326	0.0001*
Overall patients' self-care practices:						
Satisfactory	5	10.4	39	81.3		
Unsatisfactory	43	89.6	9	18.8		
Mean±SD Median (range)	22.75 ± 18.33 16 (1-73)		68.08 ± 5.37 68 (56-80)		5.326	0.0001*

Wilcoxon Signed Ranks Test **p<0.05= statistically significant**

Table (5): Frequency and Percentage Distribution of Studied Patients' Facial Functions and Quality of Life Pre- and Post-Rehabilitation Program Intervention Phases (n = 48):

QoL Domains	Phase of study				χ^2	p-value
	Pre intervention		Post intervention			
	No.	%	No.	%		
Facial movement:						
- Excellent	0	.0	10	20.8		
- Good	6	12.5	30	62.5		
- Fair	18	37.5	7	14.6		
- Poor	24	50.0	1	2.1		
Mean±SD Median (range)	31.7±15 30(13-60)		64.9±13 60(20-80)		5.702	0.0001*
Facial comfort:						
- Excellent	0	.0	12	25.0		
- Good	0	.0	23	47.9		
- Fair	24	50.0	13	27.1		
- Poor	24	50.0	0	.0		
Mean±SD Median (range)	32.4±12.4 30(13.3-53.33)		63.8±12.3 60(33.3-80)		5.955	0.0001*
Oral function:						
- Excellent	0	.0	12	25.0		
- Good	1	2.1	15	31.3		
- Fair	29	60.4	21	43.8		
- Poor	18	37.5	0	.0		
Mean±SD Median (range)	30.4±9.9 30(20-60)		59.4±14.9 60(30-80)		5.982	0.0001*
Eye comfort:						
- Excellent	0	.0	13	27.1		
- Good	2	4.2	26	54.2		
- Fair	27	56.3	9	18.8		
- Poor	19	39.6	0	.0		
Mean±SD Median (range)	30.8±11.3 30(10-60)		66.7±14.6 60(30-90)		5.987	0.0001*
Lacrimation control:						
- Excellent	0	.0	16	33.3		
- Good	11	22.9	21	43.8		
- Fair	31	64.6	9	18.8		
- Poor	6	12.5	2	4.2		
Mean±SD Median (range)	42.1±11.8 40(20-60)		57.9±21.9 60(20-80)		3.833	0.0001*
Social function:						
- Excellent	0	.0	19	39.6		
- Good	4	8.3	29	60.4		
- Fair	22	45.8	0	.0		
- Poor	22	45.8	0	.0		
Mean±SD Median (range)	32.6±13.1 30(20-60)		77.3±8.4 75(60-95)		6.042	0.0001*

$\chi 2$ =Chi square test,
p<0.05= statistically significant

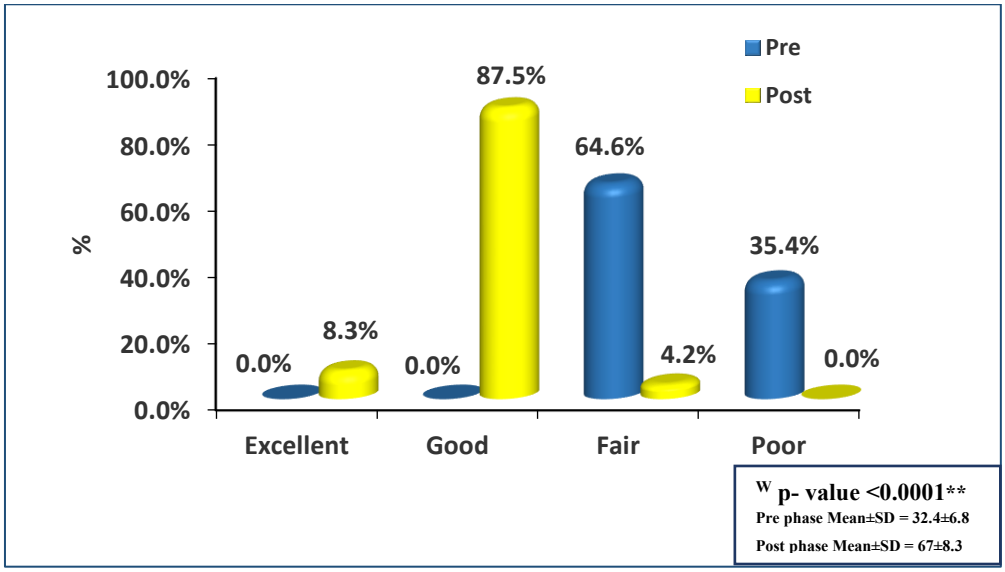

Figure 1: Overall Patients' Facial Functions and QoL Score Pre- and Post-Rehabilitation Program Phases (n = 48)

Table (6): Relationship between Pre- Intervention Patients' Knowledge Level and Their Demographic Data

Variables	Pre Intervention Patients' Knowledge				n.	χ^2	p-value
	Satisfactory = n.3		Unsatisfactory = n.45				
	No.	%	No.	%			
Age group:							
- <35 years	2	8.7	21	91.3	23	F	0.601
- ≥35 years	1	4.0	24	96.0	25		
Sex:							
- Male	2	7.7	24	92.3	26	F	0.99
- Female	1	4.5	21	95.5	22		
Occupation:							
- Work	2	6.5	29	93.5	31	F	0.99
- No work	1	5.9	16	94.1	17		
Marital status:							
- Single	1	5.9	16	94.1	17	0.16	0.924
- Married	2	6.9	27	93.1	29		
- Other	0	.0	2	100.0	2		
Level of education:							
- Illiterate	0	.0	4	100.0	4		
- Read and write	1	14.3	6	85.7	7	1.08	0.78
- Diploma	1	5.3	18	94.7	19		
- High	1	5.6	17	94.4	18		
Residence:							
- Rural	2	5.6	34	94.4	36	F	0.99
- Urban	1	8.3	11	91.7	12		
Income:							
- Enough	1	20.0	4	80.0	5	F	0.29
- not enough	2	4.7	41	95.3	43		

χ^2 =Chi square test, f: Fisher exact test, p>0.05= no statistically significant, p<0.05= statistically significant

Table (7): Relationship between Pre-Intervention Patients' Self-Care Practice Level and Their Demographic Data

Variables	Pre Intervention patients' Practice				n.	χ^2	p-value
	Satisfactory = n.5		Unsatisfactory = n.43				
	No.	%	No.	%			
Age group:							
- <35 years	3	13.0	20	87.0	23	f	0.66
- ≥35 years	2	8.0	23	92.0	25		
Sex:							
- Male	3	11.5	23	88.5	26	f	
- Female	2	9.1	20	90.9	22		0.99
Occupation:							
- Work	4	12.9	27	87.1	31	f	0.64
- No work	1	5.9	16	94.1	17		
Marital status:							
- Single	1	5.9	16	94.1	17		
- Married	4	13.8	25	86.2	29	0.96	0.62
- Other	0	.0	2	100.0	2		
Level of education:							
- Illiterate	0	.0	4	100.0	4		
- Read and write	1	14.3	6	85.7	7	0.59	0.899
- Diploma	2	10.5	17	89.5	19		
- High	2	11.1	16	88.9	18		
Residence:							
- Rural	3	8.3	33	91.7	36	f	0.59
- Urban	2	16.7	10	83.3	12		
Income:							
- Enough	1	20.0	4	80.0	5	f	0.438
- not enough	4	9.3	39	90.7	43		

$\chi 2$ =Chi square test, f: Fisher exact test, p>0.05= no statistically significant, p<0.05= statistically significant

Table (8): Relationship between Post-Intervention Patients' Knowledge Level and Their Demographic Data

Variables	Post Intervention Patients' Knowledge				n.	χ^2	p-value
	Satisfactory = n.34		Unsatisfactory = n.14				
	No.	%	No.	%			
Age group:							
- <35 years	22	95.7	1	4.3	23	13.2	0.0001*
- ≥35 years	12	48.0	13	52.0	25		
Sex:							
- Male	16	61.5	10	38.5	26	2.37	0.124
- Female	18	81.8	4	18.2	22		
Occupation:							
- Work	20	64.5	11	35.5	31		0.32
- No work	14	82.4	3	17.6	17		
Marital status:							
- Single	15	88.2	2	11.8	17	7.75	0.02*
- Married	19	65.5	10	34.5	29		
- Other	0	.0	2	100.0	2		
Level of education:							
- Illiterate	1	25.0	3	75.0	4		
- Read and write	4	57.1	3	42.9	7	13.65	0.003*
- Diploma	11	57.9	8	42.1	19		
- High	18	100.0	0	.0	18		
Residence:							
- Rural	22	61.1	14	38.9	36		0.01*
- Urban	12	100.0	0	.0	12		
Income:							
- Enough	4	80.0	1	20.0	5		0.99
- not enough	30	69.8	13	30.2	43		

$\chi 2$ =Chi square test, f: Fisher exact test, p>0.05= no statistically significant, p<0.05= statistically significant

Table (9): Relationship between Post-Intervention Patients' Self-Care Practice Level and Their Demographic Data

Variables	Post Intervention Patients' Practice				n.	χ^2	p-value
	Satisfactory = n.39		Unsatisfactory = n.9				
	No.	%	No.	%			
Age group:							
- <35 years	20	87.0	3	13.0	23	f	**0**.47
- ≥35 years	19	76.0	6	24.0	25		
Sex:							
- Male	21	80.8	5	19.2	26	f	0.99
- Female	18	81.8	4	18.2	22		
Occupation:							
- Work	24	77.4	7	22.6	31	f	0.46
- No work	15	88.2	2	11.8	17		
Marital status:							
- Single	3	75.0	1	25.0	4		
- Married	4	57.1	3	42.9	7	4.896	0.18
- Other	15	78.9	4	21.1	19		
Level of education:							
- Illiterate	1	25.0	3	75.0	4		
- Read and write	4	57.1	3	42.9	7	13.65	0.003
- Diploma	11	57.9	8	42.1	19		
- High	18	100.0	0	.0	18		
Residence:							
- Rural	27	75.0	9	25.0	36	f	0.088
- Urban	12	100.0	0	.0	12		
Income:							
- Enough	5	100.0	0	.0	5	f	0.568
- not enough	34	79.1	9	20.9	43		

χ^2 =Chi square test, f: Fisher exact test, p>0.05= no statistically significant, p<0.05= statistically significant

Table (10): Correlation Matrix between Studied Patients' Overall Knowledge, Self-Care Practices, Facial Functions and QoL Pre- and Post-Rehabilitation Program Intervention (n = 48):

Items		Pre		Post	
		Knowledge	Practice	Knowledge	Practice
Overall practice score	R	.742**	1	.630**	1
	P	0.0001	.	0.0001	
Facial Functions and QoL domains:					
- Facial movement	R	0.128	0.076	.339*	0.219
	P	0.384	0.607	0.018	0.134
- Facial comfort	R	0.111	0.138	.322*	.410**
	P	0.452	0.348	0.026	0.004
- Oral function	R	0.281	0.128	.345*	.465**
	P	0.053	0.386	0.016	0.001
- Eye comfort	R	0.009	0.114	.336*	.288*
	P	0.952	0.44	0.02	0.047
- Lacrimation control	R	-0.037	0.031	0.099	0.041
	P	0.801	0.833	0.504	0.781
- Social function	R	-0.248	0.168	.332*	.345*
	P	0.089	0.255	0.021	0.016
Overall QoL score	R	0.047	0.048	.469**	.473**
	P	0.751	0.744	0.001	0.001

(r) Correlation coefficient; Non significant (p>0.05); *: significant (p<0.05), **: statistically highly significant (p<0.001).

Discussion:

Worldwide, Bell's palsy (BP) is the most frequent cause of facial paralysis. The facial nerve is affected by this acute, unilateral, and infrequently bilateral lower-motor-neuron injury. According to **Alqahtani et al., (2020),** the symptoms include weakening of the facial muscles, dry eyes, decreased tears, impaired taste perception, ear ache, and hypersensitivity to sounds. In certain situations, BP facial paresis or paralysis can cause severe transient oral insufficiency and the inability to seal the eyelids, which could cause irreversible eye damage. Moderate-to-severe facial asymmetry may remain in about 25% of BP patients, often affecting their quality of life **(Zhang et al., 2020; Tamaki et al., 2021).**

Bell's palsy rehabilitation management aims to make the patient physically and socially independent in his daily activities while correcting his face symmetry. This includes educating and reassuring the patient about his condition, reducing discomfort, laying the foundation for retraining in muscle and nerve conduction, improving or facilitating muscle contraction where needed, re-educating affected sensations (sensory integration: touch, two-point discrimination, temperature), promoting or enhancing face symmetry, and preventing secondary complications **(Kale Asmita, Suryavanshi, and Thorat, 2023).** Thus, the aim of this study was to evaluate the effect of rehabilitation program on knowledge, self-care practices, and quality of life among patients with Bell's palsy. Six main parts will be covered in a discussion according to the findings, in the following order:

Firstly, the demographic characteristics of studied patients:

Regarding the demographic characteristics of the studied patients, the current study clarified that slightly more than half of studied patients thirty five years old or more and male, more than two thirds of them were worked and married. Furthermore, there were about two thirds of patients had diploma, three quarter of them from rural area, and majority of patients with not enough income. In our opinion, that half of studied patients was more than thirty years and male, this return to the nature of disease. The greatest occurrence, according to **Athawale, Bawiskar, and Phansopkar (2021),** Bell's palsy affects persons of all ages and belonging to all social classes, but it most frequently affects those of equal sex between the ages of 15 and 50. Additionally, Bell's palsy is distributed equally by gender, according to **Javaherian et al., (2020).** Bell's palsy is believed to have manifested in 50–75% of cases between the ages of 30 and 50. Furthermore, according to **Abdullah & Hilman Hafiz Bin (2017),** happens between the ages of 15 and 45. There was no sex-based variation in prevalence.

The current results are agree with the study conducted by **Khalifa et al., (2024),** under title **"**Effect of Facial Exercises on Functional Ability for Patients with Bell's Palsy" who found that half of the participants in the study were between the ages of 35 and 45. Over two-thirds were married, employed, and made insufficient money each month. Although they disagree on the following aspects, the majority of patients live in cities, and over half of them are female and have intermediate levels of education.

This is in contrast to **Alharbi et al., (2023)** study, "Effect of neural mobilization in Bell's palsy: A randomized controlled trial," which found that most of the patients they examined were men. Additionally, the findings were different from those of the study "Comparison of PNF versus convectional exercises for facial symmetry and function in Bell's palsy" by **Tharani et al., (2018)** which recruited 20 participants between the ages of 20 and 50.

Regarding marital status and work condition of the studied patients, the result showed that more than two thirds of the patients were married and had work. This result is in accordance with **Ko et al., (2023)** who found that majority of the patients under study were married and employed in a study entitled "A pilot survey examining satisfaction for integrated medicine based on critical pathways for acute facial Palsy".

Secondly, Medical History of studied Patients:

Regarding medical history of studied patients, the present study displayed that all studied patients had sudden onset of Bell's palsy with unilateral side affected but no one had recurrent Bell's palsy, more than two fifth of patients were smokers. The least percentage of patients had family history about Bell's palsy and only one quarter of patients taking vaccinations before suffering from Bell's palsy. Almost of them had exposure to cold air currents, viral infection, colds and flu before suffering from Bell's palsy. Regarding history of chronic diseases; it was found the more prominent chronic diseases are diabetes and hypertension.

Bell's palsy (BP) can be caused by a variety of factors, according to **Colella, Orlandi, and Cirillo (2021),** these include age, pregnancy, epilepsy, obesity, hypertension, diabetes, respiratory infections, vaccinations, exposure to colds, high-pressure air, influenza,

and genetic susceptibility resulting from a Saudi Arabian relative marriage. According to **Newadkar, Chaudhari, and Khalekar (2016),** mental stress or exposure to cold can frequently cause Bell's palsy.

This finding was corroborated by **Khalifa et al., (2024),** who found that 62% of people have no family history of Bell's palsy from the second degree and half of them have a history of HTN and DM. This result is consistent with their findings in a study titled "Ocular and palpebral manifestations of facial palsy: An epidemiologic descriptive study," **Guerrero-de Ferran et al., (2023)** discovered that arterial hypertension was the primary associated disease in 40% of patients, followed by diabetes mellitus in 36.30%. In a study titled "Evaluation of factors associated with favorable outcomes in adults with Bell Palsy," **Yoo et al., (2020)** discovered that 36.1% of the study participants had managed hypertension.

Additionally, this finding is supported by **Alamodi et al., (2024)** study on "Bell's palsy characteristics, clinical manifestations, complications, and prognosis in a primary care setting, a single centre study: A retrospective cohort study," which found that the two most common pre-existing co morbidities were diabetes and hypertension. This result goes in the same line with **Urban et al., (2020),** in a study entitled "Prognostic factors for the outcome of Bells' Palsy: A cohort register based study" they discovered that, around three fifths of the studied patients had (unilateral) left side Bells' Palsy. According to a study by **Khanzada et al., (2018)** titled "Comparison of efficacy of Kabat rehabilitation and facial exercises along with nerve stimulation in patients with Bell's palsy," people over 60 who have a history of diabetes and high blood pressure are also more prone to acquire Bell's palsy.The present study demonstrated that unilateral side affected.

Thirdly, patient's knowledge regarding Bell's palsy through the rehabilitation program phases:

Concerning the knowledge domains mean scores of studied patients throughout rehabilitation program phases, the present study indicated that all knowledge dimensions were improved after application of rehabilitation program; as about three quarters of patients become had knowledge about facial nerve and bell's palsy, about two thirds had knowledge about Bell's palsy complications, and three quarters of them had knowledge about home care of Bell's palsy. In general there was a statistical significant improvement in overall patients' knowledge after application of rehabilitation program by more than two thirds. In our opinion, this returned to the effectiveness of rehabilitation program.

Albishi (2024) found that understanding Bell's palsy, including its etiology, clinical presentation, treatment methods, and prognosis, is essential in a study titled "Knowledge, attitudes, and perceptions of physical therapists toward conventional physical therapy-across-sectional study." In a study on "Beliefs, attitudes, and behaviors of Saudi physiotherapists towards evidence-based practice: a multicenter, cross-sectional study," **Alsaadi (2022)** suggested that extending specialized training programs outside of academic settings would aid in improving knowledge and fostering consistent practices across healthcare environments.

The current findings are align with **Rosadi et al., (2022),** who discovered that counseling activities increased participants' awareness from 0% to 100% after the material was provided. The study was called "kengiatan fisioterapi komuntas pada pasien bell,s palsy di rehab medic rsud provinsi nusa tenggara barat." Additionally, in their study "Knowledge and Attitude towards Bell's Palsy Rehabilitation among Physical Therapists in Saudi Arabia: A Cross-Sectional Study, Risk Management and Healthcare Policy," **Albishi, Al-Ageel, and AlAbdulwahab (2024)** found that there were notable gender, experience, and practice location-based differences in knowledge and attitudes.

These findings are agree with various studies about bell's palsy in different settings in Saudi Arabia, **Alamrani et al., (2020)** in her study about "Awareness of general adult population of Saudi Arabia toward Bell's palsy", **Alherabi et al., (2021)** in her study about "Knowledge and awareness regarding Bell's palsy among the general population in

the western region of Saudi Arabia”**, Alanazi et al., (2022)** in their study about “Incidence rate, risk factors, and management of Bell's palsy in the Qurayyat region of Saudi Arabia” and **Altowayan et al., (2023)** in their study about “Knowledge and Awareness Regarding Bell's Palsy in the Al-Qassim Region, Saudi Arabia” they reported that, The general Saudi population had poor knowledge about Bell's palsy. These results emphasize the necessity of educating Saudi citizens about Bell's palsy in order to enhance treatment results. More should be done to raise public knowledge of this problem, produce positive results, and prevent further difficulties. This includes health education campaigns. Increasing awareness might make it easier for impacted people to get the care they need because research assessing Saudi Arabian regions' understanding and awareness of Bell's palsy is lacking.

Fourthly, patients' self-care practices regarding Bell’s palsy throughout rehabilitation program phases:

Ferreira et al., (2015) & **Martineau et al., (2020)** found that patients with severe, total, and persistent Bell's palsy (more than 14 days after onset) recover considerably more quickly and adequately when they receive early facial rehabilitation in addition to the gold standard medication. Recovery from facial rehabilitation may be improved and have long-term consequences. Exercise therapy for acute Bell's palsy currently largely consists of applying facial rehabilitation strategies that were created specifically for the condition.

From the previous point of view, the current study results clarified that all patients’ self-care practice dimensions were improved after application of rehabilitation program where the highest improvement percentage (81.3%) regarding patients' self-care practice about eye care while the least improvement percentage (62.5%) regarding patients' self-care practice about facial exercises with statistically significant difference. In our opinion, this returned to the effectiveness of rehabilitation program.

The current results supported by several studies have reported that a facial muscle exercise program that includes facial massage is an effective intervention for improving facial muscle function and reducing depression in patients with facial nerve paralysis (**Ajimsha, Al-Mudahka, and Al-Madzhar, 2015**; **Kashoo, Alqahtani, and Ahmad, 2021).** Patients with BP who receive physical therapy report a considerable increase in their functioning abilities **(Çiğdem Karaçay, and Şahbaz, 2022).**

Also this result consistent with study conducted by **Mishra & Sayed, (2021)**, who found that most of patients believed that early initiation of therapy leads to better effects, emphasizing the importance of early intervention. Early rehabilitation during the acute phase of Bell’s palsy enhances recovery in study about “Effects of mime therapy with sensory exercises on facial symmetry, strength, functional abilities, and the recovery rate in bell’s palsy patients”. Other study was done by **Khan et al., (2022),** similarly discovered that facial exercise therapy and early treatment leads to better results. The study is “Physical therapy for facial nerve paralysis (Bell’s palsy): an updated and extended systematic review of the evidence for facial exercise therapy”.

Fifthly, patients’ facial functions and quality of life throughout rehabilitation program phases:

Studies have demonstrated that physiotherapy improves face function and speeds up recovery, which is one of the many advantages it offers patients with BP. Overall, facial workouts appear to be a significant factor in enhancing facial muscular function **(Gatidou et al., 2021; Kale & Suryvanshi, 2022).** After seven weeks of physiotherapeutic rehabilitation, the patient's level of handicap decreased and their face functions improved **(Jha, Khan, and Zaidi, 2022).**

Based on the above mentioned facts, the present study results displayed that there was statistically significant difference of all quality of life domains (facial movement, facial comfort, oral function, eye comfort, lacrimation control and social function) for bell’s palsy patients pre and post intervention program. It obvious improvements of all QoL parameters post rehabilitation program. In our

opinion, this returned to the effectiveness of rehabilitation program.

In this respect, **Klassen et al., (2015),** in their study about "FACE-Q scales for health-related quality of life, early life impact, satisfaction with outcomes, and decision to have treatment: development and validation" emphasized that the FACE-Q scales were found to be reliable, valid, and responsive to clinical change (i.e., significant improvement after face lift and lip treatment) analysis. Also, **Kleiss et al., (2015)** in the study about **"**Quality of life assessment in facial palsy: validation of the Dutch Facial Clinimetric Evaluation Scale" reported that the domains 'facial comfort' and 'social function' statistically significantly improved.

Also this result was agree with the study performed by **Van Veen et al., (2019)** about "Patient-perceived severity of synkinesis reduces quality of life in facial palsy: a cross-sectional analysis in 92 patients" they clarified that the facial comfort subscale, was found to be the second most important component of overall quality of life related facial palsy and the only other statistically significantly contributing subscale.

Furthermore, **Yoon et al., (2023)** supported this results in the study titled; "The Facial Clinimetric Evaluation scale underestimates social well-being and synkinesis in overall facial palsy-specific quality of life: A cross-sectional study in 80 patients" they discovered that the social burden that patients endure is the most significant factor in their "overall" quality of life and that the FaCE total score undervalues it. Social factors may account for over half of the "overall" quality of life associated with facial palsy, according to our findings.

On the same hand, **Khalifa et al., (2024)** they discovered that the physical, social, and psychological well-being of the patients under study—including eating, drinking, speaking, brushing their teeth, and tearing their eyes—improved significantly, with highly statistical significance, both before and after the facial exercises were implemented. The beneficial impact of facial exercises on physical function could be the cause of this outcome. This result is supported by **Mishra & Sayed (2021)** who showed statistically significant improvements between the two groups in physical component post exercises implementation. Also, the study of **Martineau et al., (2020)** demonstrated that the intervention group had better facial symmetry and faster recovery than the control group. In addition, it was observed that the participants who received the treatment had an improvement in their speaking and swallowing.

The result also was in harmony with **Choi & Shin (2016),** in their study entitled "Effects of a facial muscle exercise program including facial massage for patients with facial Palsy" and stated that, facial muscular function of the experimental group improved significantly in comparison to the control group. This result reflects the positive effect of facial exercises due to increase blood flow to facial muscles. This confirmed that facial exercises have important role in improving the condition consequences for such group of patients. In a similar, recent study carried out by **Hotton et al., (2020),** who found improvements in social function over time to closely correlate with improvements in facial function.

Similar results were found by **Khan et al., (2022)** who illustrated that, there were statistically significant differences in the effectiveness of facial exercise therapy for greater functional recovery of individuals with belly Palsy. Also, the results of current study go in the same line with the study carried out by **Parveen et al., (2023)** they concluded in this study that neuromuscular electrical stimulation shows significant improvement in Bell's palsy with facial muscle exercises is more effective in improving facial function and minimizing facial disability shows faster recovery. Furthermore, **Rajangam et al., (2024)** reported that facial exercises lead to greater improvements in facial movement and symmetry.

Sixthly, relation and correlation between the study variables throughout rehabilitation program phases:

Concerning the relation between patients' overall knowledge and self-care practices with their demographic data, the current study results found that there was no statistically significant

relation between satisfactory patients' knowledge level and their demographic characteristics pre-intervention program, while post-rehabilitation program there was a statistically significant relation between satisfactory patients' knowledge level and their demographic characteristics such as age, marital status, level of education, and residence. It is obvious that patients who benefited greatly from the rehabilitation program and had better knowledge levels post-program were those who were less than thirty-five years old, single, with high education, and residing in urban areas. On the other hand, there was no statistically significant relation between satisfactory patients' self-care practice level and their demographic data pre- and post-program.

The current result agree with **(Al Meslet et al., 2019; Albishi, 2024)** they found that a significant relationship between knowledge and education levels and that respondents with postgraduate degrees had higher overall knowledge scores than those with bachelor's degrees. Also, **Altowayan et al., (2023)** supported this result and reveals that there was a statistically significant difference in awareness levels, according to age ($p<0.001$). There was also a significant correlation between marital status with awareness of Bell's palsy ($p<0.001$).

Furthermore, this result coincide with **Alherabi et al., (2021)** they discovered that there were significant correlations between awareness and age ($p<0.001$), gender ($p<0.001$), marital status ($p<0.001$), occupation ($p<0.001$), information source ($p<0.001$), nationality ($p=0.009$), and education levels ($p<0.031$). Addressing these gaps and demographic subtleties through targeted educational campaigns is crucial for increasing general awareness of Bell's palsy. Too, **Alamrani et al., (2020)** they found that a significant association was observed between participants' awareness and their marital status ($p < 0.0001$) and residence ($p = 0.034$).

Concerning the correlation between patients' overall knowledge, self-care practices, facial functions and quality of life, the current study results found that there was statistically significant correlation between patients' knowledge and self-care practices score with facial functions and QoL scores of studied patients at pre and post intervention of rehabilitation program. The current result in same line with **Ahmed et al., (2024)** who demonstrated in study entitled "Impact of knowledge and self-care practices on quality of life among patients with Bell's palsy: A quasi-experimental study" that patients who received structured education and training in self-care practices reported significantly higher scores in physical, emotional, and social quality of life domains compared to those who did not receive such interventions, indicating that empowering patients with knowledge directly enhances their ability to manage their condition and maintain well-being.

Too, **Hassan et al., (2024)** emphasized that educational and self-care interventions led to significant improvements in patients' emotional and physical health outcomes. The study concluded that higher levels of disease-specific knowledge were strongly associated with better adherence to self-care routines and an overall improvement in QoL, highlighting the importance of integrating patient education into rehabilitation programs.

The present result was context with **Khalifa et al., (2024)** they showed a significant positive correlation between overall physical wellbeing, social/psychological wellbeing, and Facial muscle assessment pre/post and follow up facial exercises implementation. Also, this result was supported by the study entitled "Psychosocial functioning in patients with altered facial expression: a scoping review in five neurological diseases" which conducted by **Rasing et al., (2023)** they concluded a positive correlation among all health domains after applying of facial exercises. This correlation was seen for the patients with acquired facial weakness and psychosocially affected. In addition, this result was consistent with the study conducted by **Bruins, et al., (2021)** they stated in study about "Associations between clinician-graded facial function and patient reported quality of life in adults with peripheral facial palsy" there is correlation between the facial function and physical function but better than correlation between facial function and social function domain.

Conclusion:

The current study concluded that the rehabilitation program plays an effective role in improving knowledge, self-care practices, and facial function and quality of life for patients with Bell's palsy. As in the pre-phase of the rehabilitation program, most of the studied patients had unsatisfactory overall knowledge and self-care practices regarding Bell's palsy, and they also had poor facial function and quality of life. In contrast, in the post-phase, patients' knowledge and self-care practices, as well as facial function and quality of life, improved in comparison to the pre-phase, which indicated the positive effectiveness of the rehabilitation program. Additionally, the current study affirmed that there was a statistically significant correlation between patients' knowledge and self-care practice scores and facial functions and QoL assessment scores of studied patients pre- and post-intervention. There was statistically significant relation between satisfactory patients' knowledge level and their demographic data post-intervention, while there was no statistically significant relation between satisfactory patients' practice level and their demographic characteristics pre- and post-intervention program. These results indicated the easy application of this program for all individuals without limitation from age, level of education, sex, residence, or income.

Recommendation:

In view of the study results, the study recommends the following:

- Providing patients in the physiotherapy department and neurologic outpatient clinic with educational rehabilitation pamphlets, handouts, and colored posters about Bell's palsy and rehabilitative activities.
- Assign specialized rehabilitative nurses to the neurologic outpatient clinic to help patients understand and comprehend every facet of Bell's palsy.
- The developed rehabilitation program should be implemented on a wide scale in study settings and all similar ones, including all governmental hospitals.
- Further studies should be done on a large sample size and in various settings for generalization.

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