Seasonal pattern, Socio-demographic and health status effects on development of facial palsy in Gaza Strip

أثر النمط الموسمي والحالة الاجتماعية والديموغرافية والوضع الصحي في تطور مرض الشلل الوجهي في قطاع غزة

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نتيجة الحكم على أطروحة ماجستير

بدأً على موافقة شئون البحث العلمي والدراسات العليا بالجامعة الإسلامية بغزة على تشكيل لجنة الحكم على أطروحة الباحث جمال عبدالناصر حمزة الفرا ليل درجة الماجستير في كلية العلوم قسم علوم بيئة صحة بيئية وموضوعها:

أثر النمط الموسمي والحالة الاجتماعية والديموغرافية والوضع الصحي في تطور مرض الشلل الوجهي في قطاع غزة
Seasonal pattern, Socio-demographic and health status effects on development of facial palsy in Gaza Strip

وبعد المناقشة التي تمت اليوم الأحد 29 جمادي أول 1438هـ، الموافق 26/2/2017م الساعة الواحدة ونصف ظهرًا، في قاعة مؤتمرات بنى الدنيا، اجتمعت لجنة الحكم على الأطروحة والمكونة من:

أ.د. سمير عبد الفتاح عفقي - مشرفًا ورئيسًا
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أ.د. محمد رمضان الأخغا - مناقشًا داخليًا
د. ناهض علي اللحام - مناقشًا خارجيًا

وبعد المداولات أوصت اللجنة بمنح الباحث درجة الماجستير في كلية العلوم قسم علوم بيئة صحة بيئية.

واللجنة إذ تمنح هذه الدرجة فإنها توبيخًا لبقي الله ونجوم طاعته وأن يشكر علمه في خدمة دينه ووطنه.

والله بالتوحيدي

نائب الرئيس لشئون البحث العلمي والدراسات العليا

أ.د. عبدالرؤوف علي المناعية
Abstract

Background: Facial palsy a fairly common disorder predominantly prevalent in the adult age group, affects nerves and muscles in the face causing paralysis or dropping of one side of the face. Seasonal distribution has been discussed in several studies with variable, often contradictory results.

Objectives and aims: The main aim of this study is to evaluate the seasonal pattern, socio-demographic factors and health status related to the development of facial palsy in Gaza governorates.

Methodology: The study adopted a quantitative descriptive, analytical cross-sectional design. The population of the study included the patients who are suffering from facial palsy in the main physical therapy departments in Gaza governorates including North Gaza, Gaza, middle area, Khanyounis and Rafah. The sample of this study was a convenience, it consisted of 146 patients. Data was collected by interview questionnaire.

Results: The study results showed that 59.6% of patients have right side facial palsy. The majority (89.0%) of patients with facial palsy were affected in winter season. Moreover, the results showed that 45.2% of patients with facial palsy have the age below 26 years old. More than half (53.4%) of patients are females. The results showed that there was statistical significant association between the onset of facial palsy and (irritation and ulceration of the cornea, eye condition and spasms in the face muscles; p < 0.05), while there is no statistical significant association between the onset of facial palsy and (permanent weakness in the eyelid, runny tears from the eye, change in the taste of the food, present of drooling, increasing hearing sounds, pain behind the ear and lack of facial symmetry; p > 0.05).

Conclusions & Recommendations: The study concluded that there is an environmental impact on facial pasly especially the winter season. There is a need to increase awareness about the preventive measure to avoid facial palsy as well as the role of physiotherapist in the management of this disease at different health care levels.

Key Words: Facial palsy, Seasonal pattern, Gaza strip.
الملخص

المشكلة: يعتبر الشلل الوجهي اضطراباً شائعاً إلى حد كبير خصوصاً لدى كبار السن، إذ أنه يؤثر على الأعصاب والعضلات الوجهية مما يتسبب في شلل أو إسقاط من جانب واحد من الوجه. وقد تمت مناقشة الانتشار الموسمي للمرض في العديد من الدراسات وكانت منها نتائج متناقضة.

لقد هدفت هذه الدراسة إلى تقييم النمط موسمي والتعامل الديموغرافي والاجتماعي والحالة الصحية بين المرضى المصابين بالشلل الوجهي في محافظات غزة.

المنهجية: أُتيت الدراسة المنهج الوصفي التحليلي، وقد تكون مجتمع الدراسة من المرضى الذين يعانون من الشلل الوجهي في مراكز العلاج الطبيعي الرئيسية في محافظات غزة وقد تألفت عينة الدراسة من 146 مريض، حيث أنه تم جمع البيانات عن طريق استبانة تم إعدادها وتحميتها مسبقاً.

النتائج: أظهرت نتائج الدراسة أن 59.6% من المرضى يعانون من شلل الجانب الأيمن في الوجه، حيث كانت غالبية نسبة الإصابة (89%) في فصل الشتاء، أيضًا أظهرت النتائج أن 45.2% من المرضى أقل من 26 سنة، وقد كان (53.4%) من الإناث. علاوة على ذلك أظهرت النتائج أن هناك علاقة ذات دلالة إحصائية بين آلية بداية ظهور الشلل الوجهي وبعض المضاعفات الناجمة عنه مثل (تبييض وتقرح القرنية، القدرة على إغلاق العين، وقلق حالات عضلات الوجه)، في حين أنه لم يكن هناك علاقة ذات دلالة إحصائية بين آلية بداية ظهور الشلل الوجهي وبعض المضاعفات الناجمة عنه مثل (ضعف دائم في الجفن، سيلان الدموع من العين، تغير في طبع الأذن، ألم خلف الأذن، وعدم التماثل في الوجه).

الخلاصات والتوصيات: خلصت الدراسة إلى أن هناك تأثير بيئي واضح على الشلل الوجهي خاصة في فصل الشتاء وأن هناك حاجة لزيادة الوعي حول كيفية الوقاية من الشلل الوجهي، وخصوصاً دور أخصائي العلاج الطبيعي في عملية علاج المريض في مختلف مبادلات الرعاية الصحية. وقد أوصت الدراسة أيضاً بوضع وتتتيف مبادئ توجيهية لسياسة علاج الشلل الوجهي من خلال البحث والدراسات المستقبلية.

الكلمات المفتاحية: الشلل الوجهي، النمط موسمي، قطاع غزة.
I dedicate this thesis to my parents who have always been my nearest, and have been so close to me whenever I needed. It is their unconditional love that motivates me to set higher targets.

Also, I dedicate this thesis to my wife (Iman) She is my nearest surrenders and has provided me with a strong love shield that always surrounds me and never lets any sadness enter inside.

In addition, I dedicate this thesis to my lovely kids (Abdelnasser, Ali Seraj, Mohammed, Jomana, Tasneem, Maryam, Janna and Basant)

In addition, I dedicate this thesis to my sisters (Ayda, Marwa, Ahed and Myasser) and brothers (Hamza, and Mohammed) who are my nearest surrenders and they gave me real love.
Acknowledgment

In the name of Allah, the most gracious, the most merciful. All praise to Allah, the One to whom all dignity, honor, and glory are due, the Unique with perfect attributes, who begets not, nor is He begotten. He has no equal but He is the Almighty Omnipotent. Peace and blessings of Allah be upon the last prophet, Muhammad, and on all who follow him in righteousness until the Day of Judgment. All Praise be to Allah for enabling me to finish this paper. As the prophet Muhammad, peace be upon him, said, "He who is thankless to people, is thankless to Allah."

I therefore gratefully acknowledge the many people who so graciously helped and supported me to successfully complete this thesis. First, I would like to thank my supervisors, Prof. Dr. Samir A. Afifi and Prof. Dr. Yousef Al-Jeesh for their support, advice and encouragement throughout this study; I am grateful for their willingness to help in reviewing the study to come out to light. Their useful comments were truly a tremendous help at every stage. I would like to thank my friend Suliman El Jabale and Alaa Abu-Jamea for their continued support during my studies.

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May Allah Bless Them All
Table of Contents

Declaration......................................................................................................................... ii
Abstract............................................................................................................................... iii
الملخص............................................................................................................................... iv
Dedication............................................................................................................................. v
Acknowledgment............................................................................................................... vi
Table of Contents............................................................................................................. vii
List of Tables ..................................................................................................................... x
List of Figures ................................................................................................................... xi
List of Abbreviations........................................................................................................ xii
Chapter 1 Introduction....................................................................................................... 1
  1.1 Background.................................................................................................................... 2
  1.2 Problem statement......................................................................................................... 3
  1.3 Significance of the study............................................................................................... 4
  1.4 General objective of the study.................................................................................... 5
  1.5 Specific objectives......................................................................................................... 5
  1.6 Research question........................................................................................................ 6
  1.7 Context of the study.................................................................................................... 6
  1.7.1 Population and demography.................................................................................. 6
Chapter 2 Literature Review............................................................................................. 10
  2.1 Conceptual framework................................................................................................. 11
  2.2 Literature Review........................................................................................................ 12
  2.2.1 Introduction.............................................................................................................. 12
  2.2.2 Background, definition and prevalence of facial palsy......................................... 12
  2.2.3 Anatomy.................................................................................................................. 13
  2.2.4 Demographics and facial palsy............................................................................. 15
  2.2.5 Factors associated with the development of facial palsy ................................... 15
    2.2.5.1 Auto-immune system....................................................................................... 15
    2.2.5.2 Viral infection................................................................................................... 16
    2.2.5.3 Inflammatory disorder.................................................................................... 16
2.2.5.4 Pregnancy

2.2.5.5 Vascular Ischemia

2.2.6 Pathophysiology and etiology of facial palsy

2.2.7 Diagnosis of facial palsy

2.2.8 Evaluation of Facial palsy

2.2.9 Prognosis of the disease

2.2.10 Management of facial palsy

2.2.11 Residual effects of facial palsy

2.2.12 Previous studies

Chapter 3 Materials and Methods

3.1 Study design

3.2 Study population

3.3 Sample of the study

3.4 Period of the study

3.5 Setting of the study

3.6 Inclusion criteria

3.7 Exclusion criteria

3.8 Study instrument

3.8.1 Questionnaire design

3.9 Pilot Study

3.10 Validity of the instrument

3.10.1 Face and content validity

3.11 Ethical considerations

3.12 Data entry and statistical analyses

Chapter 4 Results and Discussion

4.1 Introduction

4.2 Socio-demographic characteristics of the study

4.2.1 Distribution of the study participants according to their age, gender and marital status
4.2.2 Distribution of the study participants according to the number of family members, level of education and residency ................................................................. 42
4.3 Facial palsy characteristics among patients in Gaza governorates ................. 43
4.4 Seasonal pattern of facial palsy among patients in Gaza governorates .......... 46
4.5 Socio-demographic characteristics of patients with facial palsy in Gaza governorates ....................................................................................................... 48
4.6 Health status of patients with facial palsy in Gaza governorates ................. 51
4.7 Complications after facial palsy ................................................................... 53

Chapter 5 Conclusion and Recommendations ..................................................... 56

Chapter 5 Conclusion and Recommendations ..................................................... 57

5.1 Introduction .................................................................................................... 57
5.2 Conclusions .................................................................................................. 57
5.3 Recommendations ......................................................................................... 59
5.3.1 Future research ......................................................................................... 60

The Reference List ............................................................................................... 61

Appendix 1: Approval from IUG ......................................................................... 71
Appendix 2: Approval from MoH ......................................................................... 72
Appendix 3: Approval from Helsinki ..................................................................... 73
Appendix 4: Experts Panel .................................................................................... 74
Appendix 5: Questionnaire (English version) ....................................................... 75
Appendix 6: Questionnaire (Arabic version) ......................................................... 82
Appendix 7: Consent Form ................................................................................... 88
List of Tables

Table (2.1) The Modified House-Brackmann scale ........................................... 20
Table (4.1) Distribution of the study participants according to their age, gender and marital status .................................................................................................................. 42
Table (4.2) Distribution of the study participants according to the number of family members, level of education and residency .................................................................................. 43
Table (4.3) Seasonal pattern of facial palsy among patients in Gaza governorates 47
Table (4.4) Socio-demographic characteristics of patients with facial palsy in Gaza governorates ............................................................................................................. 50
Table (4.5) Health status of patients with facial palsy in Gaza governorates ........ 53
Table (4.6) Association between onset of facial palsy and its complications ....... 54
List of Figures

Figure (2.1) Conceptual Framework (Self-Developed) ........................................ 11
Figure (2.2) The Facial Nerve and its Different Branches ................................... 14
Figure (2.3) Facial Nerve Anatomy .................................................................... 18
Figure (4.1) Facial Palsy Side among Patients at Gaza Governorates ............ 44
Figure (4.2) Hereditary History of Facial Palsy ................................................ 44
Figure (4.3) Facial Palsy Onset ......................................................................... 45
List of Abbreviations

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>FP</td>
<td>Facial palsy</td>
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<tr>
<td>CT</td>
<td>Computer Tomography</td>
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<td>DNA</td>
<td>Deoxyribonucleic Acid</td>
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<tr>
<td>FDI</td>
<td>Facial Disability Index</td>
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<td>Facial palsy</td>
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<tr>
<td>HBS</td>
<td>House-Brackmann scale</td>
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<td>HILT</td>
<td>High Intensity Laser Therapy</td>
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<td>HSV</td>
<td>Herpes simplex virus</td>
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<td>IUG</td>
<td>Islamic University–Gaza</td>
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<td>LLLT</td>
<td>Low Level Laser Therapy</td>
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<td>MoH</td>
<td>Ministry of Health</td>
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<td>MRI</td>
<td>Magnetic Resonance Imaging</td>
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<td>PCBS</td>
<td>Palestinian Central Bureau of Statistics</td>
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<tr>
<td>PNF</td>
<td>Proprioceptive Neuromuscular Facilitation</td>
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<tr>
<td>RCT</td>
<td>Randomised Controlled Trial</td>
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<td>US</td>
<td>Ultrasound</td>
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<td>USA</td>
<td>United States of America</td>
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Chapter 1
Introduction
1.1 Background

Sir Charles Bell (1774–1842), a British anatomist and surgeon, in the 19th century published his discovery that the facial nerve innervates the facial muscles that give facial expression. He further more reported that the trigeminal nerve mainly is responsible for facial sensation and described several cases of facial paralysis due to trauma or infection. Before Facial discovery the functions of the facial and trigeminal nerve were poorly understood. Many believed that both the facial nerve and the trigeminal nerve are responsible for facial sensation and facial movement. In the mid-19th century the eponym “Facial palsy” was established (van de Graaf et al 2009).

Facial palsy (FP) is a fairly common disorder that affects nerves and muscles in the face causing paralysis or the dropping of one side of the face. The disease was first described by Nicolaus Friedrich in 1797 and named after Sir Charles Bell who explained the disease (Greco et al., 2012).

Viral infections are the most common reason for the development of Facial Palsy as opposed to tumors, immune disease or drugs (Liu, Li, Yuan & Lin, 2009). It is considered a devastating disease as it harms many aspects of an individual, both physical and psychological. The annual incidence of facial palsy globally is approximately 11 to 40 cases per 100 000 people per year (Hato, et al., 2007) with peak incidence usually between the ages of 15 and 50 years (Zandian et al., 2014).

Facial palsy affects females and males of all age groups (Ivona et al., 2010). A higher prevalence is noticed in people 40 years and older (Finsterer, 2008) as well as in clients with diabetes (Riga et al., 2012) and pregnant women (Hawood- Nusset al., 2009). The symptoms manifest following irritation to the facial nerve (7th cranial nerve) that supplies the muscles of the face, including the muscles that raise the
eyebrow, close the eye, wrinkle the nose, and assist with smiling and opening and closing of the mouth. The sensation of the front part of the tongue and the tear ducts of the eyes are also affected. The diagnosis of facial palsy depends on eliminating other diseases as soon as possible, as delayed treatment and inappropriate therapy methods could hamper the client’s outcome (Liu et al., 2009; Greco et al., 2012).

The majority of patients with facial nerve paralysis are expected to recover 85% within the first three weeks after the onset, while about 15% of recovery only starts after 2 to 3 months from onset (Peitersen, 2002). Complete recovery without medical or/and physiotherapy intervention is expected for most of the patients with the disease. However, some cases remain complicated and result in incomplete recovery of symptoms.

1.2 Problem statement

Patients with facial palsy face many challenges, including psychological, physical and emotional challenges. A long recovery period and/or delayed complete healing of a patient with facial palsy could lead to a negative effect on many aspects of an individual's life. How society perceives the person, for instance staring at the person or making statements because the person looks different may make the client feel uncomfortable and embarrassed. This could negatively influence the client’s self-confidence as he or she can become anxious to appear in social situations.

Moreover, individuals often worry about the social stigma related to facial asymmetry, a secondary result of the disease. The aforementioned problem is furthermore enhanced by the physical impact the paralysis may have on the client’s eating and drinking practices. Literature indicates that physiotherapy plays an important role in the recovery of patients with facial palsy. However, not all patients with are referred for physiotherapy as part of their rehabilitation protocol. This could negatively influence the recovery process and outcome. Although all the treatment modalities aim to enhance motor and facial functions of the clients with facial palsy, different implementation strategies could contribute to sub-standard outcomes for the
client. It is therefore necessary to determine the factors related to the management of the disease that may influence the recovery process of clients with facial palsy.

Climatic or meteorological factors, such as temperature, humidity, or barometric pressure have been implicated in triggering off the pathogenetic mechanism of facial palsy. It has been suggested that a meticulous study of a "combination of changing factors" may help illuminate the underlying pathophysiology of this "puzzling" disease (Danielides et al., 2001). The seasonal distribution of the disease has been extensively studied; however, no consensus has been reached. Patients often recall cooling of the face or a cold draught just before the outburst of the facial palsy (Danielides et al., 2001).

1.3 Significance of the study

The study could enlighten health care professionals on the role of physiotherapy which can play in the management of patients with FP. It could provide valuable information of the best practices that should be followed to obtain better recovery outcome of FP patients. In addition, all health care professionals managing patients with facial palsy could see the importance of multi-disciplinary management strategies in order to improve the recovery of clinical symptoms and hence reduce the physiological burden of the disease on these clients.

To the best of the researcher knowledge, this study is the first to be done in Gaza Strip and there are no previous studies which highlight this problem especially seasonal effect of facial palsy in Gaza Governorates. Furthermore, the results of the study could be a guiding source of information to the government or decision-makers when enacting policies involving clients with facial palsy.

Facial palsy affects both sexes equally, although the condition is more frequent in younger women (aged 10-19) compared to the same age group of men. Pregnancy can increase the risk threefold, and in pregnant women facial palsy most commonly appears in the third trimester. Preeclampsia (disorder of pregnancy
manifesting with high blood pressure and proteins in the urine) is also shown to increase the risk.

The condition is generally more common in adults. Peak ages are between 20 and 40 years of age, although this disease occurs in children and elderly population over 70 years as well. The rate basically increases with age up to the fourth decade, and then remains steady until the old age, when growth of incidence is noted again. Hence a somewhat higher prevalence rate is found in people older than 65 years of age (59 cases per 100,000 persons). In children younger than 13 years of age the incidence rate is markedly lower (13 cases per 100,000 persons).

1.4 General objective of the study

The general objective of this study is to evaluate the seasonal pattern, socio-demographic factors and health status related to the development of facial palsy in Gaza governorates.

1.5 Specific objectives

- To determine the seasonal pattern and the development of facial palsy in Gaza governorates.
- To identify the relationship between sociodemographic factors and patients with facial palsy.
- To explore the patients’ health status related to the development of facial palsy.
- To explore the association between the onset of facial palsy and its complications in Gaza governorates.
- To suggest recommendations to the policy makers at the ministry of health to prevent and overcome the occurrence of disease.
1.6 Research question

1. What is the seasonal pattern for the development of facial palsy in Gaza governorates?
2. What is the patients' marital status which is considered the most likely to have facial palsy?
3. What is patients’ residence which is considered the most likely to have facial palsy?
4. What is the patients’ nature of house which is considered the most likely to have facial palsy?
5. What is the patients’ socio-economic status which is considered the most likely to have facial palsy?
6. What is the patients’ health status which is considered the most likely to have facial palsy?
7. Is there an association between the onset of facial palsy and its complications among patients in Gaza governorates?

1.7 Context of the study

1.7.1 Population and demography

1.7.1.1 Gaza Strip

The Palestinian territories consist of two geographically separated areas West Bank (WB) and Gaza Strip. Gaza strip is a narrow zone of land bounded of the south by Egypt, on the west by the Mediterranean Sea, and on the east and north by the occupied territories in 1948. Gaza strip is very crowded place with 46 kilometers long and 5 –12 kilo-meters wide and with a total area of 365 sq km. Gaza strip is administratively divided into five governorates: North, Gaza, Mid-zone, Khan-Younes and Rafah. It consists of four cities, fourteen villages and eight refugees' camps.

The total population of the Palestinian national authority (PNA) is approximately 3.826 million of which 2.4 million is in the West Bank and 2.3 million
in Gaza Strip. The average annual population growth rate is 2.8% and about 42% of the population is below 15 years old. The average number of individuals in a household is 6.3 (5.9 in the West Bank and 7 in Gaza) (PCBS, 2015).

1.7.1.2 Health status

The Palestinian population is going through an epidemiological and demographic transition. Behind the standard health indicators lies much suffering. People often report being negatively affected by constant conflict and military occupation, checkpoint closures, and the Israeli siege. These may well be contributory factors to the “epidemic” of chronic diseases that is emerging. Within the last decade male life expectancy increased from 69.0 in 1997 to 70.2 years in 2008, while life expectancy for females did not change and stands at 73 years (MoH, 2010).

Fertility is declining in both the West Bank and the Gaza Strip, but still considered relatively high. The total fertility rate in Palestine has declined to 4.6 in 2007 compared to 6.0 in 1997. In the West Bank, the fertility rate was down to 4.2 in 2007 compared to 5.6 in 1997. In the Gaza Strip, it was 5.4 in 2007 compared with 6.9 in 1997. The average age of the population will increase as fertility declines and children make up a shrinking percentage of the population. In the West Bank, the proportion of children below 15 declined from 45.1% in 1997 to 41.3% in 2007. In the Gaza Strip, the decline was from 50.2% in 1997 to 48.3% in 2007. By contrast the percentage of working age population aged 15-64 years has increased during the same period; the proportion rose from 51.1% in 1997 to 55.3% in the West Bank and rose from 46.9% to 49% in the Gaza Strip (MoH, 2010).

Palestine would thus be facing a period of ‘demographic bonus’ if the growing cohort of young active men and women could be constructively absorbed in the community and economy. However, the downside is that over the next 2 decades, the number of Palestinian youth (15-24 year) will increase 80% to 1.3 million, placing greater demands on public services and resources such as education, health, housing, employment opportunities, and natural resources. If these demands cannot be met – and in the current socio-political situation, the scenario is not positive - the
‘demographic bonus’ will instead become a ‘youth bulge’ with potentially destabilizing effects on the society (MoH, 2010).

1.7.1.3 Ministry of Health

The ministry of health (MOH) owns and operates 25 hospitals (13 in GS and 12 in the WB), furnished with 2,815 beds (1,499 in GS and 1,316 in the WB), of these hospitals there are the general hospitals with 2,163 beds (1,199 in GS and 964 in WB), two psychiatric hospitals with 319 beds (280 in WB and 39 GS), one ophthalmic hospital in GS with 31 beds and two Pediatric hospitals in GS with 222 beds (MOH, 2010).

Nasser Medical Complex (NMC), contain two hospitals: Nasser (medical and surgery) and Altahreer hospital (obstetrics and women, and children), the clinical capacity is a total of 258 beds. The complex is situated in the western area of Khan Younis, which was built in 1958 on an area of 50000 m2, and serves the area of Khan Younis, with a population of 270,979 inhabitants (MoH, 2010).

Al Shifa is a medical complex includes three hospitals: the surgery hospital, medical, obstetrics and Gyna hospital, the clinical capacity is a total of 500 beds. It is located in the central west of Gaza City, it was built in 1946 on an area of 42000 m2, and serves the area of coverage of the Gaza province with a population of 496,411 people in particular, and the Gaza Strip in general, has ten operating rooms. Obstetrics and Gyna hospital in Shifa medical complex has 14 delivery rooms, there are a total of 1500 deliveries in this hospital (400 CS and 1100 normal vaginal delivery). Aqsa Martyrs Hospital provides medical, surgical, pediatric, and women and obstetrics services, the clinical capacity is about 103 beds, located in the middle governorate of Deir Al-Balah, it has been built in 2001 on an area of 4000 m2, serves the segment of the population living in the central Gaza governorate with a population of 205,535.

Al Emaraty Crescent hospital is a specialized hospital of gynecology and obstetrics services, the clinical capacity of about 40 beds, located in the Tel Sultan-
Rafah, built in the year 2000 on an area of 4000 m2, and serves the segment of the population living in the Rafah governorate with a population of 173,372 (MoH, 2010).

Beit Hanoun hospital provides surgical, pediatric and medical services, the clinical capacity is the total of 36 beds, located in the center of the town of Beit Hanoun, built in 2006 on an area of 2500 m2, has two operating rooms (MoH, 2010).

1.7.1.4 Location, geography and climate
The Gaza Strip is located in the Middle East. It has a 51 kilometers border with the so-called Israel, and an 11 km border with Egypt, near the city of Rafah. Khan Yunis is located 7 kilometers northeast of Rafah, and several towns around Deir el-Balah are located along the coast between it and Gaza City. Beit Lahia and Beit Hanoun are located to the north and northeast of Gaza City, respectively.

The Gaza Strip has an arid climate, with mild winters, and dry, hot summers subject to drought. The terrain is flat or rolling, with dunes near the coast. Environmental problems include desertification; salination of fresh water; sewage treatment; water-borne diseases; soil degradation; and depletion and contamination of underground water resources (PCBS, 2015).
Chapter 2

Literature Review
Chapter 2

Literature Review

2.1 Conceptual framework

Based on the review of the available literature, the researcher designed the conceptual framework (Figure 2.1). The conceptual framework is the map that guides the design and the implementation of the study and its effect mechanism for illustrating and summarizing the study variables, this is used to guide the research process and to make research finding more meaningful. (Self-developed model), to address the main domains of the study in accordance with previous studies. It includes three factors, which affect on development of FP in GS. Which classified as seasonal pattern, sociodemographic and health status.

![Conceptual Framework](image)

**Figure (2.1) Conceptual Framework (Self-Developed)**

**Sociodemographic factor**
- Age, gender
- Marital status
- Level of education
- Income
- Living area

**Seasonal pattern**
- Summer
- Winter
- Autumn
- Spring

**Health status**
- Medical history
- Blood pressure
- Diabetes
- Family planning (pregnant)
- Infection

**Facial Palsy**
Figure 2.1 illustrates the self-developed conceptual framework for this study. As shown in the figure, there are three four domains; three of them are considered independent variables for the development of facial palsy which are seasonal pattern, sociodemographic factors and health status. The fourth domain is the dependent variable which is facial palsy.

The first domain “seasonal pattern” consists of a number of environmental variables, such as summer, winter, autumn and spring. The second domain is sociodemographic factors, such as age, gender, level of education, marital Status, family members, living area, income and residency. The third one is health status such as medical history, diabetes, blood pressure disease, stroke, transient ischemic attack, myasthenia gravis, hypothyroidism, multiple sclerosis, viral infection, history of head area injury, hereditary history and pregnancy.

2.2 Literature Review

2.2.1 Introduction

This chapter provides an overview of existing literature regarding aspects of facial palsy. The literature review was done based on articles, studies, and available literature. The researcher reports on the prevalence of Facial palsy, signs and symptoms of the disease, factors associated with the development of the disease, etiology and pathophysiology of the disease, the psychological impact of Facial palsy, diagnosis and differential diagnosis and the classification of the severity of the disease. Finally, the pharmacological and nonpharmacological management of the disease, with special reference to physiotherapy modalities, are discussed.

2.2.2 Background, definition and prevalence of facial palsy

Facial palsy, a lower motor neuron lesion, is a complex neuromuscular facial disorder of unknown etiology which affects the 7th cranial nerve or facial nerve (Eliot, 2006), causing ipsilateral paralysis or paresis of the muscles of facial expression. The paralysis caused by Facial palsy present the same as for facial paralysis due to a head injury. The pathophysiology process can be described as an
inflammation of the facial nerve resulting in demyelination of the axons and disruption of the blood supply to the facial nerve, affecting the facial expression muscles, salivary glands as well as sensory fibers that supply taste sensation (Elliot, 2006).

Globally the incidence of facial palsy is approximately 20 to 30 cases per 100,000 people per year (Hato et al., 2007). In developed countries, the highest incidence (approximately 18725 patients per year) was found in Seckori, Japan while the lowest incidence (approximately 1300 patients per year) was found in Sweden (Perry et al., 2011). In the United States of America (USA) the incidence is ranging between 13 and 34 cases per 100,000 people per year. There is however a lack of information regarding the prevalence of Facial palsy in developing countries, including Palestine.

2.2.3 Anatomy

The course of the facial nerve through the Fallopian canal is unique. No other nerve in the body covers such a long distance through a bony canal (May and Schaitkin 2000). The facial nerve, cranial nerve VII, is composed of motor fibres, parasympathetic fibres and sensory fibres. The motor fibres innervate the facial muscles and are responsible for facial expression. Efferent parasympathetic fibres innervate the submandibular, sublingual and lacrimal glands. Taste from the anterior two-thirds of the tongue, and skin sensations in the region of the external ear are carried by sensory fibres (figure 2.2) (May and Schaitkin 2000).
The cortical motor face region is located in the lower part of the precentral gyrus. The nerve fibres from the cortex to the facial nucleus pass the internal capsule and the basal part of the pons. Most fibres cross over in the caudal pons and reach the facial nucleus on the opposite side but some diverge to the ipsilateral facial nucleus.

The superior portion of the nucleus innervates the occipitofrontal muscle, the upper part of the orbicularis oculi and the corrugator supercilii. These neurons receive bilateral cortical input. Facial muscles in the lower face receive only contralateral input from the motor cortex. This is why a central lesion results in contralateral paralysis of the lower face but spares the function in the forehead on the same side (May and Schaitkin 2000).
2.2.4 Demographics and facial palsy

Facial palsy is more likely to occur in clients between the ages of 15 and 45 years (Sarhan et al., 2012) and is three times more likely to affect pregnant women (Ragupathy & Emovon, 2013). At the same time studies report that facial palsy wide spread affects women in the adolescence stage and in their twenties. However the prevalence seems to be the same for both genders in their thirties, with a higher incidence after the age of 40 years (Garg, Gupta, Singh & Chaudhury, 2012).

Both genders tend to be affected equally around middle age, but young females between 10-19 years of age and males older than 40 years of age have been noted to be affected more often (2 times and 1.5 times greater, respectively). The right and left facial nerves are equally involved, but simultaneous bilateral involvement is a rare event with a 1% occurrence. Recurrence occurs 10% of the time, and only 10% of affected individuals report a positive family history of similar symptoms.

Some studies showed that the mean age of onset was between 40-44 years, but it was less common in those younger than 15 years and those older than 60 years of age. There was no gender predilection, and a recurrence rate between 6-9% was observed in this population. Some associated symptoms included a reduced stapedial reflex, phonophobia, postauricular pain, dysgeusia, and decreased lacrimation (The University of Texas Medical Branch (Pham et al., 2012)

2.2.5 Factors associated with the development of facial palsy

2.2.5.1 Auto-immune system

Greco et al. (2012) proposed that the process of auto-immune cell interceded may be associated with the development of FP. Some evidence showed modifications in the lymphocytes divisions of tangential blood as well as gaps in cellular and humoral immunologic alterations’ during the acute phase of FP. In addition, a decline of the proportion of T-cells and helper-cells are evident in FP.
Many studies proposed a correlation between facial palsy and Guillain-Barre syndrome. This disorder influences the peripheral nerves causing paralysis that commence in the feet and hands, spreading to the back. In both conditions researchers found a significant decline in T-lymphocytes (Greco et al., 2012). Neuromuscular diseases are common in clients with human immunodeficiency virus (HIV). It can occur at any stage of the disease and affect any part of the peripheral nervous system. Facial palsy has been observed in clients who are already known to be infected with HIV (Robinson-Papp & Simpson, 2009).

2.2.5.2 Viral infection
A viral infection, especially the type 1 Herpes simplex virus (HSV) is recognised to be the major cause of idiopathic facial palsy. Epidemiological data reported an estimation of three months of this virus since the onset of the paralysis and laboratory test can provide its presence in the saliva of the client (Kennedy, 2010). Furthermore, electrophysiological assessments found that the highest level of the infection is between the first and fourteenth day after the onset of the paresis (Barbara et al., 2010).

2.2.5.3 Inflammatory disorder
An inflammatory response caused by viruses such as Herpes Simplex or Herpes Zoster for instance may cause swelling in the affected area. In Facial palsy, the swelling results in disruption in the conduction of the nervous system, all as a result of the viral infection or auto-immune system response (Salinas et al., 2010).

2.2.5.4 Pregnancy
According to Aditya (2014) pregnant women are 2 - 4 times more prone to the development of facial palsy compared to non-pregnant women. Ragupathy and Emovon (2013) reported an incidence of Facial palsy in 45.1 per 100 000 pregnant women, with the highest frequency occurring during the third trimester of pregnancy. Researchers furthermore reported a powerful relationship between facial palsy and pre-eclampsia, with 22% of women with facial palsy indicating pre-eclampsia in
their pregnancy which may be explained by the equivalent in pathogenesis of extra-cellular oedema (Hawood-Nuss et al., 2009).

Therefore, females who are diagnosed with facial palsy are advised to conduct tests for pre-eclampsia, including urine dipstick to determine protein levels as well as examination of the function of the liver and kidneys (Ragupathy & Emovon, 2013). Some obstetricians do not think of Facial palsy as a diagnosis for pregnant women with pre-eclampsia and facial paralysis as a stroke also manifests in signs and symptoms related to facial palsy. The last trimester of pregnancy is characterised by increased cortisol hormones, which could stimulate the herpes simplex virus (HSV) that is situated in the geniculate nucleus of the facial nerve (Hawood-Nuss et al., 2009).

2.2.5.5 Vascular Ischemia

Swelling around the facial nerve can be caused from ischemia, infections, inflammatory diseases or mass lesions which lead to consequential compression within the bony confines of the facial nerve, as it departs the skull. The result of pressure and ischemia (because of continual decreasing blood flow from the vasa nervorum) are blocking of the transmission of neural signals, or damage to the facial nerve (Sarhan et al., 2012). The pathogenesis of the paralysis can be a viral neuropathy alone or ischaemic neuropathy due to a viral infection, although acute paralysis can happen during many viral illnesses like mumps, rubella, herpes simplex and Epstein-Barr virus (Greco et al., 2012).

2.2.6 Pathophysiology and etiology of facial palsy

From the point that facial palsy is considered to cause weakness or paralysis in the face due to unknown causes, it is critical to exclude other reasons for facial paralysis. It is essential to have done a thorough evaluation as it would impact on the choice of management of the disease (Garg et al., 2012). It is proposed that facial palsy occurs due to oedema around and inflammation in the facial nerve (7th cranial
nerve). The consequences of persistent compression (pressure and oedema) obstruct conduction of neural signals (Sarhan et al., 2012).

The reason for the inflammation is still unknown, although some theories suggest viral infections. Sanchez-Chapul, Cadena and Caprera (2011) reported on the role of diabetes mellitus, hypertension, vascular disorders, viral infection and inflammation as causes of facial palsy. The correlation between cases of facial palsy and nerve ischemia has been recognised due to the increased prevalence of the disease in elderly people and patients with diabetes (Sarhan et al., 2012). Magnetic Resonance Investigation (MRI) of the affected nerve shows impaired density located next to geniculate ganglion which affects sensory, motor and parasympathetic fibers, as it shows in the Figure 2.3 below (Sarhan et al., 2012).

Figure (2.3): Facial Nerve Anatomy (Liu et al. 2009)
2.2.7 Diagnosis of facial palsy

It is well known that central nervous system diseases, including tumors and multiple sclerosis, present with similar symptoms as paralysis due to facial palsy (Greco et al., 2012). According to Sarhan et al. (2012) additional special tests, apart from the immediate and past medical history and physical assessment of the patient could be necessary, especially in the case of delayed recovery. The aim of these tests are to assess the patient for infections, ischemia and other infections, ischemia and inflammation illnesses (Sarhan et al., 2012).

MRI and computer tomography (CT) scanning is suggested and done if there is no improvement in the facial nerve palsy after one month from the injury. In addition, if the patient presents with signs of loss of hearing and loss of sensation (Garg et al., 2012), a hearing test is indicated to rule out acoustic neuroma (Greco et al., 2013). Laboratory assessments are an effective way for diagnosis of facial palsy in patients who have not improved after four weeks from the onset of the facial paralysis or for patients who had an association with other systemic diseases (Garg et al., 2012). Tests include a fasting glucose test to exclude diabetes mellitus (Sarhan et al., 2012); a complete blood count to exclude a case of suspected lymphoreticular malignancy (Garg et al., 2012); serum calcium and angiotensin converting enzyme where increased levels is an indication of sarcoidosis; and cerebral spinal fluid to determine neoplastic and inflammation diseases. Electroneurography should also be obtained after three days from the onset as it assists to define the degree of facial nerve injury as well as help predict the outcomes of the treatment (Sarhan et al., 2012).

2.2.8 Evaluation of Facial palsy

Medical assessment for Facial palsy is considered to be the main factor for evaluating the severity of the facial palsy and predict signs of impairments (Garg et al., 2012). The assessment aims to measure the result of Facial palsy by evaluating the following factors: synkinesis, facial regularity, muscle rigidity, labial movement,
mental, social and physical effects regarding facial palsy incidence (Pereira et al., 2011). A variety of tools are available to use during the evaluation.

### 2.2.8.1 The Modified House-Brackmann scale

One of the most common methods for evaluating facial nerve injuries was adapted by House and Brackmann in 1985 and is used worldwide. This clinical tool is used to document the degree of facial paralysis and to predict probability of recovery. It assesses gross facial features and symmetry, both at rest and during movement or motion. The grading range from 1 to 6, with the latter being total paralysis, as illustrated in Table 2.1 below.

**Table (2.1) The Modified House-Brackmann scale (Brackmann, 1985)**

<table>
<thead>
<tr>
<th>Description</th>
<th>Function percentage</th>
<th>Category</th>
<th>Degree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal facial movement</td>
<td>100</td>
<td>Normal</td>
<td>1</td>
</tr>
<tr>
<td>Slight irregularity consist of small synkinesis</td>
<td>76 – 99</td>
<td>Mild</td>
<td>2</td>
</tr>
<tr>
<td>Symmetry at relax but deformity at motion</td>
<td>51 – 75</td>
<td>Moderate</td>
<td>3</td>
</tr>
<tr>
<td>Symmetry in the relax position, motion deformity when conduct facial movement, weakness in the eye and forehead movement</td>
<td>26 – 50</td>
<td>Moderately severe</td>
<td>4</td>
</tr>
<tr>
<td>Asymmetry at relax with fall of mouth corner with missing of nasal labial fold minimum facial movement at motion</td>
<td>1 - 25</td>
<td>Severe</td>
<td>5</td>
</tr>
<tr>
<td>Lacking any signs of movement</td>
<td>0</td>
<td>Complete paralysis</td>
<td>6</td>
</tr>
</tbody>
</table>

### 2.2.8.2 The Linear measurement index

Developed by Burres and Fisch, the Liner index has a similar function as the modified House-Brackmann scale. It is employed to evaluate facial muscle regulation and overall muscle motion using a quantitative approach. The total score that can be obtained is 100 points with a higher score indicating less impairment and handicap (Pereira et al., 2011).
2.2.8.3 The Facial Disability Index (FDI)

This tool, developed by Van Swearingen and Brach, is used to determine the physical and social features of patients with Facial palsy. This questionnaire includes ten questions related to the physical function and social well-being of the patients. The scale has a score of 0 - 200, with a higher score indicating minimum deformity and less difficulty with tasks (Pereira et al., 2011).

2.2.8.4 Five Point Scale

The Five Point Scale measures the abnormal movements of facial and muscles rigidity, by recording the degree of patients muscle's rigidity on a scale of one to five, with a higher score indicating a high level of facial muscle rigidity (Pereira et al., 2011).

2.2.8.5 Sunnybrook Facial Grading System

This scale comprises of three sections of abnormal facial movements which include: symmetry at relaxation position, ranging from 0 - 4 with a higher score indicating better symmetry; symmetry of controlled motion ranging between 0 – 5 with a higher score indicating better symmetry. The last part of this scale measures synkinesis ranging between 0 - 3 with a higher score indicating an increased prevalence of synkinesis (Pereira et al., 2011).

2.2.9 Prognosis of the disease

According to Murthy and Saxena (2011), approximately 71% of clients with facial palsy achieve full motor function spontaneously within six months from the onset without any kind of intervention. There are many possible reasons for a delayed healing process, including hypertension, diabetes mellitus, aging and full facial paresis. However, patients who have partial improvement in symptoms may face further complications such as muscle contracture, synkinesis, post-paralytic hemi-facial seizures, sweat during eating and physical actions (Murthy & Saxena, 2011).
2.2.10 Management of facial palsy

Because the exact cause of Facial palsy is still unknown, the disease has no prevention of cure (Shannon & Meadows, 2003). Attempts at management are thus geared towards reducing inflammation to the facial nerve and the prevention of corneal complications (Runge & Greganti, 2009). The preferred management of Facial palsy includes groups of treatments such as medication treatment, physiotherapy for retraining facial neuromuscular and surgical interference (Mehta, 2009).

2.2.10.1 Pharmacological management

Medication is usually prescribed in the acute phase of Facial palsy to assist with maximal restoration of function and to avoid any future problems (Murthy & Saxena, 2011). However, the preferred and optimal medical treatment for the disease are still deliberated, with several randomised control trials (RCTs) showing mixed results (Zandian et al., 2014).

A. Corticosteroids

For many years surgeons that performed nerve decompression surgery observed oedema and inflammation around the facial nerve, while a MRI also confirmed swelling in the area of the nerve. It was concluded that inflammation plays in major role in the development of Facial palsy (Quant et al., 2009). Because of this evidence, corticosteroids have shown to have an anti-inflammatory effect that helps in decreasing chances of nerve damage as well as enhance nerve improvements, at the same time it consequently results in easing facial nerve compression when surgery is indicated (Murthy & Saxna, 2011).

Prednisolone is considered the most common type of corticosteroids prescribed for patients with facial palsy in a period of 72 hours from the onset, with a recommended dosage of 60mg for five days. The role of prednisolone in patients with facial palsy was determined by its capability of declining inflammation and swelling of facial nerve, assisting with the recovery process of the patient (De Almeida et al., 2009). The finding corroborated with a Cochrane review by Salinas et
al. (2010) where patients that received corticosteroids had better recovery of facial motor function at six months as well as a significant reduction in motor synkinesis compared to their counterparts.

B. Anti-viral medication

Anti-viral medication such as Acyclovir, are indicated for treatment of patients with Facial palsy when suspected that client affected by Herpes Simplex Virus (HSV) (Greco et al., 2012). However, its effectiveness has been disputed based on recent studies. A Cochrane systematic review conducted in 2009 concluded that anti-herpetic antivirals provide no significant benefit when compared with the placebo in generating complete recovery from the disease (Lockhart et al., 2009).

The effect of anti-viral drugs includes the restriction of viral DNA polymerase which results in a declined viral DNA synthesis. Furthermore, there has been some disagreement among health care professionals about the efficacy of steroids (Prednisolone), anti-viral medication (Acyclovir) or a combination of both on the recovery of clients with facial palsy. According to Sarhan et al. (2012) the combination of anti-viral medication and steroids does not provide strong evidence of achieving better recovery of the facial muscle paralysis compared to steroids alone. This result is in contrast to a network meta-analysis of six studies who found that a combination of corticosteroids and anti-virals had a marginal benefit over corticosteroids alone (Numthavaj et al., 2011). Since the finding was not statistical significant, the authors concluded that prednisone remains the single best evidence-based treatment for Facial palsy.

2.2.10.2 Non-pharmacological management

A. Physiotherapy

According to Manikandan (2007), physiotherapy plays an important role in the rehabilitation of clients with facial palsy. It has been used extensively as treatment for facial palsy since 1927. Several modalities are appropriate for the treatment of Facial palsy, including heat therapy, electro stimulation, therapeutic exercises, acupuncture and laser therapy. The benefits of using physiotherapy can be
summarised as follows: it assists with decrease in pain, enhances muscle contraction, develops facial symmetry, and prevents the development of complications (Finsterer, 2008).

A study conducted by Nicastri et al. (2013) showed that physiotherapy has an important impact on the severe degrees of Facial palsy, especially when applied in the early stages of the disease (Shafshak, 2006). The time of the session depends on the severity of the patient’s symptoms (Finsterer, 2008). The different modalities will be discussed below.

I. Short wave diathermy

Short wave diathermy (SWD) is a method of thermotherapy that is used to treat patients with Facial palsy. Ochs (2002) don’t recommend the use of continuous SWD due to the possible viral infection causing the disease, so the application of deep heat on a swollen, inflammed nerve may worsen the condition and hamper the recovery process. On the other hand, the author stated that the use of pulsed SWD can be beneficial and support the recovery process.

II. Electro-stimulation

The injury of a nerve is categorised depending on the specific nerve elements involved, lack of functionality, and capability to cure naturally.

III. Biofeedback

Facial neuromuscular re-education can be depicted as a traditional facial treatment. The purpose of this technique is to improve symmetrical facial function and prevent or reduce eating difficulties (Manikandan, 2007). Biofeedback training in front of a mirror helps to avoid synkinesis (Shafshak, 2006), a condition defined as "abnormal involuntary facial movement that occurs with voluntary movement of different facial muscles groups" (Husseman & Mehta, 2008, pg. 242).

This technique assists to maintain facial balance and functional improvement, particularly in clients with signs of reinnervation of facial muscles. According to
Elliot (2006), EMG is believed to be an influential method for muscle reconstruction during facial disfigurement. However, if biofeedback is not available, patients could just exercise in front of a mirror in order to assist imaging patterns for facial feedback. The facial exercises are done repetitively for a period of time with the aim of this approach to stimulate muscles in the affected side of the face that will inhibit modals of synkinesis. This way of doing exercise has proven positive outcomes regarding prevention or a decline in the development of synkinesis (Elliot, 2006).

IV. Exercise therapy

The role of exercise therapy is described in a study conducted by Pereira, et al., (2011). It is an effective approach for treating patients with Facial palsy. The benefits of this type of therapy are twofold: maintaining muscle function and enhancing total oxygen distribution to the affected muscle tissue in order to stimulate facial improvement. Exercise can be done at home and is therefore low cost. Therapeutic exercise can be also done under the supervision of a physiotherapist.

The authors proposed that the exercises should involve various groups of facial muscles. In addition, it should be conducted consistently to avoid muscle vertigo. A few examples of exercise are: moving eyebrows together and descending like in scowling; lifting eyebrows like in being shocked; shut eyes softly and after that, strongly; smile; shut mouth after that; press lips together; wrinkle lips; try to hiss; smile unaccompanied by teeth then smile showing teeth; crimp superior lip above and lift; emerge superior lip; attempt shifting lips into a little smile quietly; and wrinkle the forehead.

V. Kabat rehabilitation

Harmony, coordination and optimal strength are the main strategies applied in the Kabat technique for patients with Facial palsy (Barbara et al., 2010). The Kabat technique can be described as a method using stimulant voluntary movements of weak muscles. It is one of the motor control rehabilitation approaches resting on proprioceptive neuromuscular facilitation (PNF). The results depend on the correlation between diagonal lines and the sagittal axis of the body.
During the application of the Kabat technique, a quick stretch is followed by light resistance of movement through the full available range of the muscle. It is important before starting this technique to use ice to stimulate the facial muscles to enhance contractile power. Three areas of the face should be focused on when applying Kabat to clients with Facial palsy, namely the top area (forehead and eyes), intermediate area (nose), and lower area (mouth) (Shafshak, 2006). According to Barbara et al., (2010) the Kabat approach can help accelerate patient's healing and achieve the best kind of improvement when applied in the early phase of the disease.

VI. Ultrasound

Ultrasound (US) may improve patient outcomes, especially when applied in the early stage of the weakness, before deterioration of the affected nerve sets in. US are applied to the mastoid muscle, the area around the ear (Shafshak, 2006). Although there are controversial discussions about its use due to chances of disruptions in the cranium that could result in coagulation of the blood (Alayat et al., 2014), Diels (2000) proved the discussions incorrect. US remains one of the preferred modalities for the management of facial palsy as it enhance blood flow to the affected muscles and assist in the reduction of inflammation and oedema.

VII. Laser therapy

According to studies conducted by Alayat et al. (2014), laser therapy is considered one of the many treatment modalities for facial palsy. It can help to treat patients by using non-persistent and pointless approaches of lasers, applications also more suitable for patients with diabetes mellitus and hypertension. As the use of corticosteroids is not recommended for patients with diabetes and hypertension, laser therapy has an important role to play in assisting with regeneration of peripheral nerves in neuro-motor or neuro-sensory nerve injuries.

Two types of laser therapy are available, namely high intensity laser therapy (HILT) and low level laser therapy (LLLT). Due to modern improvements in laser modalities it has been suggested that high intensity pulsed neodymium yttrium
aluminum garnet (ND-YAG laser) are used as renewal treatment because of its ability to decrease pain and inflammation (Alayat et al., 2014).

B. Complementary therapy

According to Haltiwanger et al. (2009), 7% of patients with facial palsy experience constant deterioration in symptoms, despite the use of medication. Some specialist recently introduced the use of alternative modalities such as acupuncture, aromatherapy and reflexology. The purpose of utilising complementary therapy is to reinstate sensory and motor facial muscle function and to maintain the ability of muscle movement. The relaxation that accompanies some of the complementary therapy also assists with decreasing the state of depression that may arise due to the chronic nature of the disease.

I. Acupuncture

Despite the advocacy of its use by some researchers, acupuncture has not been proven to have any effect on the recovery process of Facial palsy (Chen et al., 2010). A recent RCT conducted in 2013 by Xu et al., however reported better 6-month outcome in patients undergoing acupuncture in combination with corticosteroids. Acupuncture is defined by Chen et al. (2010) as a type of traditional Chinese medicine that consists of the application of needles into certain points of the body, the acu-points, which assist to increase the sufficient flow of vital energy over the body.

Chen et al. (2010) suggested that better results were found in the treatment of Facial palsy when a combination of physical therapy, acupuncture and medication are included in the management protocol of a patient.

Traditional Chinese medicine identified 365 acu-points on the human body. According to Kwon et al. (2011) traditional Chinese medicine build on balancing an individual’s energy system, an aspect of medicine which is not looked at in Western medicine. The obstruction of causes a disease like Facial palsy due to restriction of blood supply. Therefore by inserting very thin needles at points over energy passages (meridian) could increase the flow of blood and bring back the balance. Chen et al. (2010) suggested that better results were found in the treatment of Facial palsy when a combination of physical therapy, acupuncture and medication are included in the management protocol of a patient.
II. Aromatherapy

According to Haltiwanger et al. (2009) aromatherapy is known as the art of science that employs essential oils as treatments of choice. Essential oils have the power to increase the body’s ability to cure by facilitating the immune system, endocrine system, nervous system and psychological aspects of a person. The aim is to decrease swelling in the face by using essential oils on the affected area, combined with infrared and massage. The benefit of using heat is to assist the face in absorbing essential oils into the skin cells in the specific area. In addition, this intervention aims to reinstate facial function and speed up the recovery process as well as decrease inflammation and compression of facial nerves (Haltiwanger et al., 2009).

C. Surgery

Literature shows no consensus on the benefit of surgery in the treatment of Facial palsy due to the risks associated with an operation (McAllister, Walker, Donnan & Swan, 2011). Risks include seizures, unilateral hearing loss, and CSF leak. Although there is controversial discussion regarding surgical procedures for Facial palsy, there is little evidence related to facial nerve decompression operations for patient in the acute stage of the disease (Shafshak, 2006). Patients with Facial palsy with poor electro-neurography readings who also underwent nerve decompression, had a much better outcome compared with those who did not receive surgery (McAllister et al., 2011).

According to Sarhan et al. (2012) some studies suggested that surgery may be beneficial in the cases of facial nerve deterioration, especially if the degree of nerve degeneration is more than 90%. Another study argued that surgery is not indicated unless the deterioration is 100% (Shafshak, 2006).

There are different kinds of surgeries available for patients with Facial palsy, namely facial nerve decompression, subocularis oculus fat lift, tarsorrhaphy, implantable devices, facial nerve grafting and direct brow lift. Facial reconstructive surgery is indicated for severe degree of nerve compression. It only assists with facial symmetry, not with the re-establishment of normal motion and natural
appearance of the face. On the other hand, practices like transposition of nerves and muscles may progress muscle functions and also improve facial appearance.

D. Eye care

Protecting the cornea from excessive dryness and abrasions should be through education of the patient (Lee, Currie & Collin, 2004). Damage to the eye is considered to be one of the major threats that patient are faced with. Eye injury can be treated by using artificial tears which protect the eye from dryness, a side effect from paralysis of the orbicularis oculi muscle (improper closure of the eye lid). The most important goal of eye care is to make sure of corneal preservation in both short and long term, as well as taking conservative strategies which consist of using eye patches and the use of lubrication drops during the day and eye ointment at night (Murthy & Saxena, 2011).

Ophthalmologist has an influential impact on recognising potential eye problems and rehabilitating patients. At the same time, some ophthalmologists recommend that patients wear sunglasses to defend their eyes from the air, sand and daylight. However, in the case of delayed spontaneous eye closure patients may need an operation. Surgical intervention includes lateral canthoplasty, tarsorrhaphy as well as inserting gold weight to the upper lid (Shafshak, 2006).

E. Botox

According to Diels (2000), Botox was applied in the 1970’s to a hypertonic eyelid of a patient with Facial palsy in order to relax the muscles to allow the eye to close properly. Since then, it has been used for many complications associated with Facial palsy, including contractures of neck, face, and eyelid muscles. If Botox is injected into the eyelid muscle it may reduce muscle synkinesis. A small measure of Botox is inserted into the muscles with a tiny sized needle, which starts to take effect within 24-72 hours after therapy. Total impact reinforcement through duration of time generally begins after a couple of months.
Botox is considered a non-permanent treatment which acts for 3-6 months whereafter the injection must be repeated (Diels, 2000). Unfortunately, there are also known side effects to this treatment, namely permanent powerlessness or an unpleasant feeling in eyelids, a decline in eyelid movement, unfocused seeing, double sight, difficulty in shutting eyes, drop of the mouth, fall of the brow, and intemperate tearing.

2.2.11 Residual effects of facial palsy

Residual effect happens in the situation of delayed improvement after three months of onset of the disease. Residual markers include incomplete motor recovery, synkinesis, hemi-facial convulsion, contractures, salivation and lacrimation modification. The effect of these markers could negatively impact on the life standards of patients due to its influential role in the psychological and emotional aspects (Nicastri et al., 2013). Other complications include impairments of the eye such as a decline or rising of the lid shutting, dehydration/over-watering of the eye, a runny or dry nose as well as problems with eating, drinking or speaking (Diels, 2000).

2.2.12 Previous studies

A study of (Jamil et al., 2013): “Seasonal Incidence of Facial Palsy In Al-Jouf Region”

The man aim of this study is to evaluate the influence of different seasons on the occurrence of Facial palsy. This prospective study was conducted in the Central Hospital of the northern area, Al-Jouf, Kingdom of Saudi Arabia. The facial appearance of Facial palsy patients was assessed in four standard poses: at rest, with a smile, with raised eyebrows, and with eyes tightly closed. Four hundred and three cases (males 211, females 192) of Facial palsy between 10 to 60 years of age between January 2011 to December 2012 were included in the study.
Patient distribution patterns by season and age groups were recorded. The results of this study showed that there were 52.4% males and 47.6% females. 23.3% were aged 10-20 years, 23.6% were aged 21-30 years, and 20.9% between 31-40 years, 15.1% between 41-50 years and 17.1% were above 51 years of age. Facial palsy was more (27.8%) during the autumn season followed by winter season (26.3%) in the two sexes, whereas both summer (23.1%) and spring seasons (22.8%) had nearly the same pattern.

A Study of (Narci et al., 2012): “Seasonal Effects on Facial Palsy: Four-Year Study and Review of the Literature”

In this retrospective study, all cases documented have been reviewed in the archive of the hospital during the period from January 1, 2007, until December 31, 2010. Patient distribution patterns by season, month and age groups were recorded.

A Total 634 facial paralysis patients visits were established during the study period and 533 (84%) of them were diagnosed as facial palsy. The mean age of the facial palsy patients was 55 ± 24.7 years. 51.40% of all patients were males and 48.59% were females. The cases determined as facial palsy, 105 (19.69%) were aged 30-39 years, 83 (15.57%) cases were aged 20-29 years, 50 (9.38%) 70-79 years, 12 (2.25%) 80-89 years and 2 (0.37%) 0-9 years.

Facial palsy was most common in the 30-39 age group and this was also statistically significant (P < 0.01) (range 9-89). The months with the greatest facial palsy were May (n = 59, 11.06%), March (n = 54, 10.13%), April (n = 51, 9.56%) September (n = 50, 9.38%). July (n = 34, 6.38%), December (n = 34, 6.38%) January (n = 35, 6.56%) and November (n = 36, 6.75%) had the lowest facial palsy (P > 0.01) (range 34-59). Numbers of admitted patients with facial palsy at seasons were winter (n = 115, 21.57%), Spring (n = 169, 31.70%), summer (n = 121, 22.70%) and fall (n = 133, 24.95%). The peak ratio of facial palsy according to season was in spring and nadir was in winter (p = 0.002).
A Study of (Danielides et al., 2001): “Weather conditions and Facial palsy: five-year study and review of the literature”

In this study, the researchers have evaluated the influence of meteorological parameters, such as temperature, humidity, and atmospheric pressure, and their variation and covariation on the incidence of facial palsy and present a review of the literature on the effect of meteorological conditions on facial nerve function.

A total of 171 cases of FP admitted to hospital over a five-year period were studied. The meteorological database included daily values of 13 distinct parameters recorded at the meteorological station of the University of Ioannina during this period. A relationship between each meteorological variable and the incidence of FP was investigated by applying chi-square test on data from 13 contingency tables. In addition, the influence of different weather types on the incidence of FP was also investigated.

The results of this study showed that there was no significant correlation found either between FP and each distinct meteorological parameter or between FP and any specific weather.

A Study of (Chpaul et al., 2011) “Longitudinal, descriptive, and observational analysis of prognosis factors for recovery in Mexican patients”

The main objective of this study is to determine the prognosis factors in Mexican patients with Facial palsy. The study adopted prospective, longitudinal, descriptive, and observational analysis. Two hundred and fifty one patients diagnosed with Facial palsy at the National Institute of Rehabilitation were included. The study showed that 39% of patients had a complete recovery and 41.5% had an incomplete recovery. Marital status, gender, etiology, symptoms, sidedness, House-Brackmann grade, and treatments did not represent significant prognostic factors for recovery. The study concluded that the proportion of cases with incomplete recovery was high. The age > 40 years and lack of physical therapy were the only significant prognostic factors for an incomplete recovery.
A study of (Monini et al., 2010) “Epidemiology of Facial palsy in an Italian Health District: incidence and case-control study”

The main aim of this study is to estimate the incidence of Facial in a health district of a major Italian city, taking also into consideration the potential risk factors that might influence the occurrence of Facial palsy. A matched case-control was therefore designed, by collecting data from the Emergency Departments of four Hospitals belonging to the same Health District in Rome (Italy), coordinated by a tertiary referral centre University Hospital.

All patients affected by Facial palsy within the health district and four controls for each case were included. Controls were selected from other ENT patients, and were matched for hospital admission, week of disease onset, and climate conditions. Information regarding possible risk factors was collected using standardized telephone interviews.

The study group comprised 381 patients with acute, unilateral, peripheral facial palsy, clinically diagnosed as Facial palsy observed between 1st January 2006 and 31st December 2008. The cumulative incidence of Facial palsy was found to be 53.3/100,000/year. Among the risk factors, age was found to influence onset of Facial palsy, with an odds ratio of 2% for each one-year increase in age, with a linear trend (95% CI = 1-3%; p = 0.005). Facial palsy was found to occur with an annual incidence close to previous reports. Among the possible known risk factors (diabetes, pregnancy, etc.), only aging was found to play a significant role.


In this study, the researchers have used a centralized surveillance system that contains demographic, military assignment, and medical encounter data of united states (US) military service members, the authors researchers rates, trends, and demographic correlates of risk of Facial palsy during a 2-year period.
From October 1997 to September 1999, there were 1,181 incident cases of Facial palsy among US service members. The crude incidence rate was 42.77 per 100,000 person-years. Incidence rates increased with age and were higher among females, Blacks, Hispanics, married persons, and enlisted service members. Both climate (adjusted rate ratio for arid vs. nonarid climate = 1.34) and season (adjusted rate ratio for cold vs. warm months = 1.31) were independent predictors of risk of Facial palsy. Latitude was not a statistically significant predictor when demographic, climate, and season effects were taken into account. The results are consistent with hypotheses regarding viral etiologies (e.g., reactivation of herpes simplex) of facial palsy.
Chapter 3
Materials and Methods
Chapter 3  
Materials and Methods

This chapter presents study methodology, which include the study design, study population, sample of the study, sitting of the study, inclusion criteria, study instrument and data collection, validity and reliability, pilot study, ethical consideration and data entry and statistical analyses.

3.1 Study design

The design of this study is a quantitative descriptive, analytical cross-sectional. This type of design is useful for describing the study construct. This design was chosen because it is suitable in terms of people, resources and it is relatively practical and manageable. Moreover, it is less expensive and enables the researcher to meet the study objectives in a short time.

3.2 Study population

The population of the study is the patients who are suffering from facial palsy in the main physical therapy departments in Gaza governorates including North Gaza, Gaza, middle area, Khanyounis and Rafah. Hospitals include: 1) Indonesian hospital in the northern GS, 2) Shuhada’ Al-Sheikh Radwan clinic, 3) Shifa Medical Complex, 4) Aqsa Martyrs hospital, 5) Nasser Medical Complex, 6) European Gaza hospital, 7) Abu Yousef Al Najjar Martyr hospital, and 8) Medical rehabilitation department from Alamal hospital in Palestine Red Crescent Society (PRCS).

3.3 Sample of the study

The sample of this study consisted of all patients with facial palsy at the main hospitals in Gaza governorates, the total number of selected sample was 146 patients. Sampling method which is used in this study is convenience sampling because all patients were included at the time of data collection.
3.4 Period of the study

The study was conducted during the period from January to December 2016.

3.5 Setting of the study

The study was carried out in physical therapy departments at selected governmental hospitals, governmental primary health care clinics and private sector including 1) Indonesian hospital in the northern GS, 2) Shuhada' Al-Sheikh Radwan Clinic, 3) Shifa Medical Complex, 4) Aqsa Martyrs hospital, 5) Nasser Medical Complex, 6) European Gaza hospital, 7) Abu Yousef Al Najjar Martyr hospital, and 8) Medical rehabilitation department from Alamal hospital in Palestine Red Crescent Society.

3.6 Inclusion criteria

- Confirmed diagnosed with facial palsy by medical doctor
- All ages
- Agree to participate in this study

3.7 Exclusion criteria

- Not interested to participate in this study

3.8 Study instrument

A structured interview questionnaire design by the researchers after reviewing the related previous studies and with co-operation with neurologists consultants and consultants physiotherapists. The questionnaire had been distributed in Arabic language to be easily understood by the respondents. The questionnaire was clear with no complex terms, no jargon, and no leading question.
3.8.1 Questionnaire design

The questionnaire consisted of four sections as follow:

1. The first part covered personal and professional information
2. The second part consisted of patients’ demographic data
3. The third part consisted of questions related to environmental factors
4. The fourth part covered health status information.

3.9 Pilot Study

A pilot study was conducted before starting the actual data collection as a pretest to point out weaknesses in wording, translation to Arabic, predict response rate, determine the real time needed to fill the questionnaire and identify areas of vagueness and to test the validity and suitability of the questionnaire.

A total of 10 participants were chosen from the study target population to conduct the pilot study. There were no changes made within the questionnaire and it is clear, no ambiguity. The sample of pilot study was included within the study sample.

3.10 Validity of the instrument

3.10.1 Face and content validity

The questionnaire was sent to a panel of expert persons (Appendix 4) to assess the clarity and relevance of the questionnaire to the objectives of the study. All comments on the questionnaire were taken in consideration, as a result; some modification was done for some of the items. In addition, a pilot study was conducted before starting the data collection of the questionnaire.

3.11 Ethical considerations

The researcher was committed to all ethical consideration required to conduct a research. Ethical approval was obtained from Hesinki committee (Appendix 3). Also an official approval was obtained from the MoH at Gaza governorates (Appendix 2).
Moreover, approval was obtained from the Islamic university of Gaza (Appendix 1). Ethical consent also was obtained from all patients (appendix 7) and they received a complete explanation about the research purposes and confidentiality.

3.12 Data entry and statistical analyses

Data analysis was conducted using Statistical Package for Social Sciences (SPSS 22) for statistical analysis. The data was gathered and then the instruments reviewed, appropriate entry method, data cleaning then doing frequency tables for all study variables and cross tabulation using Chi-Square test.
Chapter 4

Results and Discussion
Chapter 4
Results and Discussion

4.1 Introduction

This chapter illustrates the results of statistical analysis of the data, including descriptive analysis that presents the socio-demographic characteristics of the study sample and the answers to the questions of the study. The researcher used statistical tests including frequencies, percentages, and Chi-square test.

4.2 Socio-demographic characteristics of the study

4.2.1 Distribution of the study participants according to their age, gender and marital status

Table 4.1 shows the distribution of participant’s characteristics according to their age, gender and marital status. There are 51 (34.9%) of study participants have age between 36 – 65 years and there are 40 (27.9%) have age between 13 – 22 years. Regarding the distribution of study participants according to their gender, more than half (53.4%) of the study participants were females while 46.6% were males. There are 73 (50.0%) of the study participants married, and 64 (43.8%) were single (43.8%), while the divorced participants constitutes only 2.1%.
Table (4.1) Distribution of the study participants according to their age, gender and marital status

<table>
<thead>
<tr>
<th>Categories</th>
<th>Subcategories</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (Years)</td>
<td>Below 26 years</td>
<td>66</td>
<td>45.2</td>
</tr>
<tr>
<td></td>
<td>26 – 39 years</td>
<td>32</td>
<td>21.9</td>
</tr>
<tr>
<td></td>
<td>40 years and more</td>
<td>48</td>
<td>32.9</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>146</td>
<td>100.0</td>
</tr>
<tr>
<td>Gender</td>
<td>Male</td>
<td>68</td>
<td>46.6</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>78</td>
<td>53.4</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>146</td>
<td>100.0</td>
</tr>
<tr>
<td>Marital Status</td>
<td>Single</td>
<td>64</td>
<td>43.8</td>
</tr>
<tr>
<td></td>
<td>Married</td>
<td>73</td>
<td>50.0</td>
</tr>
<tr>
<td></td>
<td>Divorced</td>
<td>3</td>
<td>2.1</td>
</tr>
<tr>
<td></td>
<td>Widow/er</td>
<td>6</td>
<td>4.1</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>146</td>
<td>100.0</td>
</tr>
</tbody>
</table>

4.2.2 Distribution of the study participants according to the number of family members, level of education and residency

Table 4.2 shows that 46 (31.5%) of the study participants are living in Gaza city, 42 (28.8%) are living in Khan Younis city, while 30 (20.5%) of them are living in the North area of Gaza strip. Regarding the educational status of study participants; 62 (42.5%) of of study participants have a university degree education while 63 (43.10%) of them have secondery school or less.

Regarding the distribution of the study participants according to the number of family members inside home, the table shows that more than half (52.7%) of study participants are living within a family of 7 - 10 family members and 40 (27.4%) are living within a family of less than 7 family members
Table (4.2) Distribution of the study participants according to the number of family members, level of education and residency

<table>
<thead>
<tr>
<th>Categories</th>
<th>Subcategories</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Family Members</strong></td>
<td>Below 7</td>
<td>40</td>
<td>27.4</td>
</tr>
<tr>
<td></td>
<td>7 – 10</td>
<td>77</td>
<td>52.7</td>
</tr>
<tr>
<td></td>
<td>More than 10</td>
<td>29</td>
<td>19.9</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>146</td>
<td>100.0</td>
</tr>
<tr>
<td><strong>Level of education</strong></td>
<td>Illiterate</td>
<td>21</td>
<td>14.40</td>
</tr>
<tr>
<td></td>
<td>Secondey school and below</td>
<td>63</td>
<td>43.10</td>
</tr>
<tr>
<td></td>
<td>University Degree</td>
<td>62</td>
<td>42.50</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>146</td>
<td>100.0</td>
</tr>
<tr>
<td><strong>Residency</strong></td>
<td>North Zone</td>
<td>30</td>
<td>20.5</td>
</tr>
<tr>
<td></td>
<td>Gaza</td>
<td>46</td>
<td>31.5</td>
</tr>
<tr>
<td></td>
<td>Middle Zone</td>
<td>9</td>
<td>6.2</td>
</tr>
<tr>
<td></td>
<td>Khan Younis</td>
<td>42</td>
<td>28.8</td>
</tr>
<tr>
<td></td>
<td>Rafah</td>
<td>19</td>
<td>13.0</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>146</td>
<td>100.0</td>
</tr>
</tbody>
</table>

4.3 Facial palsy characteristics among patients in Gaza governorates

Figures (4.1), (4.2) and (4.3) show the distribution of facial palsy characteristics (side, hereditary and onset) among patients in Gaza governorates. The figures show that 87 (59.6%) of patients have right side facial palsy while 59 (40.4%) of them have left side. The figures also shows that 24 (16.4%) of patients have a history of facial palsy and there are 80 (60.3%) have sudden and rapid onset of facial palsy.
Figure (4.1) Facial Palsy Side among Patients at Gaza Governorates

Figure (4.2) Hereditary History of Facial Palsy
In the present study researcher found that facial palsy affected the right side more than left side, and both side were rare, this results was contrary of finding of other studies which was done by Pham et al. (2012) and Murthy & Saxena (2011) which revealed that the right and left facial nerves are equally involved. Also the study reasults is not consistent with the results of Tallawy (2015), Katz et al. (2011), Chapul et al. (2011), which revealed that the left side facial palsy was occurred more than the right side.

On the other hand, the study results is consistant with the results of Lamina and Hanif (2012) which revealed that the right sided facial palsy was predominant, other study found that there was no predilection for either side of the face (Rowlands et al., 2002).

The results of Qin (2009) revealed that facial palsy has been documented in a few with very strong family history, and only 10% of affected individuals report a positive family history of similar symptoms. Some studies found a positive family history of facial palsy (May and Schaitkin, 2000 and Peitersen, 2002). Genetics may play an important role since different authors agree with the fact that facial palsy transmits with an autosomal dominant inheritance pattern; however, which factors are actually inherited remains unknown (Clement and White, 2000).
Our findings revealed that the sudden and rapid onset of facial palsy is more than gradual onset, this finding come in accordance with earlier study done by Dariush (2008) and Hamdy et al., (2015) which revealed that facial palsy is a relatively common disease characterized by the sudden and acute onset of unilateral facial paralysis. Also this results is consistent with the results of Donald and Gilden (2004) which revealed that the facial palsy found as the most common causes of the abrupt onset of unilateral facial weakness, also this results is supported with the review done by Arif Khan et al. (2011) which revealed that the weakness is often sudden in onset and evolves rapidly, with maximal facial weakness developing within two days.

4.4 Seasonal pattern of facial palsy among patients in Gaza goovernorates

Table 4.3 shows the distribution of patients with facial palsy based on seasonal incidence and day time observed. The table shows that the majority (89.0%) of patients with facial palsy were in winter season and there were only 7 (4.8%) of patients were affected in autumn. Moreover, the table shows that 64 (43.8%) of patients were affected during the morning, 51 (34.9%) were affected during the night time while 31 (21.2%) were happened during afternoon.

The effect of climate on facial palsy onset has been in the majority of studies, investigated through the effect of minimum and maximum temperatures in the hottest and coldest seasons. Our findings showed that the most common incidence time for facial palsy was in winter time and autumn season, this result come in accordance with the results of the study done by Chapul et al., (2011) who reported that the largest number of cases occurred during the rainy season followed by the cold season, also this study results are consistent with the results of Diego et al., (1999) who reported that the highest number of cases occurred during the cold season.

Moreover, these results are consistent with the results of the study which was done in Iran in which the researchers found that the crude incidence rates were occurred during the colder months of the year, while the crude rates during the warmer months of the year were consistently lower, and found that both climate and
season were found to be significant predictors of facial palsy risk (Dariush and Abedi, 2008).

Another study done in Iraq revealed that the peak incidence of facial palsy occurred during winter months particularly December followed by January, and there is clear decline of the incidence of the condition during hot time especially summer months (Estabrak, 2009). On the other hand, other study reported that facial palsy is a disease without seasonal or gender predilection (Danielides et al., 2001). Experimental findings would support a significant role played by low temperatures, which might be related to a higher incidence of facial palsy in the colder period of the year (De Diego et al., 2005).

Table (4.3): Seasonal pattern of facial palsy among patients in Gaza governorates

<table>
<thead>
<tr>
<th>Categories</th>
<th>Subcategories</th>
<th>Number of patients</th>
<th>% of patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Season</td>
<td>Winter</td>
<td>130</td>
<td>89.0</td>
</tr>
<tr>
<td></td>
<td>Spring</td>
<td>4</td>
<td>2.7</td>
</tr>
<tr>
<td></td>
<td>Summer</td>
<td>5</td>
<td>3.4</td>
</tr>
<tr>
<td></td>
<td>Autumn</td>
<td>7</td>
<td>4.8</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>146</td>
<td>100.0</td>
</tr>
<tr>
<td>Day time observed</td>
<td>Morning</td>
<td>64</td>
<td>43.8</td>
</tr>
<tr>
<td></td>
<td>Afternoon</td>
<td>31</td>
<td>21.2</td>
</tr>
<tr>
<td></td>
<td>Night</td>
<td>51</td>
<td>34.9</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>146</td>
<td>100.0</td>
</tr>
</tbody>
</table>
4.5 Socio-demographic characteristics of patients with facial palsy in Gaza governorates

Table 4.4 shows the distribution of patients with facial palsy based on their socio-demographic characteristics. The table shows that the nearly half (45.2%) of patients with facial palsy have the age below 26 years old and 32.9% have the age of more than 40 years. The table also shows that more than half (53.4%) of patients are females while 46.6% of them are males.

Moreover, facial palsy tends to be occurred among half (50.0%) of married patients and 43.8% tend to be occurred among single patients. The table also shows that 31.5% of patients with facial palsy are living in Gaza governorate and 28.8% of them are living in Khanyounis. Moreover, the majority (82.9%) of patients with facial palsy are living in a concrete house and 12.3% of patients are living in asbestos.

On the other hand, facial palsy are mostly occurred among patients who are working in open working places (70.5%), while only 24.7% of patients with the condition are working in closed places. Regarding facial palsy and its percentages with monthly income; the table shows that nearly half (47.9%) of patients with the condition have monthly income between 1001 – 1500 shekels and only 21.2% of patients have monthly income more than 2000 shekels.

In the present study, the researcher found that the younger age group is prone to facial palsy more than older adults; this result is consistent with the result of Peitersen (2002) which revealed that the disease is less common among the age of 15. On the other hand, these results was inconsistent with the results revealed by Fahimi et al. (2013) which found that the mean age of onset was between 40-44 years, also this result is consistent with the result of (Lamina and Hanif, 2012) which revealed that the age group 20–34 years had a greater prevalence of facial palsy, other study found that adults are affected more than other age groups (Estabrak, 2009). Other studies also showed that the possibility of facial palsy occurrence
among patients over 60 years of age when diabetes and hypertension are also present (Finsterer, 2008, Morris et al., 2002, Oskouei, 2008).

This study shows that females are affected with facial palsy slightly less than males. These results are consistent with the results of Hamdy et al. (2015) which revealed that the incidence rates of facial palsy among females was less than males in all age groups, other study also found that females were affected more than males (Estabrak, 2009).

On the other hand, this result is not consistent with the result of Chapul et al. (2011) which revealed that the incidence of facial palsy is higher in women than in men. Moreover, the inconsistency was noted in the results revealed by Diego et al. (1999), Rowlands et al. (2002) and (Donald and Gilden, 2004) which showed almost equal frequencies in males and females, and with other study done by in which found that the sexes are affected equally. The consistency and inconsistency of this study results with other previous studies may be attributed to the type of the study design, type of sample chosen and the total number of selected patients.

The researcher found that facial palsy was more prevalent in Gaza and Khanyounis. Our findings come in accordance with earlier study done by Hassoun et al., (2009) which found that the facial palsy was occurring more in urban areas. Also the results of Chapul et al. (2011) revealed that the incidence of facial palsy varies largely in different parts of the world, and diverse geographical areas because these areas have the most population density.
Table (4.4) Socio-demographic characteristics of patients with facial palsy in Gaza governorates

<table>
<thead>
<tr>
<th>Categories</th>
<th>Subcategories</th>
<th>Number of patients</th>
<th>% of patients</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age (Years)</strong></td>
<td>Below 26 years</td>
<td>66</td>
<td>45.2</td>
</tr>
<tr>
<td></td>
<td>26 – 39 years</td>
<td>32</td>
<td>21.9</td>
</tr>
<tr>
<td></td>
<td>40 years and more</td>
<td>48</td>
<td>32.9</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td>146</td>
<td>100.0</td>
</tr>
<tr>
<td><strong>Gender</strong></td>
<td>Male</td>
<td>68</td>
<td>46.6</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>78</td>
<td>53.4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td>146</td>
<td>100.0</td>
</tr>
<tr>
<td><strong>Marital Status</strong></td>
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<td>64</td>
<td>43.8</td>
</tr>
<tr>
<td></td>
<td>Married</td>
<td>73</td>
<td>50.0</td>
</tr>
<tr>
<td></td>
<td>Divorced</td>
<td>3</td>
<td>2.1</td>
</tr>
<tr>
<td></td>
<td>Widow/er</td>
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<td>4.1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td>146</td>
<td>100.0</td>
</tr>
<tr>
<td><strong>Residency</strong></td>
<td>North Zone</td>
<td>30</td>
<td>20.5</td>
</tr>
<tr>
<td></td>
<td>Gaza</td>
<td>46</td>
<td>31.5</td>
</tr>
<tr>
<td></td>
<td>Middle Zone</td>
<td>9</td>
<td>6.2</td>
</tr>
<tr>
<td></td>
<td>Khan Younis</td>
<td>42</td>
<td>28.8</td>
</tr>
<tr>
<td></td>
<td>Rafah</td>
<td>19</td>
<td>13.0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
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<td>100.0</td>
</tr>
<tr>
<td><strong>Employment status</strong></td>
<td>Not working</td>
<td>7</td>
<td>4.8</td>
</tr>
<tr>
<td></td>
<td>In open places</td>
<td>103</td>
<td>70.5</td>
</tr>
<tr>
<td></td>
<td>In closed places</td>
<td>36</td>
<td>24.7</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td>146</td>
<td>100.0</td>
</tr>
<tr>
<td><strong>Monthly income</strong></td>
<td>Less than 1000 Shekels</td>
<td>21</td>
<td>14.4</td>
</tr>
<tr>
<td></td>
<td>1001 – 1500 Shekels</td>
<td>70</td>
<td>47.9</td>
</tr>
<tr>
<td></td>
<td>1501 – 2000 Shekels</td>
<td>24</td>
<td>16.4</td>
</tr>
<tr>
<td></td>
<td>More than 2000 Shekels</td>
<td>31</td>
<td>21.2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td>146</td>
<td>100.0</td>
</tr>
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<td><strong>House Structure</strong></td>
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<td>121</td>
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<td></td>
<td>Asbestos</td>
<td>18</td>
<td>12.3</td>
</tr>
<tr>
<td></td>
<td>Shinko Aluminum</td>
<td>7</td>
<td>4.79</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td>146</td>
<td>100.0</td>
</tr>
</tbody>
</table>
4.6 Health status of patients with facial palsy in Gaza governorates

Table 4.5 shows the distribution of patients with facial palsy based on their health status. The table shows that 19 (13.0%) of female patients with facial palsy are pregnant. The table also shows that 114 (78.1%) of patients have no chronic diseases and there are 20 (13.7%) of patients have diabetes mellitus while 10 (6.8%) of them have hypertension.

Moreover, 135 (92.5%) of patients have had no any head trauma, while 4 (4.79%) have had teeth trauma. Regarding the distribution of patients with regard to viral infection; the table shows that 134 (91.8%) of patients have had no viral infection and there are 8 (5.47%) of patients have herpes and herpes zoster.

On the other hand, 129 (88.4%) and 139 (95.2%) of patients with facial palsy do not have otitis media and allergy respectively.

In our study, 40.4% of female cases have had facial palsy without pregnancy, and 13.0% reported that they have had the incident of the condition during their pregnancy time, studies did not show an increase in the incidence of facial palsy during pregnancy (Vrabec et al., 2007), other study done by Morris et al., 2002 reported that the incidence is higher in pregnant women. On the other hand, many studies reported that pregnancy is considered as a risk factor for having facial palsy (Tiemstra and Khatkhate, 2007; Cano et al., 2013), and that is confirmed in the findings of other studies which revealed that facial palsy has been reported to occur recurrently with each pregnancy, amongst some women (Lakshmaiah, 2012).

However, our results are not consistent with the results of previous studies which revealed that there is association between facial palsy and pregnancy; this may be attributed to the limited number of pregnant cases which were included in this study, al it may be attributed to the type of the sample chosen. The association between pregnancy and facial palsy has been attributed to the high extracellular fluid content, viral inflammation, and immunosuppression characteristic of pregnancy, but findings are controversial (Cohen et al., 2000).
The present study showed that diabetes, hypertension, and middle ear infection were the most common diseases accompanied with facial palsy. Variety of theories have been proposed with regard to its etiology, including diabetes mellitus, hypertension, vascular dysfunction, viral infection, immunological disorders, and inflammation (Billue, 1997).

As it is known that facial palsy etiology is still unclear; however, viral infections, vascular disease, hypertension, pregnancy, and diabetes have been suggested as possible causal agents (Linder et al., 2005, Shmorgun et al., 2002). Risk factors that have been associated with facial palsy, including diabetes (Tiemstra and Khatkhate, 2007, Morris et al., 2002), other studies reported that facial palsy has been linked to a variety of diseases, including multiple sclerosis, sarcoidosis, and infection with Lyme disease, herpes simplex virus and varicella-zoster virus (Chou et al., 2007; Piercy, 2005). It has also been reported that it occurs more frequently in persons with prediabetes or diabetes (Bosco et al., 2011, Tiemstra and Khatkhate, 2007). Moreover, an association with hypertension has also been observed (Oskouei, 2008).

Other studies concluded that several possible causes have been proposed for familial facial palsy and they include: 1) inherited anatomical abnormality; 2) vascular risk factors (e.g., diabetes or glucose intolerance and hypertension; and 3) immunogenetic factors. Of these factors, inherited anatomical abnormality of the facial canal is the most commonly proposed cause for familial facial palsy (Yanagihara et al., 1988).

In some studies, people with diabetes or hypertension, and pregnant women are more susceptible to peripheral facial palsy with worse outcome, but this is not seen in all studies (Gillman et al., 2002, Peitersen, 2002).
Table 4.5 Health status of patients with facial palsy in Gaza governorates

<table>
<thead>
<tr>
<th>Categories</th>
<th>Subcategories</th>
<th>Number of patients</th>
<th>% of patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pregnancy¹</td>
<td>Yes</td>
<td>19</td>
<td>13.0</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>59</td>
<td>40.4</td>
</tr>
<tr>
<td>Chronic diseases</td>
<td>No chronic siseases</td>
<td>114</td>
<td>78.1</td>
</tr>
<tr>
<td></td>
<td>DM</td>
<td>20</td>
<td>13.7</td>
</tr>
<tr>
<td></td>
<td>HTN</td>
<td>10</td>
<td>6.8</td>
</tr>
<tr>
<td></td>
<td>Other diseases</td>
<td>2</td>
<td>1.36</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>146</td>
<td>100.0</td>
</tr>
<tr>
<td>History of head area injury</td>
<td>No</td>
<td>135</td>
<td>92.5</td>
</tr>
<tr>
<td></td>
<td>Jaw and Cheek area</td>
<td>4</td>
<td>2.73</td>
</tr>
<tr>
<td></td>
<td>Teeth</td>
<td>7</td>
<td>4.79</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>146</td>
<td>100.0</td>
</tr>
<tr>
<td>Viral infection</td>
<td>No Viral Infection</td>
<td>134</td>
<td>91.8</td>
</tr>
<tr>
<td></td>
<td>Herpes &amp; Herpes zoster</td>
<td>8</td>
<td>5.47</td>
</tr>
<tr>
<td></td>
<td>Other</td>
<td>4</td>
<td>2.7</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>146</td>
<td>100.0</td>
</tr>
<tr>
<td>Otitis media</td>
<td>No</td>
<td>129</td>
<td>88.4</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>17</td>
<td>11.6</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>146</td>
<td>100.0</td>
</tr>
<tr>
<td>Allergy</td>
<td>No</td>
<td>139</td>
<td>95.2</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>7</td>
<td>4.8</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>146</td>
<td>100.0</td>
</tr>
</tbody>
</table>

4.7 Complications after facial palsy

Table 4.6 shows the complications of facial palsy which were faced by the patients. The table shows that 14 (9.6%) of patients have had irritation and ulceration of the cornea, 33 (22.6%) have had permanent weakness in the eyelid. The table also shows that 72 (49.3%) of patients do not have the ability to close their eyes and 46.6% have had runny tears from the eye.

Table 4.6 shows the association between the onset of facial palsy and its complications. The table shows that there is statistical significant association between the onset of facial palsy and (irritation and ulceration of the cornea, eye

¹ Pregnant cases include only female patients, the total number of male patients is 68
condition and spasms in the face muscles; \(p < 0.05\), while there is no statistical significant association between the onset of facial palsy and (permanent weakness in the eyelid, runny tears from the eye, change in the taste of the food, present of drooling, increasing hearing sounds, pain behind the ear and lack of facial symmetry; \(p > 0.05\)).

**Table (4.6) Association between onset of facial palsy and its complications**

<table>
<thead>
<tr>
<th>Categories</th>
<th>Onset</th>
<th>X(^2) (df)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Suddenly and rapidly</td>
<td>Gradually</td>
<td></td>
</tr>
<tr>
<td>Irritation and Ulceration of the cornea</td>
<td>No</td>
<td>83 (62.9)</td>
<td>49 (37.1)</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>5 (35.7)</td>
<td>9 (64.3)</td>
</tr>
<tr>
<td>Permanent weakness in the eyelid</td>
<td>No</td>
<td>70 (61.9)</td>
<td>43 (38.1)</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>18 (54.5)</td>
<td>15 (45.5)</td>
</tr>
<tr>
<td>Eye condition</td>
<td>Close</td>
<td>38 (51.4)</td>
<td>36 (48.6)</td>
</tr>
<tr>
<td></td>
<td>Does not Close</td>
<td>50 (69.4)</td>
<td>22 (30.6)</td>
</tr>
<tr>
<td>Runny tears from the eye</td>
<td>No</td>
<td>43 (55.1)</td>
<td>35 (44.9)</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>45 (66.2)</td>
<td>23 (33.8)</td>
</tr>
<tr>
<td>Change in the taste of the food</td>
<td>No</td>
<td>33 (51.6)</td>
<td>31 (48.4)</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>55 (67.1)</td>
<td>27 (32.9)</td>
</tr>
<tr>
<td>Present of drooling</td>
<td>No</td>
<td>19 (70.4)</td>
<td>8 (29.6)</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>69 (58.0)</td>
<td>50 (42.0)</td>
</tr>
<tr>
<td>Increasing hearing sounds</td>
<td>No</td>
<td>46 (61.3)</td>
<td>29 (38.7)</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>42 (59.2)</td>
<td>29 (40.8)</td>
</tr>
<tr>
<td>Pain behind the ear</td>
<td>No</td>
<td>60 (62.5)</td>
<td>36 (37.5)</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>28 (56.0)</td>
<td>22 (44.0)</td>
</tr>
<tr>
<td>Spasms in the face muscles</td>
<td>No</td>
<td>64 (67.4)</td>
<td>31 (32.6)</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>24 (47.1)</td>
<td>27 (52.9)</td>
</tr>
<tr>
<td>Lack of facial symmetry</td>
<td>No</td>
<td>36 (75.0)</td>
<td>12 (25.0)</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>52 (53.1)</td>
<td>46 (46.9)</td>
</tr>
</tbody>
</table>

The results of this study show that 9.6% of patients have had irritation and ulceration of the cornea, 22.6% have had permanent weakness in the eyelid. The table also shows that 49.3% of patients do not have the ability to close their eyes and 68 (46.6%) have had runny tears from the eye.
The results of this study also show that there is statistical significant association between the onset of facial palsy and (irritation and ulceration of the cornea, eye condition and spasms in the face muscles), while there is no statistical significant association between the onset of facial palsy and (permanent weakness in the eyelid, runny tears from the eye, change in the taste of the food, present of drooling, increasing hearing sounds, pain behind the ear and lack of facial symmetry).

Some authors are suggesting that about 20-31% of patients with facial palsy not receiving an appropriate treatment, run a higher risk of residual facial muscle weakness with complications, such as synkinesis or hypercontractures that would cause secondary physiological and psychological sequelae (Shafshak, 2009), also other study done by Shafshak (2009) explained the complications as synkinesis, hyperkinesis, and contracture that might cause secondary physiological sequels.

As revealed by the previous studies, the most distressing complications of facial palsy is unilateral facial weakness, denervation of the orbicularis oculi muscle results in inability of the patient to close the eye lids effectively, while denervation of the risorius muscle results in the limited retraction of the angle of mouth. Less common symptoms include decreased production of tears, altered taste, and numbness or pain around the ear (Salinas et al., 2004).

Tallawy (2015) recorded that 75% of cases have ipsilateral facial pain and numbness in 48% and hyperacusis in 21% of cases.

Complications can be troublesome for the patient and have probably been underestimated by clinicians (Smith et al., 1994). When recovery from the palsy is incomplete there are different grades of complications that may become troublesome to the patient, such as synkinesis, hemi-facial spasm, contractures and fasciculations. Peitersen reports that 12% of patients in his study had slight, 13% had moderate, and 4% had severe complications (Peitersen, 2002).
Chapter 5

Conclusion and Recommendations
Chapter 5
Conclusion and Recommendations

5.1 Introduction

This chapter represents the conclusion of findings and results, which were clarified previously from statistical analysis. In addition, this chapter includes recommendations that could contribute in improving the future planning to reduce the risk levels of facial palsy. The following recommendations are proposed for related authority or operator in order to improve the work place conditions, which will lead to reduce the risk levels.

5.2 Conclusions

The study results showed that 87 (59.6%) of patients have right side facial palsy while 59 (40.4) of them have left side. Also there are 80 (60.3%) have sudden and rapid onset of facial palsy.

Regarding facial palsy and seasonal incidence, the results show that the majority (89.0%) of patients with facial palsy were in winter season and there were only 7 (4.8%) of patients were affected in autumn. Moreover, the results showed that 64 (43.8%) of patients were affected during the morning, 51 (34.9%) were affected during the night time while 31 (21.2%) were happened during afternoon.

Moreover, the results showed that 45.2% of patients with facial palsy have the age below 26 years old and 32.9% have the age of more than 40 years. The results also showed that more than half (53.4%) of patients are females while 46.6% of them are males. Facial palsy tends to be occurred among half (50.0%) of married patients and 43.8% tend to be occurred among single patients. The results also showed that 31.5% of patients with facial palsy are living in Gaza governorate and 28.8% of them are living in Khanyounis. Also, the majority (82.9%) of patients with facial palsy are living in a concrete house and 12.3% of patients are living in asbestos.
On the other hand, facial palsy are mostly occurred among patients who are working in open working places (70.5%), while only 24.7% of patients with the condition are working in closed places. Regarding facial palsy and its percentages with monthly income; the results showed that nearly half (47.9%) of patients with the condition have monthly income between 1001 – 1500 shekels and only 21.2% of patients have monthly income more than 2000 shekels.

The results showed that 19 (13.0%) of female patients with facial palsy are pregnant and there were 114 (78.1%) of patients have no chronic diseases and there are 20 (13.7%) of patients have diabetes mellitus, while 10 (6.8%) of them have hypertension.

Moreover, 92.5% of patients with facial palsy have had no any head trauma, while 4.79% have had teeth trauma. Regarding the distribution of patients with regard to viral infection, the results showed that 91.8% of patients have had no viral infection and there are 5.47% of patients have had herpes and herpes zoster.

On the other hand, 129 (88.4%) and 139 (95.2%) of patients with facial palsy do not have otitis media and allergy respectively.

Complications of facial palsy include irritation and ulceration of the cornea, permanent weakness in the eyelid, inability to close the eye and runny tears from the eye. Also, there is statistical significant association between the onset of facial palsy and (irritation and ulceration of the cornea, eye condition and spasms in the face muscles; p < 0.05), while there is no statistical significant association between the onset of facial palsy and (permanent weakness in the eyelid, runny tears from the eye, change in the taste of the food, presence of drooling, increasing hearing sounds, pain behind the ear and lack of facial symmetry; p > 0.05).
5.3 Recommendations

- Patient-specific rehabilitation programmes should be developed for each patient attending the health care facility in order to enhance the recovery process. The rehabilitation team should include a medical doctor, nurse, physiotherapist, speech therapist and psychologist.
- Clients should be educated regarding the preventive measures regarding the risk of facial palsy in the winter season.
- Clients should be empowered to take control of their disease and prevent the development of complications.
- All health professionals should be given all the necessary skills to employ a holistic approach in the management of patients with facial palsy. Staff should be encouraged to update their skills and knowledge through courses, in-service training, workshops and seminars.
- Building a health educational program at primary and secondary health care facilities to prevent or reduce the incidence of facial palsy among populations in Gaza governorates.
- Campaigns (educational talks and workshops) should be offered at the facilities and in the community to make people aware of the disease as well as the management thereof.
5.3.1 Future research

- Future research should employ studies that involve both urban and rural populations as well as patients from the private sector.
- The patients with facial palsy should be evaluated prior to treatment, during the treatment, immediately after the course of treatment and some months after the rehabilitation. Quality of life data is also important to include in all stages of rehabilitation.
- Different combinations of treatment modalities (medication, physiotherapy, complementary therapy) should be examined through randomised control trials.
The Reference List


Pham, V., Young, D., Makishima, T., Quinn, F., Quinn, M. (2012). Facial Palsy. The University of Texas Medical Branch (UTMB Health). Grand Rounds Presentation, Department of Otolaryngology.


Appendix 1: Approval from IUG

The Islamic University - Gaza

Moktib Nabi, the Rector for Research and Postgraduate Studies

Reference: 01/03/2016

Approval from IUG

The topic: Seasonal pattern, Socio-demographic and health status effects on development of facial palsy in Gaza Strip

Dean of Medicine

Approval by:

D. Prof. Salah Abo El-Rouf

The Islamic University - Gaza

R. O. Box 108, Gaza, Palestine

Tel: +970 (8) 286 0700

www.iugaza.edu.ps
Appendix 2: Approval from MoH

State of Palestinian
Ministry of Health

الموضوع: اقتراح لجهانغیری

الميد: فيSTALL الساقطة أبوعيسان

مدير عام بالوزار/الإدارة العامة للقوى البشرية - وزارة الصحة

السلام عليكم ورحمة الله وبركاته...

نقوم بتسليم مهمة البحث/عمل عند القاضي القرا

التفاصيل:

نقوم بتسليم مهمة البحث/عمل عند القاضي القرا

تلقى البحث بنجاح

نقوم بتسليم مهمة البحث/عمل عند القاضي القرا

أحب أن أوجهكم أن المشروع يتفوق على الموقف المستقبلي من الرسوم التي ما على استعداد للمشاركة في البحث وسنتمم البحث من التواصل مع محاضر المعالج وحسن أخلاقيات البحث العلمي. نحن نتابع الوزارة حتى تعديلا أو نسخار...

موفقين بأيام النجاح والقرص

محمد إبراهيم محمد السماوي

مدير دائرة/إدارة العامة للقوى البشرية

الجهات المتعلقه

- مكتب رئيس مجلس الوزراء
- مكتب رئيس الوزراء
- مكتب رئيس مجلس الوزراء
- مكتب رئيس الوزراء
- مكتب رئيس مجلس الوزراء
- مكتب رئيس الوزراء

Appendix 3: Approval from Helsinki

Helsinki Committee
For Ethical Approval

Date: 06/06/2016
Name: Jamal A. Alfarra

Number: PHRC/HC/124/16

We would like to inform you that the committee had discussed the proposal of your study about:

Seasonal pattern, Socio-demographic and health status effects on development of facial palsy in Gaza Strip

The committee has decided to approve the above mentioned research. Approval number PHRC/HC/124/16 in its meeting on 06/06/2016.

Signature

General Conditions: -
1. Valid for 2 years from the date of approval.
2. It is necessary to notify the committee of any change in the approved study protocol.
3. The committee appreciates receiving a copy of your final research when completed.

Specific Conditions: -

E-Mail: pal.phrc@gmail.com
Gaza - Palestine

لا يمكن العودة إلى اللدنة بعد نتائج مشروع دراستكم حول: و قد قررت الموافقة على البحث المذكور عاليه بالرقم والتاريخ المذكوران عاليه
## Appendix 4: Experts Panel

<table>
<thead>
<tr>
<th>Name</th>
<th>Affiliation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dr. Yehya Abed</td>
<td>Alquds University</td>
</tr>
<tr>
<td>Dr. Khamis El-Essi</td>
<td>Islamic University of Gaza</td>
</tr>
<tr>
<td>Dr. Abdel Fattah Abd Rabou</td>
<td>Islamic University of Gaza</td>
</tr>
<tr>
<td>Dr. Mohammed Naser</td>
<td>Al Azhar University Gaza</td>
</tr>
<tr>
<td>Dr. Mohamed Al-Soltan</td>
<td>Al Azhar University Gaza</td>
</tr>
<tr>
<td>Mr. Adnan Naser</td>
<td>Al Azhar University Gaza</td>
</tr>
<tr>
<td>Dr. Iyad Hussin</td>
<td>Nasser Medical Complex</td>
</tr>
<tr>
<td>Dr. Mohammed Abu-Muammar</td>
<td>Nasser Medical Complex</td>
</tr>
<tr>
<td>Mr. Osama Abu Libda</td>
<td>European Gaza hospital</td>
</tr>
<tr>
<td>Mr. Fouad Lazon</td>
<td>Palestine Red Crescent Society</td>
</tr>
</tbody>
</table>
Appendix 5: Questionnaire (English version)

Islamic University of Gaza
Deanship of Graduate Studies
Faculty of Sciences
Department of Environmental and Earth Science

A questionnaire on the study of Seasonal pattern, Socio-demographic and health status effects on development of facial palsy in Gaza Strip

Dear brother / Dear sister;
The purpose of this study is to identify the factors that affect health status of facial palsy disease, so I ask you my dear brother / my dear sister kindly to fill in this questionnaire objectively, knowing that the information obtained will be kept confidential and will contribute to the achievement of my thesis. Thank you for your kind cooperation.

Date: ..........................
Firstly / Personal data

<table>
<thead>
<tr>
<th>Age:</th>
<th>Gender:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of family members:</td>
<td>Occupation:</td>
</tr>
</tbody>
</table>

Secondly / Demographic situation (statistical study of the population)

A. **Marital status?**
   1) Single  
   2) Married  
   3) Divorced  
   4) Widower

B. **The scientific degree?**
   1) Learner  
   2) Not Learner  
   If the answer is (learner) select?
   1-1) Primary  
   1-2) Prep  
   1-3) Secondary  
   1-4) Academic

C. **Select the Living area according to the Governorate?**
   1) The North  
   2) Gaza  
   3) Middle  
   4) Khan Younis  
   5) Rafah

D. **Select home conditions?**
   1) Property  
   2) Rent  
   3) Other, select.........
E. **Select the nature of the house?**
   1) Concrete
   2) Asbestos
   3) Shinko Aluminum
   4) Other, select.........

F. **Select the conditions of work?**
   1) There is no work
   2) Work in open places (Stream air) Example / driver, working in coastal areas, construction workers and others
   3) Work in closed places - such as / technical professions, teacher, a government employee and others

G. **Select monthly income?**
   1) less than 1,000 shekels
   2) From 1000 to 1500 shekels
   3) From 1500 to 2000 shekels
   4) More than 2,000 shekels
### Third / Seasonal Pattern (the season in which it the incidence)

<table>
<thead>
<tr>
<th>A. When was observed incidence?</th>
<th>1) Morning</th>
<th>2) Afternoon</th>
<th>3) Night-Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>B. Select Month incidence? (The month in which the disease has occurred)?</td>
<td>1) January</td>
<td>2) February</td>
<td>3) March</td>
</tr>
</tbody>
</table>
Fourth / Health status information

A. **Select from the first to observe your facial palsy?**
   1) You
   2) Husband/Wife
   3) The father/The mother
   4) Sons
   5) Friends

B. **Select a side of facial palsy?**
   1) Right side
   2) Left side

C. **Determine the location of facial palsy?**
   1) One whole side of the face is affected
   2) Only the lower half of the face is affected
   3) Both sides of the face are affected

D. **Is there a hereditary history of facial palsy?**
   1) Yes
   2) No

E. **Is the injury during pregnancy? (For women)**
   1) Yes
   2) No

F. **Identify how to suffer from facial palsy?**
   1) Suddenly and rapidly
   2) Gradually

G. **Select the status of the eye?**
   1) Close
   2) Do not close

H. **Do you suffer from runny tears from the eye?**
   1) Yes
   2) No

I. **Do you suffer from a change in the taste of the foods?**
   1) Yes
   2) No

J. **Do you suffer from drooling?**
   1) Yes
   2) No
K. Do you suffer from an increased sensitivity to sound when you hear?
   1) Yes
   2) No

L. Do you suffer from pain behind the ear before the occurrence of facial palsy?
   1) Yes
   2) No

M. Have you had a direct trauma in the head about a year ago of the incidence of facial palsy?
   1) Yes
   2) No
   If the answer is (Yes) Select site of the injury.
   1-1) Jaw injury
   1-2) Cheek injury
   1-3) Dental injury
   1-1) Other, Select…………

N. Are you have a history with any viral infection before one year of occurrence of facial palsy?
   1) Yes
   2) No
   If the answer is (Yes) select?
   1-1) Infected with herpes simplex virus(HSV)
   1-2) Herpes Zoster – Ramsay Hunt syndrome
   1-3) Other, Select…………

A. Do you have a certain sensitivity?
   1) Yes
   2) No
   If the answer is (Yes) mention it…………

B. Do you suffer from inflammation of the middle ear before the injury?
   1) Yes
   2) No
C. **Do you suffer from any of the following chronic diseases?**
   1) Diabetes
   2) Blood pressure disease
   3) Stroke
   4) Transient Ischemic Attack
   5) Myasthenia Gravis
   6) Hypothyroidism
   7) Multiple Sclerosis
   8) Other, Select……………

D. **Select the complications that you got as a result of facial palsy?**
   1) Irritation and ulceration of the cornea
   2) Permanent weakness in the eyelid
   3) Lack of facial symmetry
   4) Spasms in the face muscles
   5) 8) Other, mention it…………

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*Thank you for your cooperation*

*Researcher / Jamal Abdel Nasser AlFarra*

*Mobile No. / 0599736484*
Appendix 6: Questionnaire (Arabic version)

جامعة الإسلامية - غزة
عمادة الدراسات العليا
كلية العلوم
شعبة علوم الأمراض

رقم الإستبانة

إستبانة حول دراسة أثر النطاق الموسمي والخالة الاجتماعية والديموغرافية والوضع الصحي في تطور مرض الشلل الوخيمي في قطاع غزة

أخي العزيز/ أختي العزيزة:
إن الهدف من هذه الدراسة هو التعرف على العوامل التي تؤثر على الحالة الصحية الخاصة بمرض الشلل الوخيمي،
لذا أرجو منك أخي العزيز/ أختي العزيزة التكرم بملء هذه الاستبانة بموضوعية، مع العلم بأن المعلومات المتحصل عليها ستبقى سرية وستساهم في إنجاز رسالة الماجستير الخاصة بي... أشكركم لحسن تعاونكم.

التاريخ: ___________________
البيانات الشخصية

<table>
<thead>
<tr>
<th>النظام</th>
<th>العمر</th>
<th>الجنس</th>
</tr>
</thead>
<tbody>
<tr>
<td>عدد أفراد الأسرة:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>المهنة:</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

الحالة الديموغرافية (الدراسة الإحصائية للسكان)

أ- عدد الحالات الاجتماعية؟
  1- أعزب  2- متزوج  3- مطلق  4- أرمل

ب- عدد الدرجة العلمية؟
  1- متعلم  2- غير متعلم

إذا كانت الإجابة (متعلم) حدد؟
  1- ابتدائي  2- اعدادي  3- ثانوي  4- جامعي

ت- عدد مكان السكن حسب المحافظة؟
  1- الشمال  2- غزة  3- الوسطى  4- خانيونس  5- رفح

ث- عدد ظروف المنزل؟
  1- ملك  2- إيجار  3- غير ذلك، حدد...

ج- عدد طبيعة المنزل؟
  1- بطن  2- إسبست  3- زينكو  4- غير ذلك حدد...

د- عدد ظروف العمل؟
  1- لا يوجد عمل
  2- العمل في أماكن مفتوحة (مجرى هواء) مثال/ السانق، العمل في المناطق الساحلية، عمال البناء وغيرها
  3- العمل في أماكن مغلقة – مثال/ المهنة الفنية، المدرس، الموظف الحكومي وغيرها

خ- عدد الدخل الشهري؟
  1- أقل من 1000 شيكل
  2- من 1000 إلى 1500 شيكل
  3- من 1500 إلى 2000 شيكل
  4- أكثر من 2000 شيكل
ثالثاً / النمط الموسمي (الموسم الذي تم فيه حدوث الإصابة)

<table>
<thead>
<tr>
<th>1- صباحاً</th>
<th>2- ظهراً</th>
<th>3- ليلاً</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- A) متى تمت ملاحظة الإصابة؟
- B) حدد شهر الإصابة (الشهر الذي حدث فيه المرض)؟
رابعًا: معلومات الوضع الصحي

أـ: عدد من أول من لاحظ إصابتك بالشلل الوجه؟
1- أنت 2- الزوجة 3- الأب/الأم 4- الأبناء 5- الأصدقاء

بـ: عدد جهة الإصابة بالشلل الوجه؟
1- الوجه اليمنى 2- الوجه اليسرى

تـ: عدد مكان الإصابة بالشلل الوجه؟
1- إصابة نصف الوجه كاملا 2- إصابة نصف الوجه السفلي 3- إصابة جانبين الوجه

ثـ: هل يوجد تاريخ وراثي في الشلل الوجه؟
1- نعم 2- لا

جـ: هل كانت الإصابة أثناء فترة الحمل؟ (للسيدات)؟
1- نعم 2- لا

حـ: عدد كيفية الإصابة بالشلل الوجه؟
1- فجأة وسريعة 2- بالتدريج

خـ: عدد وضع العين؟
1- تغلق 2- لا تغلق

دـ: هل تعاني من سيلان الدموع من العين؟
1- نعم 2- لا

ذـ: هل تعاني من تغير في المذاق عن تناول الأطعمة؟
1- نعم 2- لا

رـ: هل تعاني من سيلان اللعاب؟
1- نعم 2- لا

زـ: هل تعاني من زيادة في حدة الصوت عند السمع؟
1- نعم 2- لا

سـ: هل تعاني من الألم خلف الأذن قبل حدوث الشلل الوجه؟
1- نعم 2- لا
هل تعرضت لإصابة مباشرة في الرأس قبل عام من الإصابة بالشلل الوجه؟
- نعم
- لا

إذا كانت الإصابة (نعم) حد مكان الإصابة؟
1-إصابة الفك
2-إصابة الخد
3-إصابة الأذن
4-غير ذلك، اذكر ها——

هل سيق وأن أصيب بأي عدوى فيروسية قبل عام من الإصابة بالشلل الوجه؟
- نعم
- لا

إذا كانت الإجابة (نعم) حدها؟
1-إصابة فيروس الهربس
2-وجود طفح جلدي على الأذن الخارجية
3-غير ذلك، اذكر ها———

هل لديك حساسية معينة؟
- نعم
- لا

إذا كان الجواب (نعم) اذكر ها——

هل تعاني من التهاب في الأذن الوسطى قبل الإصابة؟
- نعم
- لا

هل تعاني من أي من الأمراض المزمنة التالية؟
1-مرض السكري
2-مرض ضغط الدم
3-الجلطة الدماغية
4-الجلطة الدماغية العابرة
5-مرض وهن العضلات
6-مرض خف الفخذ الدقية
7-مرض التصلب المتعدد
8-غير ذلك، حدد——

حدد المضاعفات التي حصلت معك نتيجة لإصابة بالشلل الوجه؟
1-تهيج وتقرح قرنية العين
2-ضعف دائم في الجفن
3-عدم تناسق الوجه
4-تقلصات عضلة في الوجه
5-غيرها اذكر ها——
Appendix 7: Consent Form

أخي المريض .. أختي المريضة
حفظك/ي الله
 السلام عليكم ورحمة الله وبركاته

يقوم الباحث أدناه بإعداد رسالة ماجستير بعنوان أثر النمط الموسمى والحالة الاجتماعية والديموغرافية والوضع الصحي في تطور مرض الشلل الوجهي في قطاع غزة

إن هذا البحث يشكل جزء ضروري من دراستي كمتطلب أساسي للتخرج من كلية العلوم بالجامعة الإسلامية تخصص ماجستير العلوم البيئية-صحة بيئة - وقد تم اختياركم ضمن مجموعة المرضى المشاركين في هذه الدراسة للإجابة على العبارات الواردة فيها.

إذا كنت توافق على المشاركة في هذه الدراسة، يرجى التكرم بقراءة العبارات التالية بدقة والإجابة عنها بموضوعية لما في ذلك من أثر كبير على صحة النتائج والتصانح التي سوف تتوصل إليها الباحث مع التأكيد بأن هذه البيانات سوف تستخدم لأغراض البحث العلمي فقط، وسيتم التعامل معها بسرية تامة.

[] أوافق
[] لا أوافق

ملاحظة / الوقت اللازم لتعبئة الإستبانة كاملة لا يستغرق أكثر من 20 دقيقة.

شكركم على حسن تعاونكم معنا.

الباحث
جمال عبدالناصر الفرا