Knowledge of Patients' With Hearing Impairment Regarding Care of Hearing Aids, Sudanese Hearing Center, Khartoum State, Sudan (2018)

Mogahed Abd Alwahab Ibrahim Kheri
B.Sc. in Nursing Sciences
University of Khartoum (2010)

A Dissertation
Submitted to University of Gezira in Partial Fulfillment of the Requirements for the Award of the Degree of Master of Sciences

in
Community Health Nursing
Department of Nursing
Faculty of Applied Medical Sciences

2018
بسم الله الرحمن الرحيم

قال تعالى:

(قل هل يستوى الذين يعلمون والذين لا يعلمون إنما يتناقص أولوا الألباب)

حمد لله العظيم

سورة الزمر الآية (9)
Knowledge of Patients' With Hearing Impairment Regarding Care of Hearing Aids, Sudanese Hearing Center, Khartoum State, Sudan (2018)

Mogahed Abd Alwahab Ibrahim Kheri

Supervision Committee:

<table>
<thead>
<tr>
<th>Name</th>
<th>Position</th>
<th>Signature</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dr. Eitimad Ibrahim Abd Elrhman Kambal</td>
<td>Main Supervisor</td>
<td>..........</td>
</tr>
<tr>
<td>Dr. Amna Eltom Ibrahim Hassan</td>
<td>Co. Supervisor</td>
<td>..........</td>
</tr>
</tbody>
</table>

Date :.../..../2018
Knowledge of Patients' With Hearing Impairment Regarding Care of Hearing Aids, Sudanese Hearing Center, Khartoum State, Sudan (2018)

Mogahed Abd Alwahab Ibrahim Kheri

Examination Committee:

<table>
<thead>
<tr>
<th>Name</th>
<th>Position</th>
<th>Signature</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dr. Ietimad Ibtahim Abd Elrhman Kambal</td>
<td>Chairperson</td>
<td>…………………….</td>
</tr>
<tr>
<td>Dr. Montha Mohamed Ibrahim</td>
<td>External Examiner</td>
<td>…………………….</td>
</tr>
<tr>
<td>Dr. Ekhlas Mohamed Ali</td>
<td>Internal Examiner</td>
<td>…………………….</td>
</tr>
</tbody>
</table>

Date of Examination : …/…./………..
DEDICATION

I dedicate this dissertation to my beloved mother who surrounded me with all warm feeling may God bless her. To my dear wife for all what she did.

And finally I would like to dedicate this effort to my all family for their unlimited support and encouragement.
Acknowledgement

I wish to recognize and appreciate the generous intellectual support. The writing of this thesis would not have been possible without the support and help of many people, whom I am truly indebted to in one way or another. Though, I would have loved to mention everyone by name, but that may not be possible in these pages provided here. My sincere appreciation also goes to the lecturers of the faculty of applied medical science for their valuable contributions and for impacting knowledge to me. May God continue to protect you and bless you all. Received from my main supervisor Dr. Ietimad Ibrahim Kambal and my co-supervisor Dr. Amna Eltom Ibrahim, for their guidance, assistance, critics and encouragement saw me through this project work. May Almighty God continue to protect and bless you and your families. This study would not have been possible at all, without the center who contribute to it, in special way hearing impairment patients at Sudan hearing center, as research participants, many thanks to them all, for selflessly dedicating time and providing me with valuable information which informed the gist of this study. May Almighty God protect and bless them all.
Knowledge of Patients' With Hearing Impairment Regarding Care of Hearing Aids, Sudanese Hearing Center, Khartoum State, Sudan (2018)

Mogahed Abd Alwahab Ibrahim Kheri

Abstract

Children and adults are at risk to have hearing impairment or have hereditary problems, while others occur due to infection or occupational hazard. To solve this problem advanced technology has provided verity of option of aids. Patients have to be aware of their problem of hearing impairment and have enough knowledge about how to care their aids because it help them to improve the best dignified life. A descriptive study was conducted in Sudanese hearing center at the period from January to February 2018, aimed to assess patient knowledge toward hearing aids. Data collected using interview questionnaire designed for the study. The sample size consisted of all (62) patients who constituted the available number during the period of the study. The data was analyzed using Statistical Package for Social Sciences (SPSS). The result showed that 29% of the participants were above 40 years old and most of them were from rural area (73) and basic school education. (there is association between the educational level and knowledge of the clients,) also the study represent that 51% of clients using in the ear hearing aids, 40% of them had duration of disease of 1-5 years and 37% of them were using the aids for 1 to 6 months, where's 61% of the participants revealed that they don’t have a problem with the mold, also the study showed that the they have good knowledge about visiting the center for check-up where's 28% of them responded with correct answer. Also the result showed that (32%) of the study sample were responded with correct answer about the action they take if the device fail to work, and (29%) of the study sample were responded with the correct answer about the reason if their poor amplification in their hearing aids. Finally most of the participants responded with correct answer about the clean and care of the devices, where's 92% of them using soft tissues to clean the mold. The study concluded that the participants knowledge toward hearing aids was satisfactory. Mean of knowledge=52.5 The study recommended that, to train more clients about the use and care of their devices.
معرفة مرضى ضعف السمع عن العناية بسماعة الأذن

المؤسسة السودانية للسمع، ولاية الخرطوم، السودان

(2018)

مجاهد عبد الوهاب إبراهيم خيري

ملخص الدراسة

الصغار والكبار لديهم خطر فقدان السمع إما بمشاكل وراثية أو عدوى تصيب القناة السمعية أو عن طريق مخاطر العمل. ومعالجة هذه المشكلة قامت تقنيات متقدمة باكتشاف العديد من مصاعب الأذن التي تساعد المرضى على مواجهة حياتهم بشكل طبيعي نسبيًا. يجب على المرضى أن يكونوا مدركين بشكل محدد حول مصاعب السمع الخاصة بهم كما يجب أن يكون لديهم المعرفة الكافية حول مراقبة أمراض الأذن لكي يستطيعوا أن يكونوا حياء كريمة تليق بهم. من خلال الدراسة الوصفية التي أجريت مركز السودان للسمع في الفترة من يناير إلى فبراير 2018 بغرض تقييم معرفة المستخدمين للوسائل السمعية، تم جمع البيانات من المرضى باستخدام استبيان تم استخدامه استبان على للدراسة. جمعت المعلومات من (62) مريض كانوا موافقين للمعايير في فترة الدراسة. حللت البيانات باستخدام الحزمة الإحصائية للعلوم الاجتماعية. كشفت الدراسة أن (75%) من عينة الدراسة أعمارهم تفوق 40 سنة ومعظمهم من المناطق الريفية. كما كشفت الدراسة أن (51%) من عينة الدراسة يستخدمون نوع السمعات داخل الأذن. كما كشفت الدراسة أن (40%) من عينة الدراسة فترة إصابتهم بالمرض من 1-5 سنوات وأن (37%) منهم يقومون باستخدام السمعات لفترة من 6-12 شهر، كما أن (61%) من عينات الدراسة وضحوا أنهم لا يواجهون أي مشاكل حول السمعات التي يستخدمونها. كما أوضحت الدراسة أن المرضى لديهم معلومات جيدة حول استخدام وعتبة السمعات، حيث أن (28%) منهم كانت اجاباتهم صحيحة حول زيارة المركز للمتابعة. و(23%) منهم كانت اجاباتهم صحيحة حول الفعل الذي يقومون به في حال عدم عمل السمعات، كما أن (29%) كانت اجاباتهم صحيحة عن السبب في حالة كان هناك اكتشاف في تكبير الصوت. وأخيرا كشفت الدراسة أن معظم عينات الدراسة كانت اجاباتهم صحيحة حول كيفية تنظيف السمعات حيث أن (92%) منهم يستخدمون المناديل المجففة لتنظيف السمعات. اعتمادا على النتائج التي استشكلت من هذه الدراسة كشفت أن معلومات المرضى متقنة. كما أن هناك علاقة بين المستوى التعليمي والمعرفة لدى المرضى متوسط المعرفة = 52.5. اقترحت الدراسة ضرورة عمل برامج تدريبية وتثقيفية لمزيد من المرضى تساعدهم استخدام والعناية بالأجهزة.
# list of contents

<table>
<thead>
<tr>
<th>Subject</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>DEDICATION</td>
<td>iii</td>
</tr>
<tr>
<td>English Abstract</td>
<td>v</td>
</tr>
<tr>
<td>Arabic Abstract</td>
<td>vi</td>
</tr>
<tr>
<td>list of content</td>
<td>vii</td>
</tr>
<tr>
<td><strong>Chapter one (Introduction)</strong></td>
<td></td>
</tr>
<tr>
<td>1-1 background</td>
<td>1</td>
</tr>
<tr>
<td>1-2 Problem statement</td>
<td>1</td>
</tr>
<tr>
<td>1-3 Justification</td>
<td>2</td>
</tr>
<tr>
<td>1-4 Objectives - 1-4-1 General objective - 1-4-2 Specific objectives</td>
<td>4</td>
</tr>
<tr>
<td><strong>Chapter two (literature Review)</strong></td>
<td></td>
</tr>
<tr>
<td>2-1 literature review - 2-1 Definition:</td>
<td>5</td>
</tr>
<tr>
<td>2-2 Types of hearing aids</td>
<td>6</td>
</tr>
<tr>
<td>2-3 Patient education - 2-3-1 common hearing aids problem - 2-3-2 What to do if hearing aids fail to work</td>
<td>8</td>
</tr>
<tr>
<td>2-3-3 Simple rules of good hearing aid care - 2-3-4 How do client clean the aids - 2-3-5 How can client protect the aid from wax - 2-3-6 Patients knowledge</td>
<td>9</td>
</tr>
<tr>
<td>2-3-7 Previous studies</td>
<td>10</td>
</tr>
<tr>
<td><strong>Chapter three (Materials and Methods)</strong></td>
<td></td>
</tr>
<tr>
<td>3- Material and method - 3-1 Study design 3-2 Study area - 3-3 Study population - 3.4 Sample size - 3-5 Data collection tool</td>
<td>13</td>
</tr>
<tr>
<td>3.6 Ethical consideration - Table (3-1) knowledge scale - 3.7 Data collection techniques - 3.8 Data analysis</td>
<td>14</td>
</tr>
<tr>
<td><strong>Chapter Four (Results and Discussions)</strong></td>
<td></td>
</tr>
<tr>
<td>4-1 Results</td>
<td>15</td>
</tr>
<tr>
<td>4-2 Discussion</td>
<td>23</td>
</tr>
<tr>
<td><strong>Chapter Five (Conclusion and Recommendation)</strong></td>
<td></td>
</tr>
<tr>
<td>Conclusion</td>
<td>24</td>
</tr>
<tr>
<td>Recommendations</td>
<td>25</td>
</tr>
<tr>
<td>References</td>
<td>26</td>
</tr>
<tr>
<td><strong>Appendix</strong></td>
<td></td>
</tr>
</tbody>
</table>
Chapter One

Introduction
1- Introduction

1-1 background:

Definition: Hearing is one of the most attributes that human have with them. Through our hearing we are able to communicate verbally and set of society up with distinct audio tones that will help with everyday life through all these there are southands of children and adults are at risk to have hearing impairment or have hereditary problems, while others occur due to infection or occupational hazards (Gondim et al., 2012). Hearing impairment is the most frequent sensory deficit in human populations, affecting more than 250 million people in the world. Consequences of hearing impairment include inability to interpret speech sounds, often producing a reduced ability to communicate, delay in language acquisition, economic and educational disadvantage, social isolation and stigmatization. It may be worsened by some medical conditions such as hypothyroidism, diabetes, and possibly hyperlipidemia, among others. and it's of interest to note that hearing impairment basic disability that can interfere with the social workers and environmental spheres of the patients life, but it will establish that advanced technology has provided verity of option of aids to solve this problem such as; digital hearing aids , electronic hearing aids, environmental hearing aids, cochlear implantation, sign language and organizing for deaf. So when client deciding to have an appropriate type and style of hearing aids he and hid audiologist should considered the ability and home activities, physical limitation, medical condition and cosmetic preferences as well as the budget, so most people take time to adjust to new hearing aids become truly proficient its used and care. For all these the client need especial instructions by the audiologist and the nurse on the care and use of the aids because it has some problem and its need continuing of monitoring (Colin et.al, 2013).

A hearing aids makes sound louder, but it does not improve a client ability to discriminate words or understand speech, so that chief benefit from a hearing aids is amplification , there for aids is most helpful when the basic hearing problems is reduced. Hearing aids is potentially useful in conductive hearing loss and may be used by children as early as six month of age, and it has different types with different size, which can be worn, at different side of the body (William et.al, 2010).

1-2 Problem statement:

Worldwide: In 2012, WHO released new estimates on the magnitude of disabling hearing impairment. The estimates are based on 42 population-based studies. Estimates are as follows: There are 360 million persons in the world with disabling hearing impairment (5.3% of the world’s population).328 million (91%) of these are adults (183 million males, 145 million females).32 (9%) million of these are children. The prevalence of disabling hearing impairment in children is greatest in South Asia, Asia Pacific and Sub-Saharan Africa. Approximately one-third of persons over 65 years are affected by disabling hearing impairment. The prevalence of disabling hearing impairment in adults over 65 years is highest in South Asia, Asia Pacific and Sub-Saharan Africa. A review that focused on East Asian population found that the prevalence of hearing impairment is 22%, and 9% in Latin America and Caribbean. The studies showed that prevalence of hearing impairment in Asia Pacific is 10% and 27% in south Asia. Result showed that only 3% is the prevalence of hearing impairment in Middle East and North Africa. Also the result showed the prevalence in Sub-Saharan Africa which is 9% and the same 9% in Central/East Europe and Central Asia. 11% is the prevalence of hearing impairment in high income
countries.[WHO,2012]. Another study demonstrated that over 5% of the world’s population or 466 million people has disabling hearing impairment (432 million adults and 34 million children). It is estimated that by 2050 over 900 million people or one in every ten people will have disabling hearing impairment (WHO, 2017). In some settings, the prevalence of chronic ear infections may be as high as 46%. Ear infections are usually accompanied by discharge from the ear. This can lead to hearing impairment and may cause life-threatening complications, such as meningitis and brain abscesses. Where as in Developing countries: 80% of deaf people live in low and middle-income countries. Deafness has a great impact in these low-income countries because of a lack of services, equipment, understanding and trained people, Higher prevalence of childhood hearing impairment is associated with lower levels of development across regions and this will lead to affect the development of speech and language skills in children, lead to slow progress in school, cause difficulties in obtaining, keeping and performing an occupation, Produce social isolation and stigmatization at all ages, cause poverty and place an economic burden on individuals and society. At least 50% of the burden of hearing impairment in developing countries can be prevented with current knowledge and many more people with hearing impairment can be treated or given rehabilitation, Therefore, there is an urgent need for new means to raise awareness and provide knowledge transfer and skills enhancement in developing countries, especially at the primary and secondary levels (Andrew, 2014).

The prevalence of hearing impairment (defined as Hearing loss >35 dB) for adults aged >15 years old was 15.7% in sub-Saharan Africa vs. 4.9% in high-income countries. For children aged between 5 and 14 years, the prevalence was estimated at 1.9% in sub-Saharan Africa vs. 0.4% in high-income countries (Olusanya et al, 2014).

In Sudan: two Sudanese researchers examined 264 children, aged between 14 months and 14 years, all of them suffering from severe hearing impairment. As many as 75 percent of the children with hearing impairment were born to parents who were close blood-relatives, making hereditary cause the most likely cause of the children's hearing impairment. (Saudi Journal 2007). And study conducted by Mahmoud Abdelbagi et. Al To determine the associated factors of unilateral sensor neural hearing loss among different age groups in Sudanese patients, 115 Sudanese patients presented to Khartoum state ENT hospitals complaining of unilateral hearing impairment were included, the result showed that male to female ratio 1:1.3, 49 patients (42.6%) were from Khartoum state and the rest were from different areas in Sudan. The most frequent age group was from 1-15 years representing (38.3%) with a mean age of 24.48, the commonest associated factor in this study was mumps and it was found in 47 of patients (40.9%) , tinnitus was the commonest presenting symptoms in unilateral S ense neural hearing impairment 81 patients (70.4%) were assessed audiologicly with pure tone eudiometry and 34 patients (59.1%) assessed by Auditory Brain Stem Response (ABR). So this research showed that unilateral Sensor neural hearing impairment commonly presents during school-age. Mumps is the most common associated factor. Pure tone eudiometry and auditory brain stem response are suitable method for the assessment and the diagnosis (Mahmoud et.al, 2017).

1-3 Justification:

According to WHO 360 million persons live with disabling hearing impairment worldwide and that the majority of these people live in developing countries, specifically South Asia, Asia Pacific and Sub-Saharan Africa. Hearing impairment
As it's well known that the goal of correcting hearing impairment have been met by hearing aids, but clients still express dissatisfaction with their aids. Hearing aid is a device designed to improve hearing by making sound audible to a person with hearing impairment. Hearing aids are classified as medical devices in most countries, and regulated by the respective regulations. Small audio amplifiers or other plain sound reinforcing systems cannot be sold as "hearing aids". Early devices, such as ear trumpets or ear horns, were passive amplification cones designed to gather sound energy and direct it into the ear canal. Modern devices are computerized electroacoustic systems that transform environmental sound to make it audible, according to eudiometrical and cognitive rules. Modern devices also utilize sophisticated digital signal processing to try and improve speech intelligibility and comfort for the user. Such signal processing includes feedback management, wide dynamic range compression, directionality, frequency lowering, and noise reduction. Modern hearing aids require configuration to match the hearing impairment, physical features, and lifestyle of the wearer. This process is called "fitting" and is performed by audiologists. The amount of benefit a hearing aid delivers depends in large part on the quality of its fitting. Almost all hearing aids in use in the US are digital hearing aids (Robyn et.al 2017), and it's has been reported that a hearing aid has much higher problems, such as redness or drainage in the ear, mechanical failure of the device, difficulty with placement and other issues concern to the client there for it needs continuing or monitoring program in extended care facilities to promote successful hearing aids care and use among clients and these depends among numerous factors. therefore, this study designed to assess the knowledge of clients using hearing aids about different variety of techniques, communication and their ability to care and use of the device. and to identify the most common problems that interfere with the use of hearing aids. Plus to know the most common types of hearing aids that use by clients.

1-4 Objectives:

1-4-1 General objective:

To study the knowledge of clients using hearing aids in Sudanese hearing center in Khartoum State during the period from January to February 2018.

1-4-2 Specific objectives:

- To assess biographical data of the study population such as education during the period of the study.

- To identify knowledge of the patients regarding the use and care of hearing aids.
- To identify the association between the knowledge of the patients and educational level.
Chapter Two
Literature Review
2- literature review

2-1 Definition:

Hearing impairment ranges from minor difficulty in understanding word or hearing certain sounds to total deafness. Hearing impairment is the nation's primary disability: 1 in each 15 Americans is affected. Because of fear, misinformation, lack of information, many clients do not admit that they have a hearing problem. Up to 80% of all hearing impairment are caused by hearing nerve disorders. For which no cure is currently available. Hearing impairment diminish the quality of life for a third of adults between 65 and 75 years of age (Baltimore, UAS, 2011).

Hearing impairment classified into; Conductive hearing loss result from interference of sound transmission through the external ear and the internal ear. It may be caused by anything that close the external ear such as wax, infection or foreign body, thickening, retraction, scarring or perforation of the tympanic membrane; or any pathological change in the middle ear that affect or freeze one or more icicles. And sensor neural hearing impairment :- is caused by impairment of the function of the inner ear, the eight cranial nerve or brain. Causes are congenital hereditary factors, noise injury, aging and degenerative process, métier's disease and ototoxicity. The Pathophysiology indicates that a conductive hearing impairment is as a result of interference of sound transmission into and through the external ear and the middle ear. The inner ear is not affected in pure conductive loss, therefore sound transmission from inner ear to the brain is normal. Sound is perceived as faint or distant, but it remain relatively clear. Most of conductive hearing loss is correctable by medical or surgical treatment. In sensor neural hearing loss, however, results from disease or damage to the Corte or auditory nerve pathway of the inner ear leading to the brain stem. Normal reception and transmission of sound wave are disrupted. Sensor neural hearing impairment is usually permanent and are generally not correctable by medical or surgical treatment (Dhillion, 2012).

Most of hearing impairment is gradual and goes unnoticed by the client until several incident of communication problem have occurred. Health care providers should be alert for the following manifestation of hearing impairment in clients:- Failure to respond to oral communication, Inappropriate response to oral communication, Excessively loud noise, Abnormal awareness of sounds, Strained facial expressions, Titling of head when listening, Constant need for clarification of conversation, Faulty speech articulation, Listening to radio and television at increased volume. Onset of conductive hearing impairment can be sudden or progressive.

Hearing impairment can be treated either by medical management and thaw goals of management are to restore hearing with administration of medication according to the causes, and to assist hearing by providing a hearing aids and assistive listening devices, to manage tinnitus, and to implement aural rehabilitation. Or surgical management: surgery may be performed to restore the conductive hearing impairment, to remove tumor, and to assist in profoundly deaf people by use of implantable hearing devices such as cochlear implants, temporal bone stimulation, and middle ear implants (Timothy, 2014).
A hearing aid is an electronic, battery-operated device that receives sound through a small microphone and amplifies it to correct the effects of hearing impairment. With the amplified sound, the client is able to protect himself from environmental dangers, and as a result enjoy the environmental pleasures of communication and music.

Regardless of types, the hearing aids consist of four parts:—Microphone to receive sound wave from the air and change sound into electrical signal, Amplifier to increase the strength of the electrical signal, Receiver (Loudspeaker) to transmit the electrical signal into sound waves, battery to provide electrical energy needed to operate the hearing aid. On all types of hearing aids except the body worn type all four components are housed in one small case. The louder sounds are then directed into the ear through an custom—molded earpiece(Bethesda, 2011).

2-2 Types of hearing aids

Hearing aids differ in how they look, their size, where they are placed in the ear, and how much they can amplify the sound. There are three major types of hearing aids:—Analog adjustable hearing aids are made based on your hearing tests. They amplify both speech and other sounds in the same amount. These are the least expensive. Analog programmable:—they can be programmed for the different environments. You change hearing program by using a remote control. And digital programmable:—hearing aids can analyze the hearing environments and adjust to the sound, they allow more flexibility in programming than analog hearing aids. They are more advanced and the most expensive type of hearing aids. There are different types of hearing aids, vary according to the size and location, and can be worn at the following location:—

**In the ear (ITE):** Hearing aids have a hard plastic case that fits completely in the outer ear. Some have optional features such as a telecoil, a device that improves sound transmission during telephone calls. ITE aids are used for mild to severe hearing loss, but are not generally recommended for children because the casings need to be replaced as the ear grows. They can be damaged by earwax and ear drainage and sometimes suffer from adjustment problem and feedback due to their small size.

**Behind-the-Ear (BTE):** Hearing aids are worn behind the ear. A plastic ear mold fits inside the outer ear and connects to the components, which are held in a case behind the ear. BTE aids are used for mild to profound hearing loss and can be used by all ages. It is important for BTE aids to be properly fitted, as poorly fitted BTE ear mold can cause feedback.

**In-the-Canal (ITC):** These hearing aids are customized to fit into the ear canal. In addition, they are two sizes of canal aids. Completely-in-Canal (CIC) hearing aids are mostly concealed within the ear canal. Both sizes are used for mild to moderately severe hearing loss. Because of their small size, canal aids can be difficult to adjust and remove and are not recommended for children. Extra devices such as the telecoil may not fit within the casing. Canal aids can be damaged by earwax and ear drainage. Body Aids:—Are attached to a belt or pocket and connected to the ear by a wire. They are used by people with profound hearing loss, but because of their large size, usually only when other types of hearing aid cannot be used (David de Kretser et.al 2010). Body (mild-profound) Advantages: separation of recessive and microphone prevent acoustic feedback. Allowing high amplification. Generally used in school setting and it's disadvantages is Bulky; require wire, which may be cosmetically displeasing, some loss of high Frequency response behind the ear. Behind the ear:—Advantages large size permits use of large component that enable the aid to provide more power and features, most versatile due to size, no long wires, and
disadvantages: large size. In the ear (mild-moderately sever):- Advantages: One piece custom fit to contour of ear; n tubes or cords; miniature microphone is located in or cords; miniature microphone is located in the ear which is more natural placement; more cosmetically appearing due to easy concealment. Disadvantages: smaller size limits output, patient who have arthritis or cannot perform tasks requiring good manual dexterity, may have difficulty with the small size of aid or battery which can require more repair than the behind the ear aid. In the canal ear (mild _ moderately sever) – it's advantages is same as in the ear aid; less visible, so more cosmetically pleasing. While it's disadvantages: is, even smaller than in the ear aids, requires good manual dexterity (David de Kretser et.al, 2010). caring for hearing aids and helping client's maintenance of these devices may be delegated to unlicensed assistive personnel. Clients with new hearing aids need individualized teaching provided by the nurse. Therefore, the nurse have to evaluate the clients understanding of instruction before delegating aid care, consider the following issues:- The client hearing needs, Are these new hearing aids, Does the client have a new hearing loss disorders (Bethesda, 2011) If so, the nurse should instruct the client to care for the device and provide consistent teaching. Then competency of the unlicensed assistive personnel who will potentially perform hearing aid care. So instruct the unlicensed assistive personnel caring for the client with hearing aid to achieve the following:- encourage the use of hearing aids and independent care by clients without cognitive impairment. Provide safe storage of the hearing aids when not in use turn the device off when it is not in use. If the aid to be off for prolonged duration (such as during the night or sleeping) open the battery compartment to avoid additional drainage of pottery power. Cleanse the ear mold with mild soap and water each day or as needed. Completely dry the ear mold before reconnecting it to hearing aid. Help the client insert the ear mold into the ear if the hearing aids makes a whistling noise, the device is not inserted properly into the ear. At this point, it may be necessary for you to assess more completely placement in the ear canal. Allow the client to adjust the volume before speaking. Speak clearly in a normal tone to the client. Don’t shout. Turn off the device before removing it to prevent squalling (feedback). Avoiding exposure of the aid to radiation or ice. Storing batteries in a cool, dry location, being careful not to place them on a metal surface. Don’t wear the hearing aid when you have an ear infection. Keep an extra battery available at all times. Cleaning the case with a cloth dampened with water rather than alcohol or acetone. Description of available condition that could damage the hearing aid. List of known side effects that may warrant physician consultation, e.g.: skin irritation and accelerated communication, Instruction for proper use, maintenance, and care of the hearing aid, as well as instruction for replacing or rechecking the batteries. A plan of care must be directed and developed toward enhancing cooperation reducing confusion, and promote comfort. The client should be informed on all procedure beforehand(Bethesda, 2011).

2-3 Patient education:

2-3-1 common hearing aids problems:-

Whistling noise:- may be due to lose ear due to improper made, improperly worn or worn out. Improper aid selection:- either too much required in aid, within adequate separation between microphone and receiver. Or open mold used inappropriately. Inadequate amplification:- due to following; dead batteries, wax in ear, wax or other material in mold, improper mold, improper aid for degree of loss, pain from mold:- may be due to the following:- improper fitted mold, ear skin or cartilage infection,
middle ear infection, ear tumor, unrelated causes: tempromandiblar joint, throat or larynx, others. Common medical problem among hearing aids wears include external otitis media and pressure ulcer in the external auditory canal or meatus. In addition to the common problem associated with hearing aids there are some findings that are immediately reportable to the nursing from the client which are: Difficulty with drainage in the ear, Redness or drainage in the ear, mechanical failure of the device, other issues of concern to the client (Kretser et.al, 2010).

2-3-2 What to do if hearing aids fail to work:-

Check the ON – OFF switch inspect the ear mold for cleaning and examine the battery for correct insertion, examine the cord plug for correct insertion, examine the cord for break, replace the battery, cord, and both, if necessary. The life of batteries varies according to the amount of use and power requirement of the aid. Batteries last (2-14) days. Check the position of the ear mold in the ear. If the hearing aids "whistles" the volume control is too high, ear mold is probably not inserted properly into the ear canal, or the client need to have a new ear mold made (Bethesda, 2011).

2-3-3 Simple rules of good hearing aid care:-

there's some tips should be taught to the client to promote good care of the aid, this items are; wipe hearing aid with a tissue daily, keep it in a dry place and avoid excessive heat, switch it off before you take it off, avoid getting aid wet, avoid dropping aid, keep it away from hairspray and X-ray, don't sleep with the hearing aid in your ear, open the battery door before you take it off, avoid getting aid wet, avoid dropping aid, keep it away from hairspray and X-ray, don't sleep with the hearing aid in your ear, open the battery door when the hearing aid not in use, don't attempt home require. Also daily examination of the aid is important so the client have to look for visual signs of damage such as cracks, broken parts, and clogged opening or moisture droplets(Ronald L et al, 2014).

2-3-4 How do client clean the aids:-

The client should perform regular maintenance on his aid, just as any other electronic device inspect the aids daily, because they can pick up oils and waxes that can block their effectiveness. Do not use water or other liquid such as alcohol to clean them. All hearing aids regardless of style or complexity need to be cleaned in similar manner and all come with rules to be used for this purpose(Sedona et.al, 2014).

2-3-5 How can client protect the aid from wax:-

The part of the aids that is in the ear canal will be exposed to wax, earwax can damage the mechanical components of the aid because it can build up in the receiver and cause it to malfunction. Behind the ear aids is not similarly affected because only the plastic ear mold is in the ear canal. However, ear wax can build up the ear mold of behind the ear aids and can completely stop the sound. It is recommended that the client have to remove the wax from the device daily (Ronald L et al 2014).
2-3-6 Patients knowledge:

Patients knowledge on hearing aids depend on the guidance of critical step on how to chose and use the hearing aids, because where the patient doesn't know the functioning, is not able to manipulate it suitably and doesn't take the necessary care. The guidance involve information on the hearing aid functioning, benefit and limitations, care and repairs, manipulation, insertion and expectations pursuant to its use (Reese LR 2010). Patients need to know and handle the hearing aids before choosing the one to be bought, the fact there is no interference of the retroauricular hearing aid with the use of glasses and pacemaker and that the competent professionals for the hearing aid selection and fitting process are: the fonoaudiologist and the doctor. As far as the care are concerned, the patient must know the hearing aid hasn’t any anti fall protection system and in terms of fitting, the user must be aware he or she should not use the hearing aids all day in the first week, he or she needs to remake the mould capsule annually, that upon purchase of the hearing aid. He or she need to return the auditory center for fitting, the presence of a relative is critical upon receipt of guidance for further help in the handling and care of the hearing aid and that the hearing aid fitting time depend on each user. Also emphasize the importance of phonoaudiologic service in the processes of selection, fitting, (new) guidance and permanent follow-up of old and new hearing aid users. Study conducted in city of Porto Alegre on adult and old aged, new and old users of hearing aid, composed of 51 individuals of both sexes, showed that most hearing aids users are older than 60 years, and they have good knowledge about the fitting process and care of hearing aid. It's also possible to confirm the highest education degree was not critical for the knowledge on the hearing aid fitting process (Maria Ines 2008).

2-3-7 Previous studies:

Worldwide: In 2012, WHO released new estimates on the magnitude of disabling hearing impairment. The estimates are based on 42 population-based studies. Estimates are as follows: There are 360 million persons in the world with disabling hearing impairment (5.3% of the world’s population). 328 million (91%) of these are adults (183 million males, 145 million females). 32 (9%) million of these are children. The prevalence of disabling hearing impairment in children is greatest in South Asia, Asia Pacific and Sub-Saharan Africa. Approximately one-third of persons over 65 years are affected by disabling hearing impairment. The prevalence of disabling hearing impairment in adults over 65 years is highest in South Asia, Asia Pacific and Sub-Saharan Africa. A review that focused on East Asian population found that the prevalence of hearing impairment is 22%, and 9% in Latin America and Caribbean. The studies showed that prevalence of hearing impairment in Asia Pacific is 10% and 27% in south Asia. Result showed that only 3% is the prevalence of hearing impairment in Middle East and North Africa. Also the result showed the prevalence in Sub-Saharan Africa which is 9% and the same 9% in Central/East Europe and Central Asia. 11% is the prevalence of hearing impairment in high income countries.[WHO,2012]. Another study demonstrated that over 5% of the world’s population or 466 million people has disabling hearing impairment (432 million adults and 34 million children). It is estimated that by 2050 over 900 million people or one in every ten people will have disabling hearing impairment (WHO, 2017). In some settings, the prevalence of chronic ear infections may be as high as 46%. Ear infections are usually accompanied by discharge from the ear. This can lead to hearing impairment and may cause life-threatening complications, such as meningitis.
and brain abscesses. Studies show that the global burden of illness from chronic otitis media affects from 65 to 330 million people with ear discharge. Otitis media is largely preventable, and can be effectively managed through medical and surgical approaches. Incorporating primary ear care into primary health care is a cost-effective way to reduce the long-term morbidity and mortality caused by chronic ear infections. Other study show that prevalence of child and adult hearing impairment appears to be substantially higher in middle- and low-income countries than in high-income countries, demonstrating the global need for attention to hearing impairment. Approximately 15% of the world's adult population has some degree of hearing impairment. Fifty per cent of those who are affected, have disabling hearing impairment (Henderson D et al, 2014) South and East Asia and sub-Saharan Africa remain the world regions with the highest prevalence of hearing impairment in both adults and children. This can be explained by the high rates of pre- and post-natal childhood infections such as chronic otitis media, meningitis, rubella, measles, use of ototoxic drugs and excessive noise (Colin et.al, 2013). Researchers found that overall, about 30 million Americans, or 12.7 per cent of the population aged 12 years or older, had hearing impairment in both ears and this figure increased to 48.1 million, or 20.3 per cent, when also including people who have hearing loss in one ear. The prevalence was lower in women than men, and in black than white individuals across nearly all age decades, also the study revealed good knowledge to the patients about the use and care of their hearing aids (WHO, 2012)

Report from Shield (2006) found that 19 per cent of the UK men and 13 per cent of UK women above 16 years of age report that they suffer from hearing loss and they use the hearing aids that in the ear, and they have enough knowledge to caring about their device and they also visiting the center regularly for check-up their hearing aids (Shield B et.al, 2016).

According to Hear-it.com (2011); Professor Adrian Davis of the British MRC Institute of Hearing Research estimates that —the total number of people suffering from hearing loss of more than 25 dB will exceed 700 million worldwide by 2015. Davis’s statistic suggest that more than 900 million people worldwide will suffer from hearing loss of more than 25 dB in 2025. Of those 900 million hearing impaired in the world in 2025, some 90 million will be Europeans. Generally, more is known about the incidence and prevalence of hearing impairment in Europe and the United States due to the development of the healthcare systems. This sophistication allows for better record keeping and facilitates more accuracy than in underdeveloped countries where data is scarce, this research also suggested good knowledge of clients about the use and care of hearing aids and about following up the center regularly to take additional knowledge and information about the devices (Marisol et.al, 2012).

**In developed countries:** The WHO estimates that approximately 360 million persons live with disabling hearing impairment worldwide and that the majority of these people live in developing countries, specifically South Asia, Asia Pacific and SubSaharan Africa. The study conducted by Lebogang et.al Random cluster sampling was used to select four sub-districts (cluster) from the eight health sub-districts within the Cape Town Metropolitan area through a method of probability proportional to size (PPS), The primary aim of this study was to estimate the prevalence of hearing impairment in selected health sub-districts within the Cape Town Metropolitan area. Using the WHO grading of hearing impairment classification (WHO, 2014), it was estimated that overall prevalence of hearing impairment in this study was 12.35% (95% CI: 11.06% – 13.64%). Age, gender, a family history of hearing impairment, a self-reported history of hypertension, and a
history of prior head and neck trauma were main factors associated with hearing impairment, the second aim is to study the knowledge of the patients using the hearing aids, its reported that only 45% of patients have good knowledge about their aids, how to use and care about them and how to clean them, also they don’t have enough knowledge about visiting the center for check-up, where's only 16% of them following up regularly (Lebogang, 2016). Developing countries: 80% of deaf people live in low and middle-income countries. Deafness has a great impact in these low-income countries because of a lack of services, equipment, understanding and trained people, Higher prevalence of childhood hearing impairment is associated with lower levels of development across regions and this will lead to affect the development of speech and language skills in children, lead to slow progress in school, cause difficulties in obtaining, keeping and performing an occupation, Produce social isolation and stigmatization at all ages, cause poverty and place an economic burden on individuals and society. At least 50% of the burden of hearing impairment in developing countries can be prevented with current knowledge and many more people with hearing impairment can be treated or given rehabilitation, Therefore, there is an urgent need for new means to raise awareness and provide knowledge transfer and skills enhancement in developing countries, especially at the primary and secondary levels (Andrew, 2014).

The largest proportion of hereditary hearing impairment is considered to be the result of autosomal recessive genes, while the remainder are the result of dominant genes, or sporadic genes and there are a few cases that are sex linked. In populations where there is a high incidence of consanguineous marriage (marriage between close relatives such as first cousins), there is a higher proportion of recessive genes present resulting in increased numbers of children born with disabilities which may include deafness. The information about congenital deafness is poor from developing countries but there is some good information about causes of deafness, mainly based on work within schools for deaf children. Overall, it is in Africa that the prevalence rates for congenital deafness seem to have increased. There is very little recent information from Africa, but perinatal causes like rubella are a significant cause of congenital deafness. In the Middle East and Asia these increased rates are not seen. Perinatal causes of deafness are high in the densely populated areas of South America and India, Sellars (1987) identified rubella as a major cause of congenital deafness in South Africa but also highlighted the large number of children suffering deafness as a result of problems during the perinatal period. In a series of 3,000 children, over half of those with a severe hearing impairment had suffered problems during the perinatal period (Sellars 1987).

The developing world needs to improve health care in order to eradicate preventable causes of hearing impairment and the early detection of a hearing impairment is important – and it is possible in infants and young children. Lack of equipment does not prevent a hearing impairment being identified in this age group (Newton VE et al, 2012).

In Sudan: Study conducted by Mahmoud Abdelbagi et. Al To determine the associated factors of unilateral sensorineural hearing impairment among different age groups in Sudanese patients, 115 Sudanese patients presented to Khartoum state ENT hospitals complaining of unilateral hearing impairment were included, the result showed that male to female ratio 1:1.3, 49 patients (42.6%) were from Khartoum state and the rest were from different areas in Sudan. The most frequent age group was from 1-15 years representing (38.3%) with a mean age of 24.48. the commonest associated factor in this study was mumps and it was found in 47 of patients (40.9%), tinnitus was the commonest presenting symptoms in unilateral Sensoneural hearing impairment 81 patients (70.4%) were assessed audiologicly with pure tone audiometry and 34
patients (59.1%) assessed by Auditory Brain Stem Response (ABR). So this research showed that unilateral Sensorineural hearing impairment commonly presents during school-age. The result of this study revealed that the patients have good knowledge about the use and caring of their hearing aids, 34% of them use the aids which is in the ear, and they now how to clean their device, whereas 80% of them using soft tissues to clean the device, and also they have enough knowledge about when they visit the hearing center for check-up, 45% of them following up regularly (Mahmoud et al., 2017).
CHAPTER THREE

Materials and Methods

3- Materials and Methods

3-1 Study design:

This is descriptive study, facility in the Sudan Hearing Center in the period from January to February 2018.

3-2 Study area:

The study carries on the Sudanese hearing center in Khartoum State because this center provides extended facilities of care to the client and its first center in Sudan. It located in the center of Khartoum town, it works daily from 9 am to 9 pm and it receives more than 20 patients per day. The center has four rooms for the following purpose; one room for all diagnostic and evaluation procedures and as clinic, speech room, and lab serve as preservation, determination and cast mold lab. And the center include staff; Doctor, Sister, Administrative personnel and other personnel, Electronic engineers.
3-3 Study population:
All Sudanese Patients with impaired hearing who and attend

3-4 Sample size:
All patients (62) who were using the hearing aids in Sudanese hearing center during the study period from January to February 2018.

3-5 Data collection tool:-
Data was collected by standard interview structural questionnaire, it is closed ended questionnaire to give definite answer and to fulfill the purpose of the study and easy to be answered. The questionnaire designed from two parts; first part represent the demographic data from question (1-7), the second item represent the question about the knowledge from Q NO (8-18).

Appendix [I]

3.6 Ethical consideration:
- Permission taken from the original director of the center and the patients included in this study must notify well about the objective and the need of this study, and have a chance to accept or refused to give the information.
- Research purpose and objectives was explained to participant in clear simple word.
- Participant has right to voluntary informed consent.
- Participant has right to withdraw at any time without any depreciation.
- Participant has right to no harm (privacy and confidentiality by using coded questionnaire.
- Participant has right to benefit from the researcher knowledge.

Table (3-1) patients knowledge was educated according to WHO scale :

<table>
<thead>
<tr>
<th>Level of knowledge</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unacceptable</td>
<td>Less than 30%</td>
</tr>
<tr>
<td>Poor</td>
<td>31-50 %</td>
</tr>
<tr>
<td>Satisfactory</td>
<td>51-65 %</td>
</tr>
<tr>
<td>Good</td>
<td>66-75 %</td>
</tr>
<tr>
<td>Very good</td>
<td>Above 75%</td>
</tr>
</tbody>
</table>
3.7 Data collection techniques:

The researcher collected the data within two months by visiting the center three days per week on Sunday, Monday, and Wednesday. The researcher interviewed the client and immediately filed the questionnaire, each client took from fifteen to twenty minutes. (62) Clients were interviewed during the study. All patients accept to give information and want to participate in the study.

3.8 Data analysis:

Data was analyzed by using the computer software Statistical Package for Social Sciences (SPSS) program version.
Figure (4-1) Distribution of study sample according to their age

Result of figure (4-1) shows that of the study sample (29%) were above 40 years of age.
Results of figure (4-2) shows that (34%) had basic school level, (26%) illiterate.

Table (4-3) Distribution of study sample according to their occupation

<table>
<thead>
<tr>
<th>Occupation</th>
<th>Frequency</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Employed</td>
<td>12</td>
<td>19.4</td>
</tr>
<tr>
<td>Unemployed</td>
<td>20</td>
<td>32.3</td>
</tr>
<tr>
<td>House wife</td>
<td>11</td>
<td>17.7</td>
</tr>
<tr>
<td>Student</td>
<td>19</td>
<td>30.6</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>62</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

Result of table (4-3) show the (32%) were unemployed, (30%) were student.
Result of figure (4-4) shows that more than half of the study sample (73%) were living in rural areas.

Table (4-5) Distribution of study sample according to their marital status

<table>
<thead>
<tr>
<th>Marital status</th>
<th>Frequency</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Married</td>
<td>27</td>
<td>43.5</td>
</tr>
<tr>
<td>Unmarried</td>
<td>30</td>
<td>48.4</td>
</tr>
<tr>
<td>Divorcee</td>
<td>3</td>
<td>4.8</td>
</tr>
<tr>
<td>Widow</td>
<td>2</td>
<td>3.2</td>
</tr>
<tr>
<td>Total</td>
<td>62</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Result of table (4-5) shows that (48%) of the study sample were unmarried and (43%) were married.
Figure (4-6) Distribution of study sample according to the duration of the disease

Result of figure (4-6) shows that study sample (40%) their duration of disease was 1-5 years, (22%) 6-10 years.

Table (4-7) Distribution of study sample according to their type of hearing aids use

<table>
<thead>
<tr>
<th>Types</th>
<th>Frequency</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>In the ear</td>
<td>32</td>
<td>51.6</td>
</tr>
<tr>
<td>Behind the ear</td>
<td>24</td>
<td>38.7</td>
</tr>
<tr>
<td>In the canal</td>
<td>3</td>
<td>4.8</td>
</tr>
<tr>
<td>Body aids</td>
<td>3</td>
<td>4.8</td>
</tr>
<tr>
<td>Total</td>
<td>62</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Result of table (4-7) showed that more than half of the study sample (51%) were use the device which is in the ear, (38%) were use behind the ear.
Result of figure (4-8) show that (37%) of cases were use the hearing aid for 1-6 months, (29%) were use for 7-12 month.

Result of figure (4-9) showed that more than half (61%) of the study sample had no problems with their hearing aids.
Mean of knowledge = 28%

Result of figure (4-10) show that (28%) of the study sample responded with correct answer regarding the time of visiting the center for check-up.

Table (4-11) Distribution of study sample according their response for to what they do if aids fail to work

<table>
<thead>
<tr>
<th>fail to work</th>
<th>Frequency</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Check the switch</td>
<td>13</td>
<td>21.1</td>
</tr>
<tr>
<td>Check the battery</td>
<td>28</td>
<td>45.1</td>
</tr>
<tr>
<td>Examine for break</td>
<td>2</td>
<td>3.2</td>
</tr>
<tr>
<td>Visit the center for check up</td>
<td>19</td>
<td>30.6</td>
</tr>
<tr>
<td>Total</td>
<td>62</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Mean of knowledge = 32%

Result of table (4-11) showed that (32%) of the study sample were responded with correct answer about the action they take if the device fail to work.
Figure (4-12) Distribution of study sample according to their knowledge if there is poor amplification
Mean of knowledge = 29%
Result of figure (4-12) shows that (29%) of the study sample were responded with the correct answer about the reason if their poor amplification in their hearing aids.

Figure (4-13) Distribution of study sample according to the what they use to clean the model
Mean of knowledge = 92%
Result of figure (4-13) show that most of study sample (92%) were responded with the correct answer about the clean of the device as they using soft tissues to clean the mold.
Table (4-14) Distribution of study sample according to their background knowledge of hearing aids

<table>
<thead>
<tr>
<th>Variable</th>
<th>Frequency</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>50</td>
<td>81.0</td>
</tr>
<tr>
<td>No</td>
<td>12</td>
<td>20.0</td>
</tr>
<tr>
<td>Total</td>
<td>62</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Mean of knowledge = 80%

Result of table (4-14) show that most of the study participants have good knowledge toward hearing aids
4-2 Discussion:

The result showed that the quarter of respondent (29%) were above 40 years, the (34%) of the study sample had basic school and (26%) were illiterate, and there was relation between education of the participants and knowledge (32%). Also results showed that more than half of the study sample (73%) were living in rural areas, and (48%) of them were unmarried and (43%) were married. Results showed that study sample (40%) their duration of disease was 1-5 years, (22%) were 6-10 years and more than half of them (51%) were use the device which is in the ear and (38%) were use behind the ear, and (37%) of them were using the hearing aid for 1-6 months and (29%) were using for 7-12 months the study revealed that (61%) of the study sample had no problems with their hearing aids. This is similar to the study of (Sergei 2014) were the clients revealed that they don’t have problems with their hearing aids using, where’s only (16%) have an inadequate amplification with the model also the result showed that the client have adequate knowledge about visiting hearing center for check up where’s (28%) of them responded with correct answer about the visiting center for check-up, and this was agree with study conducted by (Stachelin et al. 2011) which demonstrate that clients visiting the hearing center regularly for check up Referring to the cause if the hearing aids fail to work, (32%) of the study sample responded with correct answer that they check the battery or check the switch and visit the center if the device fail to work. This is similar to (Laplante-Lévesque et al. 2012) they stated that (37%) of clients check the battery if the device fail to work. (29%) of the study sample responded that they were responded with correct answer if there was poor amplification in the aids, while (24%) were think there was wax in ear. This was agree with study of (Laplante-Lévesque et al. 2012) which demonstrated that clients check the battery first if there’s poor amplification in there hearing aids eventually, the study show that most of the study sample chose the right answer about how to clean the device, where’s (92%) of them clean by soft tissue and this was confirmed by study of (Laplante-Lévesque 2014) where’s most of clients in this study also use soft tissue to clean there hearing aids. Finally, this study showed that the participants have satisfactory knowledge about hearing aids, their mean of knowledge was 52.5.
Chapter Five
Conclusions and Recommendations

5-1 Conclusions:

Based on the results of this study most of the study group represent good knowledge about the use and care of the device, they know how to clean the mold, in addition to their knowledge about time of visiting the center for follow-up.

The most common type of hearing aids used is the style in the ear, while number of clients using behind the ear devices.
5-2 Recommendations

The study recommended that:

- There should be additional center in different part of country to promote extended care facilities for the client to ensure good care and follow up.
- Psychotherapists should be included in the center to promote good psychological support and provide way of the clients with aids.
- Additional program should be included and performed in the center to ensure, demonstrate, and provide more teaching program to the clients.
References:

- Alshelabi. Ahmed (2013) Faculty of Public and Environmental Health, U of K Sudan


- David de Kretser, A.O. Governor of Victoria & Mrs. Jan de Kretser.(2010) hear service:
- Lebogang Ramma Ben Sebothoma (2016), Division of Communication Sciences & Disorders, University of Cape Town, South Africa.
- MBD, WHO, (2012) DHL estimates; DHL adult threshold is ≥41 dB, adults of 15 years or older.
- Maria Ines da Costa Ferreira, Jeandro Machado (2008), knowledge on adaptation process of users of hearing aid.
- Robyn M Cox, Jani A Johnson, and Jingjing Xu (July 1, 2017). "Impact of Hearing Aid Technology on Outcomes in Daily Life I: the Patients' Perspective"
- Sharfi Abdelgadir Omer Ahmed, Associated Professor, (2017) Faculty of Medicine, Omdurman Islamic University, Amarat Khartoum, Sudan

26
Appendix

بِسْمِ اللهِ الرَّحْمَنِ الرَّحِيمِ

Interview questionnaire designed to study the knowledge of
Client using hearing aids in Sudanese Hearing Center in Khartoum State

Serial no( )

First section: Demographic data:

1 / Age :
   a- 10-20 years    b- 21-30 years    c- 31-40 years    d- more than 40
2 / Residance :
   a- Urban        b- Rural
3 / Gender :
   a- Male         b- Female
4 / Educational level :
5 /Profession:
a- Employed       b- Unemployed

c- House wife      d- Student  6/

marital status:
a- Married       b- Unmarried
c- Divorcee       d- Widow

7 / How long did you had the hearing loss?
a- less than 1 year   b/ 1-5 years  c- 6-10 years   d- More than 10 years  Second section: knowledge

1 / Type of hearing aids used?
a-In the ear       b-Behind the ear
c-In the canal     d-Body aids

2 /How long, did you have had the aids?
a-1-6 month       b- 7-12 month

c-13-18 month     d- >2 years

3 /Is there any problem facing you with the model?
a-no problems      b-Pain and discomfort
c-Whistling noise d-inadequate amplification

4/How many times did you visit the center for check up?
a-Monthly           b-Every 3 month  c-Every 6 month  d- Every 12 month
e-When needed
5/What, did you do if your aids fail to work?  a-Check the switch  
b-Check the battery  
c-Examine for break  
d-Visit the center for check up

6/If there is poor amplification that mean?  a-Dead batteries  
b-Wax in ear  
c-Wax in the mold  
d-Improper mold

7/What did you clean the model?  
a-By soft tissue  
b-Spirit  
c-Tap water  
d-Dettol