



**SCHOOL OF HEALTH SCIENCES
USM HEALTH CAMPUS**

RESEARCH PROJECT

**THE USE OF MALAY VERSION OF HEARING
HANDICAP QUESTIONNAIRE ON ADULTS WITH
HEARING IMPAIRMENT : CASE STUDY**

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Abstrak

Pengukuran kesan sosial masalah pendengaran adalah penting bagi membolehkan kejayaan pengurusan pesakit dengan masalah pendengaran. Kajian ini dijalankan bagi mengkaji hubungan kesan sosial masalah pendengaran dengan tahap, jenis dan jangka masa masalah pendengaran berlaku. 10 peserta tanpa alat bantu dengar terlibat dalam kajian ini. Kesemuanya berumur 18 tahun ke atas, mempunyai masalah pendengaran, kesihatan mental yang baik, berminat dan boleh menjawab soalan dan mampu memberi komen berkaitan. Kajian dilakukan di Klinik Audiologi, Hospital Universiti Sains Malaysia(HUSM). Prosedur melibatkan 2 bahagian iaitu bahagian validasi borang penilaian tahap pendengaran dan pengumpulan data sebenar. Borang di wujudkan dengan sebaik mungkin dan di validasi dengan kaedah pilot. Semasa proses pengumpulan data sebenar, peserta ditemui secara individu dan mereka dikehendaki menjawab borang penilaian tahap pendengaran. 10 jenis keadaan pendengaran yang umum dan penting untuk dikaji ditanya di dalam borang penilaian tahap pendengaran (berdasarkan temu ramah dan pendapat pakar berkaitan). Skala 1 hingga 5 digunakan di mana skala 1 mewakili respon terhadap 'ketiadaan masalah' dan 5 untuk 'masalah pada tahap sangat teruk'. Audiogram bagi setiap peserta turut digunakan. Berpandukan audiogram, peserta dibahagikan kepada 3 kumpulan iaitu masalah pendengaran unilateral, masalah pendengaran simetri di kedua telinga dan masalah pendengaran tidak simetri pada kedua telinga. Kesukaran mendengar adalah pada tahap 10%(1 daripada 10 soalan) hingga 20%(2 daripada 10 soalan) bagi kumpulan masalah pendengaran unilateral. Kesukaran mendengar adalah di antara 80%(8 daripada 10 soalan) hingga 100%(10 daripada 10 soalan) untuk kumpulan masalah pendengaran simetri pada kedua telinga. Untuk kumpulan masalah pendengaran tidak simetri di kedua telinga, kesukaran mendengar adalah 100%(10 daripada 10 soalan) untuk kesemua peserta dalam kumpulan ini. Hasil kajian adalah konsisten dengan beberapa kajian yang pernah dijalankan yang menunjukkan wujudnya perkaitan antara tahap masalah pendengaran dengan kesan sosial masalah pendengaran. Kesan sosial masalah pendengaran adalah unik di mana peserta dengan masalah pendengaran yang sama boleh mempunyai kesan sosial masalah pendengaran yang berbeza. Kajian menunjukkan keberkesanan borang penilaian tahap pendengaran dalam mengukur kesan sosial masalah pendengaran. Walaubagaimanapun, kajian seterusnya hendaklah dilakukan dengan menggunakan peserta yang lebih ramai bagi menentukan keberkesanan dan kebaikan borang penilaian tahap pendengaran versi Melayu.

Abstract

The measurement of hearing handicap is important as it leads to better management of individual with hearing impairment. This research was conducted to study the hearing handicaps of adults with hearing impairment in relation to the degree, type and duration of hearing loss, by means of a simple questionnaire in Malay version. Ten unaided subjects participated in this study. All of them were above 18 years of age, had hearing impairment and in good mental health. They were also willing to participate, able to answer and give comments on the questionnaire. The study was conducted at Audiology Clinic, Hospital of Universiti Sains Malaysia (HUSM), Kota Bharu, Kelantan. This research can be divided into two phases: the validation of questionnaire phase and the actual data collection phase. In the first phase, the hearing handicap questionnaire was constructed accordingly and then validated via a pilot study. During the actual data collection phase, participants were interviewed personally to fill in the questionnaire. In the questionnaire, ten most common listening conditions were constructed (based on thorough interviews and opinions from experts) and rating of 1-5 was used (1 and 5 scale represents 'no problem' and 'severe difficulty', respectively). Audiogram of each participant was obtained, prior to the interview. Based on the audiogram, the participants were assigned into three groups: unilateral hearing loss, bilateral symmetrical hearing loss and bilateral asymmetrical groups. The result showed that the listening difficulties ranged from 10% (1 out of 10 questions) to 20% (2 out of 10 questions) in the unilateral hearing loss group. For bilateral symmetrical hearing loss group, the range of difficulties was from 80% (8 out of 10 questions) to 100% (10 out of 10 questions). All subjects in bilateral asymmetrical hearing loss group reported 100% hearing difficulties (10 out of 10 questions). These findings are in agreement with previous studies and support the claimed relation between the degree of hearing loss and hearing handicap. This study also found that subjects with 'identical' hearing loss showed different degree of hearing handicap (i.e. the hearing handicap is unique). This suggests a management strategy to be 'specific' for each person with hearing loss. This study demonstrates some values of having a Malay version of hearing handicap questionnaire to measure the listening difficulties among hearing-impaired individuals. However, further studies (with bigger sample size) are required to determine the usefulness of this hearing handicap questionnaire, especially for clinical use.

CHAPTER 1

INTRODUCTION

Chapter 1

1.0 Introduction

Individuals with hearing impairment may show various difficulties in listening. That is, they may suffer to hear conversation in quiet, in the presence of background noise, communicate in a group of people, listen to TV or radio and so on. All these listening difficulties are known as 'hearing handicap' because they prevent the hearing-impaired individuals to function 'normally' in their daily life.

Knowing the hearing handicap of a person is important to determine how the hearing loss affects the person's everyday life. In fact, the need for hearing handicap quantification was first implemented in the 1940's.⁸ It has been suggested that the determination of the type and degree of a person's hearing disabilities should be considered first in order to study the hearing handicap.⁵

Adults with hearing impairment may show a variety experience of hearing handicap, depending upon on the degree, type of hearing loss and onset of hearing loss. For instance, a person with mild hearing loss is generally known to have fewer handicaps, as compared to someone with profound hearing loss. An increase in the degree of hearing loss can lead to an increase in the degree of hearing handicap. A person who has much worse degree of hearing level may have more difficulties in daily communication. Moreover, the more loss of hearing he/she has, he/she will be more dependent on lip reading as a tool to help them understanding the speech communication.

Different types of hearing loss, namely the conductive, sensorineural or mixed hearing losses can also contribute to a variety degree of hearing handicap. Individuals with similar degree of hearing loss but have different the types of loss may experience different

severity of hearing handicap. For example, an adult with mild sensorineural hearing loss can have more handicaps during communication in noisy situations, as compare to someone with mild conductive hearing loss. This is because sensorineural hearing loss happens if the cochlear (that analyzes frequency aspect of sound) is damage. On the other hand, conductive hearing loss occurs due to blockage or disease affecting the outer or middle ear. This condition attenuates the sound and causes the reduction of sound transmission to the cochlear. In this case, the cochlear is healthy and the sound can be analyzed accordingly, although it is 'softer' due to the blockage/disease. Sensorineural hearing loss can be managed using amplification devices such as hearing aids, cochlear implants and so on. Conductive hearing loss can be treated medically or surgically or both.

The onset of hearing loss is also significant as it could give different impacts on the hearing handicap. The onset of hearing loss is the 'starting' point when a person realizes that he/she has hearing loss. In this situation, if hearing loss is significant, the person can actually notice that he/she has hearing difficulty. However, it is also possible that the person with hearing impairment may not notice that he/she has hearing loss in the first place, but other people (family members or friends) who may actually 'detect' the hearing problem. It has been demonstrated that longer duration of hearing loss could lead to more hearing handicaps. The progression of hearing loss (whether hearing becomes better, worse or stable) gives different impacts on the hearing handicap.

This area of research is important as hearing impairment cannot be measured directly from an audiogram. The Pure Tone Audiometry (PTA) can measure the degree and type of hearing loss but not the hearing handicap, as the hearing handicap is a complex phenomenon. That is, the hearing handicap involves the psychological and psychosocial aspects of hearing. Because of that, it is crucial to obtain the information regarding the

hearing handicap from the hearing-impaired sufferers. Various international hearing handicap measures have been developed and validated, such as the Hearing Handicap Inventory for the Elderly (HHIE), Client Oriented Scale of Improvement (COSI) and Abbreviated Profile of Hearing Aid Benefit (APHAB) to serve this purpose. Currently in Malaysia, there is no hearing handicap measure developed to assess hearing handicap in various listening conditions among Malaysian population.

It is hoped that this research can be a valuable element to study the hearing handicap of Malaysian adults. Cultural and social differences may also influence the hearing handicap among Malaysians. For example, Muslim people spend more of their time in the mosque (instead of church). Hence, a good measure of hearing handicap should consider all the relevant situations. The self-rated questionnaire of hearing handicap should also easy to understand and reliable. It is also important to have suitable items to reflect the 'true' listening difficulties faced by hearing-impaired individuals.

Therefore, the main aim of this research was to study the hearing handicaps of adults with hearing impairment in relation to the degree, type and onset of hearing loss. A validated questionnaire in Malay version was developed to serve this purpose.

CHAPTER 2

LITERATURE REVIEW

Chapter 2

2.0 Literature Review

2.1 Physiology of Hearing Loss

The healthy ear is an exquisitely sensitive organ. It processes sound frequencies ranging from 20 Hz to 20 kHz. It detects sounds as soft as 0.0002 dynes/cm² (0 dB) and can tolerate stimuli up to a million times more intense (200 dynes/cm² or 120 dB) for limited periods of exposure. The ear is particularly sensitive to signals between 500 and 4000 Hz, which includes the frequencies most important for speech processing.¹³

2.2 Anatomy of Ear

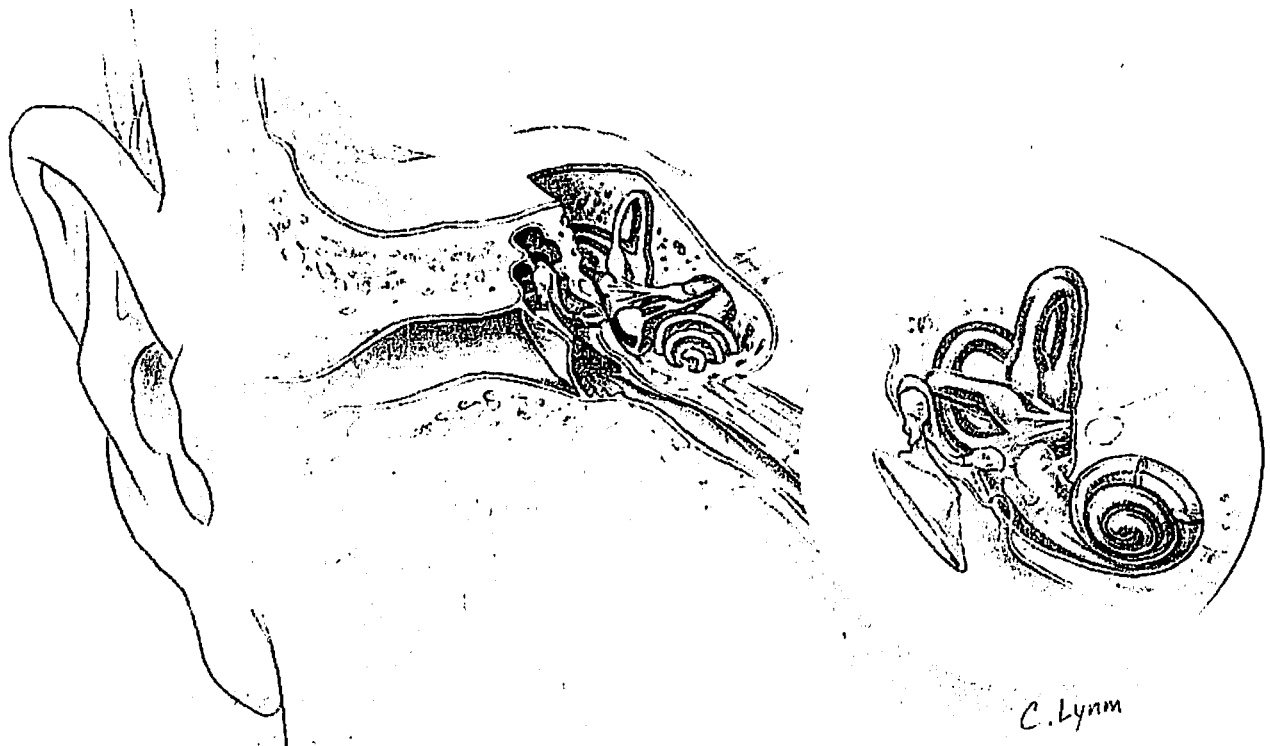


Figure 1: Structure of the human ear

The ear is composed of the external ear, the middle ear, and the inner ear, as shown in Figure 1. The external ear consists of the pinna (auricle) and the external auditory canal,

and it is immediately accessible to physical examination. Its function is thought to be largely protective, although its physical configuration may provide moderate (5-15 dB) passive augmentation of sounds at the upper range of speech processing frequencies.¹³

The middle ear is bounded laterally by the tympanic membrane (eardrum) and medially by the osseous labyrinth, which is the bone-encased structure that houses the end organs of hearing (cochlea) and balance (semicircular canals). The healthy middle ear is an air-filled cleft that contains the 3 ossicles (malleus, incus, and stapes) that transduce vibrations from the tympanic membrane to the oval window of the fluid-filled cochlea. The substantially larger area of the tympanic membrane, compared with that of the oval window, and the relatively minor mechanical gain from the ossicular configuration combine to amplify sound pressures by 20 to 30 dB (approximately the difference between a whispered voice and normal conversational speech).¹³

The inner ear includes the cochlea, the vestibular apparatus, and the vestibulocochlear (acoustic) nerve (cranial nerve VIII). The fluid channels within the cochlea are stimulated by the vibrating stapes footplate through the membranous oval window at the base of the cochlea. These fluid-filled channels (scala vestibuli, tympani, and media) are lined by hair cells, which are organized tonotopically (by sound frequency) in a coiled, spiral shape. The base of the cochlea responds to high-frequency sounds, and the apex responds to low frequency sounds. Inner hair cells are innervated by a rich array of afferent nerve fibers (10-20 fibers per hair cell) that synapse with auditory division of the vestibulocochlear nerve at the spiral ganglion.

2.3 Hearing Impairment

Many definitions have been made regarding a hearing impairment. The World Health Organization (WHO) (1980) defines impairment as “any loss or abnormality of psychological, physiological, or anatomical structure or function”. In accordance with the WHO definitions, impairment is also defined as “dysfunction that can be objectively measured, disability refers to the auditory deficits that are experienced by the hearing-impaired individual, such as difficulty understanding speech in a noisy environment” (Stephens & Hetu, 1991).⁶ While the American Speech-Language-Hearing Association (ASHA) (1981) defines hearing impairment as “the determination of a financial award for the loss of function caused by any hearing impairment that results in significant hearing handicap”. In simpler terms, hearing impairment refers to the amount of hearing loss in dB HL that exists based on the results of pure tone testing. In another words, impairment refers to hearing levels that fall outside of the normal range of hearing sensitivity.⁸

Individuals with hearing loss may not only experience declines in their abilities to communicate (Berkowitz & Hochberg, 1971; Mulrow, Aguilar, Endicott, Velez, et al., 1990; Weinstein & Ventry, 1983a). They may also exhibit declines in their overall and psychosocial functioning as a result of their hearing loss and communication difficulties (Marcus-Bernstein, 1986; Matthews, Lee, Mills, & Schum, 1990; Weinstein & Ventry, 1983b).

2.3.1 Measurement of Hearing Impairment

To assess hearing impairment, an audiologist routinely utilizes diagnostic tests such as PTA and speech audiometry. These diagnostic data mostly assess an individual's hearing impairment and may not provide precise information about the resulting communication handicap (Schow and Gatehouse, 1990; Schow and Nerbonne, 1982).⁸

The measurement of hearing is routinely performed with an audiometer or an equivalent instrument that can electronically or digitally generate and present a number of sounds (pure tones, speech, noise) to a listener at various sound levels that the examiner can control. The listener is usually seated in a sound-attenuated booth that minimizes external noise, and sound is heard through headphones or insert phone and bone vibrator.⁶

2.3.2 Pure Tone Audiometry

Pure tone audiometry (PTA) is a measure of hearing levels by air and bone conduction using pure tone stimuli (at 250, 500, 1000, 2000, 4000 and 8000 Hz) at selected intensities.⁷ The sensorineural hearing impairment is present if the bone conduction thresholds are outside of the normal limit, that is, greater than 15 dB HL, no significant air bone gaps are present (i.e., air bone gaps do not exceed 10 dB), and the air-conduction threshold are outside of the normal limit, that is, greater than 20 dB HL. A sensorineural impairment is characterized by poor bone conduction thresholds, signaling a problem in the sensorineural mechanism, and essentially equally poor air-conduction thresholds. A conductive hearing impairment is present if the bone-conduction thresholds are within normal limits, air-bone gap of 15 dB or more are present, and the air conduction threshold are outside the normal limit, that is, are more than 20 dB HL. Some clinicians consider the bone conduction thresholds to be within normal limit if they are 20 dB HL or less. ²

2.3.3 Sensorineural Hearing Loss

Sensorineural dysfunction involves deterioration of structures and functions related to the cochlea, or inner ear. When sensorineural dysfunction occurs, the inner ear does not adequately transduce sounds, and the result may be that sounds are either not heard, heard with lower intensity, or distorted.⁶ The more common causes of sensorineural hearing loss include presbycusis, noise induced hearing loss, Meniere disease, drug induced (i.e aminoglycosides) and infectious causes.⁷

Individuals suffering from sensorineural dysfunction have to rely on devices such as hearing aids to amplify sound and may also benefit from aural rehabilitation efforts that train hearing-impaired listeners to maximize their residual hearing capabilities.⁶ The profound deafness can be treated with cochlear implantation, which bypasses the hair cells to stimulate the vestibulocochlear nerve directly.¹³

2.3.4 Conductive Hearing Loss

A purely conductive hearing loss occurs when inner ear function is normal but sound is prevented from reaching the inner ear due to a dysfunction and/or blockage in the external or middle ear. The conductive losses are frequently responsive to medical treatment.⁶ The treatment is often surgical (eg, repair of the perforated eardrum, drainage of fluid-filled middle ear, reconstruction of the ossicular chain, removal of cerumen).¹³

2.4 Hearing Handicap

The World Health Organization (WHO) in 1980 defines handicap as a disadvantage for a given individual, resulting from impairment or a disability that limits or prevents the fulfillment of a role that is normal for that individual. In accordance with the WHO definitions, handicap refers to the non-auditory effects of a hearing loss on a person's life such as social withdrawal or relationship problems (Stephens & Hetu, 1991)⁶

The American Speech-Language-Hearing Association (ASHA) 1981 defines hearing handicap as the disadvantage imposed by a hearing impairment on a person's communicative performance in the activities of daily living.⁶

The effect hearing loss has on a person's communicative, social, and emotional life has been termed hearing handicap. It can vary considerably from case to case. Communication handicaps resulting from hearing impairment can range from mild inconvenience to a complete inability to understand conversational speech.⁸ Not every listening situation leads to a feeling of being handicapped, despite the presence of a hearing difficulty, for example not many respondents report being disabled when carrying on a conversation with someone in a quiet room.. This means that someone can be disabled in certain situations in daily life without having a feeling of being handicapped .The severity of a person's handicap depends on the type of disabilities he or she experiences.⁵

Since each person learns to cope with their hearing impairment differently, it is important to remember the amount of resulting hearing handicap varies greatly from person to person (Sanders, 1993).⁸

2.4.1 Measurement of Hearing Handicap

Self assessment scales, inventories, or questionnaires provide another way to measure hearing handicap. Self-assessment data reveal important insights about individual responses to hearing impairment that cannot be gleaned from audiometric data (Weinstein and Ventry, 1983). Hearing handicap represents the non-auditory problems resulting from hearing disorder, impairment or disability. With a combined administration approach of verbally asking the HHIE questions and a pencil-and-paper completion, Newman and Weinstein (1989) found the reliability to be high.

Although hearing impairment can be measured with a variety of audiological tests, these tests do not measure an individual's hearing handicap, the effect of hearing impairment on an individual's daily function. Kaplam (1982) describes hearing handicap as a diverse and complex phenomena. Non-audiological factors, a person's age, health status, environment, or how an individual adjusts to hearing loss, affect hearing handicap.¹⁰

Hearing handicap scales can assist the clinical audiologist in numerous ways. First and foremost, the individual's perceptions of communication difficulties can be measured (Schow and Nerbonne, 1982). When incorporated into the collection of case history information, results of a hearing handicap measure can provide valuable information. Furthermore, hearing handicap scales can be used quickly screen for hearing loss, develop and monitor aural rehabilitation progress, assist in counseling, aid in research, and validate compensation (Alpiner and Schow, 1993; Schow and Gatehouse, 1990; Alpiner and McCarthy, 1993).⁸

The communication problems and adjustment difficulties that constitute the disability and handicap domains of auditory dysfunction are assessed via self-reported,

indirect retrospective judgments. The disability and handicap measures address how an individual typically performs without controlling for motivation, cognition, and a host of other factors that are likely to be highly unpredictable. Additional difficulties in interpreting the sometimes equivocal findings throughout the literature arise from the use of non-standardized measures of disability and handicap and the use of different audiometric and self-report measures from study to study.¹¹

2.5 Relation between hearing impairment and handicap

The concept of hearing handicap reflects the communication and psychosocial difficulties that individuals experience as a result of hearing loss. Although hearing loss and hearing handicap are certainly related, the relation between hearing loss and hearing handicap is not as straightforward as it may seem.⁶ Hearing impairment and handicap are not considered to be synonymous, as reflected in working definitions developed by the American Speech-Language-Hearing Association (ASHA, 1996).⁸

Two people with identical audiologic results may not experience the same degree of hearing handicap due to different lifestyles and personalities (Schow et al., 1990)

One study found high correlations between hearing impairment and communication handicap in a sample of 80 older men (Weinstein & Ventry, 1983a), the majority of studies have found moderate correlations (Anderson, Dancer, & Durand, 1990; Berkowitz & Hochberg, 1971; Mc Cartney, Maurer, & Sorenson, 1976). Thus, most studies that investigated the correlation between hearing impairment and communication handicap found that audiologic variables explained no more than 50% of the variance in communication handicap.⁶

There are some consistent trends in studies of auditory impairment and disability and handicap. Correlations between a number of audiometric variables and varied self-report measures of disability and handicap are consistently moderate at best, albeit statistically significant, and, as noted above, vary depending on the measures that are correlated and the populations being studied (Berkowitz & Hochberg, 1971; Brainerd & Frankel, 1985; Demorest & Walden, 1984; Erdman & Demorest, 1990; Hallberg & Carlsson, 1991; Hawes & Niswander, 1985; Hetu, Lalonde, & Getty, 1987; High, Fairbanks & Glorig, 1964; Kielinen & Nerbonne, 1990; Kramer, Kapteyn, Festen & Tobi, 1996; Lutman, Brown, & Coles, 1987; Marcus-Bernstein, 1986; McCartney Maurer & Sorenson, 1976; Newman, Weinstein, Jacobson, & Hug, 1990; Pedersen & Rosenhall, 1991; Rowland, Dirks, Dubno & Bell, 1985; Schow & Nerbonne, 1980; Speaks, Jerger, & Trammel, 1970; Swan & Gatehouse, 1990; Weinstein & Ventry, 1983). The correlations tend to be stronger when the objective and subjective measures are similar in content.

Currently, the most widely held explanation for the discrepancy between hearing impairment and hearing handicap suggests that individuals have certain psychological characteristics that produce different levels of hearing handicap (American Speech-Language-Hearing Association, 1981; Helfer, 1991; Rosen, 1979; Thomas, 1988; Weinberger & Radelet, 1983; Weinstein & Ventry, 1983a, 1983b). Thus, the way a person subjectively experiences hearing loss may depend not only on the individual's objective level of hearing loss but also on psychosocial aspects of that individual.⁶

Newman et al. also illustrated the imperfect relationship between handicap and impairment by administering a self-report handicap. He found that the magnitude of hearing aid benefit, thus, was not affected by the degree of impairment.⁹

2.5.1 Relation between degree of hearing loss and hearing handicap

Individuals with similar levels of objectively measured hearing loss may exhibit widely different levels of hearing handicap. For example, one person may find a mild hearing loss somewhat annoying, whereas another person may experience the same mild hearing loss as highly debilitating. Those individuals would be said to have the same level of hearing impairment but different levels of hearing handicap. This observation has important implications because it suggests that hearing loss is not the only variable that contributes to the development of hearing handicap.⁶

The observed discrepancy between hearing loss and hearing handicap has been empirically validated in numerous research studies. “Objective” audiologic variables (e.g., pure-tone thresholds) that reflect the severity of hearing loss have been studied extensively in relation to hearing handicap.⁶

One of the study found that the degree of communication difficulty in patients with audiometrically mild hearing losses cannot be predicted from the audiogram.⁹

2.6 Consequences of Hearing Loss

The diminished ability to hear and to communicate is frustrating in and of itself, but the strong association of hearing loss with depression and functional decline adds further to the burden on individuals who are hearing impaired. Mulrow et al¹⁶ have reported the impact of hearing loss on social isolation, poor self-esteem, and functional disability.¹²

Individuals with hearing loss may not only experience declines in their abilities to communicate, they may also exhibit declines related to their overall and psychosocial functioning as a result of their hearing loss and communication difficulties. Many empirical

studies have found an association between hearing loss and difficulties in everyday communication abilities (Berkowitz & Hochberg, 1971; Mulrow, Aguilar, Endicott, Velez, et al., 1990; Weinstein & Ventry, 1983a). Examples of dysfunctions in everyday communication abilities include difficulty understanding speech with individuals and groups, in noisy public settings, and on the telephone. Individuals may also have difficulty understanding the television and radio, hearing other important sounds such as alarms, and hearing everyday noises such as traffic, a door opening, a clock ticking, and water boiling.⁶

2.7 Research Statements

Some important questions regarding listening conditions may not be asked in a routine clinic. Questions regarding the difficulty in certain listening condition could be missed during the history taking session. The questions regarding the hearing handicap is significant as the hearing handicap cannot be determine through the audiogram.

A hearing handicap questionnaire can be of valuable help as it can give information regarding the hearing handicap of person with hearing impairment. Two person with same degree and type of hearing impairment may have different hearing handicap and hearing difficulties in certain situations. Hearing handicap is unique to each person and is significant to be determined subjectively by using the hearing handicap questionnaire.

Till now, no Malay version of hearing handicap questionnaire is available. The various of international hearing handicap questionnaires are not suitable to be used in our Malaysian society due to different of culture and social context. The established of Malay version of hearing handicap is useful as it is practical and can be easily understood by the patient especially in Malay race.

If a hearing handicap can be measured, clinicians can manage patients effectively. The information of hearing handicap is well-documented and systematic. The information regarding the hearing handicap is useful for a better management of person with hearing handicap. For example, if the person has the difficulties during listening in meeting, an FM system can be an option to prevent the problem. With this information of hearing handicap, the management or goal can be set up to solve the problem.

Some international hearing handicap questionnaire has their own disadvantage. For example, COSI is not suitable for Malay use and its rating can be confusing. It is not suitable due to different culture and social environment. Some of the questions in COSI is confusing.

2.8 Research Questions

There were a few research question that need to be answer from this study :

1. Do degree, type, and duration of hearing loss affect the hearing handicap?
2. How degree, type, and duration of hearing loss can affect the hearing handicap?
3. Why hearing handicap can be significantly influenced by the degree, type, and duration of hearing loss?