I. INTRODUCTION

People with disabilities have abilities too
Make sure that those abilities blossom and shine so that all their dreams can come true

- ***Mary McAleese***

The word health is originated from the old English word "HOELTH" which means a state of bier and was generally used to infer a "soundness of the body". Health is defined in terms of an absence of objective sign indicating that body is not functioning properly, such as indices of high blood pressure and subjective symptoms of disease or injury such as pain or nausea (Ojha et al., 2010).

Health and disease are logical, complex and multi-factorial (Lloyd, 2014). The factors that influence health and disease include:

- ***Personal Essence*** is a descriptive concept of an individual's vital life force. When the personal essence is strong and in harmony with their desires, there is health.
- ***Lifestyle*** represents the human factor in health and disease. It is those essential elements that provide the nutrients and 'fuel' to sustain life, to move and to function. Lifestyle factors influence all stages of life and all stages of health and disease.
- ***Social factors*** relate to the relationships and interaction that one have with others. It relates to past and present family dynamics, work environment, community structure and support networks.
- ***Environmental factors*** look at the quality of air, water and soil in your surroundings. It also examines individual's exposure to heavy metals, chemicals, pollutants and other environmental toxins and pathogens.
- ***External factors*** are increasing all the time. It relates to any accidents, injuries or traumas that individual have incurred. It looks at their exposure to work environment. The impact of external factors can be immense and is important to address.

- ***Progression of Disease*** comes into play when an individual is no longer able to handle the number, intensity or duration of health destructive factors, for example, with chronic illness and advanced age. There is logic to the physiology of the body and times the innate response of the body. Determining what stage a disease or illness is, influences the treatments that are required to support healing or to improve quality of life
- ***Treatments*** relate to any premedical history, surgeries and cosmetic treatments that one has had (http://www.naturopathicfoundations.ca/ health-facts/ factors-that-influence-health).

The World Health Organization (WHO 1976) draws on a three–fold distinction between the three states of ill health, namely impairment, disability and handicap:

- ✓ **Impairment** is any loss or abnormality of psychological, physiological or anatomical structure or function.
- ✓ **Disability** is any restriction or lack (resulting from an impairment) of ability to perform an activity in the manner or within the range considered normal for a human being.
- ✓ **Handicap** is a disadvantage, for a given individual, resulting from impairment or a disability, which prevents the fulfillment of a role that is considered normal (depending on age, sex and social and cultural factors), for that individual.

In 1980, the WHO reaffirmed this classification (WHO, 1980), and in 2001 issued the International Classification of Functioning, Disability and Health (ICF). Impairment in bodily structure or function is defined as involving an anomaly, defect, loss or other significant deviation from certain generally accepted population standards, which may fluctuate over time (WHO, 2002).

The most common causes of impairment and disability include chronic diseases such as diabetes, cardiovascular disease and cancer; injuries such as those due to road traffic crashes, conflicts, falls, birth defects, malnutrition and other communicable diseases (NHRC 2005). Among these, diabetic foot ulcers cause elongated hospitalisations with high treatment costs and high rates of lower extremity amputations resulting in increased morbidity and decreased quality of life (Akcay, 2012). Diabetic neuropathy and its three subcategories can leave the lower extremity vulnerable to silent or painless trauma. That is the triggering event that can ultimately lead to lower extremity amputation, reports, Hinkes (2009). A compromised circulatory system fails to bring enough fresh oxygenated blood, nutrients, and antibiotics to a traumatic wound and the immune system cannot resolve an infection by fighting bacteria and cleansing the wound site on a cellular level, leading to amputation. In developed countries, vascular complications are the major contributors to lower limb amputations, whereas in developing countries, traumatic accidents are the major cause. Vascular complications and diabetes are burgeoning health issues in developing countries, and diabetic ulcers are precursors of lower limb amputation (Sage, 2006).

A study conducted from 2007-11 on reasons for amputation at the Government Institute of Rehabilitation Medicine, Chennai, revealed the following statistic. The hospital tracked 369 amputees of which 315 were men and the rest women. While 226 persons were found to be victims of ‘trauma,' 92 persons had lost their limb to complications caused by diabetes. In 2007, the hospital provided rehabilitation to 26 persons for diabetes-induced amputation, as against 31 trauma victims. In 2010, while 38 were treated for diabetes-related complications, 88 amputees had sustained injuries due to traffic accidents. While five persons were found to have lost their limbs due to congenital causes, 29 patients were victims of infections and burns (electrocution) reports Chinnathurai (2011).

Injuries appear to be one of the major causes of disability accounting for at least 100,000 (23 percent) amputees**.** As per documents, in the year 2009, total number of road accidents in India reported was to the tune of 4, 86,384 of which those injured was 5,15,458, which accounted for a daily accident rate of 1332 and a per hour data of 56. There is sharp increase in road accidents in India as there is a proportionate increase in number of vehicles on road too. This is a major concern for planners and policy makers (http://www.cpoindia.com/prosthetics/lower-extremity/).

Mehta (2013) states that with a population of around 61 million diabetics, India ranks next to China in housing the highest number of diabetes patients in the world. This estimate is based on a report by the International Diabetes Federation and World Health Organisation (WHO). However, though Indians and Asians are said to be genetically more prone to the ailment, the risk is 25 per cent higher if one of the parent is diabetic and 50 per cent more if both parents are diabetic. Diabetes is still more of a lifestyle disease and lack of awareness is to be blamed for making the insulin producing pancreas defunct, reports, Rao (2013). India is facing an epidemic of diabetes. In India there are 67 million, with another 30 million in pre diabetes group. By 2030, India will have the largest number of diabetic patients in the world. One of the most significant complications of diabetes is foot disease, which often leads to amputations – a feature found to be very common in developing countries like India, the to be diabetic capital of the world (Viswanathan and Kumpatla, 2011).

Amputations are performed to remove severely diseased, injured, or no longer functional extremities. As a preventive surgery and as a surgical measure, it is used to control pain due to a diseased condition of affected limb, such as malignancy or gangrene. It can also be loss of a limb or extremity from trauma or accident. Amputations can be performed at a variety of different sites, depending on the location of the damaged tissues, as little as a single toe might require amputation, or as much the entire lower body from the hip down. Common traumas that lead to amputation of the limbs include industrial accidents and burns (http://www.mossrehab.com/Amputation-and-Prosthetics/causes-of amputation.html/1 6.3.13).

The ***incidence of lower limb amputation is higher than that of the upper limb*** states Ziegler-Graham et al., (2008). Amputation leads to a permanent disability and brings a dramatic change in the life and function of the individual. This changed situation is experienced more by the lower limb amputees than by the upper limb amputees. Limitations in body structure and function due to the removal, affect the activity level, and thereby, the participation of the individual in the society (Ustun et al., 2003). Additionally, personal and environmental factors play an important role in determining outcomes after amputation and also their long term functioning.

Psycho-social supports are considered as important determinants for adjustment to amputation (Desmond et al., 2008). Depression, anxiety and body image disturbances

pose as determinants of standards in one's Quality of Living (QoL).Emotional status of lower limb amputee patients may be linked to perception of the body image (Akyol, 2013). The experience of amputation engenders disruption of body image that is subsequently associated with varying degrees of body image alteration. Re-conceptualization of body image after amputation requires the incorporation of both the loss of the limb as well as probable phantom sensation of the limb, and in some instances the incorporation of prostheses, canes, and crutches into the body image (Novotny, 1991).This potential for the incorporation of inanimate objects into the body image leads one to the related concept of "embodiment," a concept that has recently witnessed a resurgence of interest, especially among social scientists (Burkitt, 1999).**"Embodiment"** may be defined as giving physical expression to an abstract idea. In the context of the amputation experience, the way in which an amputee experiences him- or her-self and how they construct meaning out of their experience will influence their attitude toward the wearing of prosthesis. A given prosthesis may embody ability for one individual because they feel that it enables them to perform certain physical functions and social roles, whereas the same prosthesis may embody disability in someone else because they view it as prohibiting those functions and roles. Experiences of one's own body are the basis for all other life experiences (Novotny, 1991).

Despite mobility being projected as an important rehabilitation goal, there are additional factors which also affect the functioning and well-being of amputees. Therefore, quality of life (QoL) is increasingly being recognized as an important outcome for rehabilitation programs (Gallagher et al., 2004).

Physiatry or Rehabilitation medicine is a branch of medicine that aims to enhance and restore functional ability and quality of life to those with physical impairments or disabilities (Pezzin et al., 2000). ***Rehabilitation*** is a treatment or treatments designed to facilitate the process of recovery from injury, illness, or disease to as normal a condition as possible. The purpose of rehabilitation is to restore some or all of the patient's physical, sensory, and mental capabilities that were lost due to injury, illness, or disease. A proper and adequate rehabilitation program can reverse the disabling conditions and help patients cope with deficits that cannot be reversed by medical care (http://medical-dictionary.thefreedictionary.com/Rehabilitation).

Prosthesis is an artificial extension that replaces a missing body part such as an upper or lower body extremity. It is part of the field of **biomechatronics,** the science of fusing mechanical devices with human muscle, skeleton, and nervous systems to assist or enhance motor control lost by trauma, disease, or defect (http://w

ww.gov/tip/wp/pswp/upload/239_limb_prosthetics_services_devices.pdf).Prosthesis can improve the results of rehabilitation of the person with a limb amputation. If given the opportunity, most persons with an amputation will be able to use an artificial limb well.

Successful design of prosthetic devices hinges upon a research and development process that intimately combines end-users with device developers (Biddiss, 2007). This process focuses on the ***usability*** of the product in what is sometimes called a "user centred" approach to design. The concept of usability and the design and conduct of usability testing studies may be unfamiliar to many in prosthetics and rehabilitation because of the dearth of studies published in these areas. The field of usability engineering originates from the disciplines of human factors science and ***ergonomics*** (http://www.rehab.research.va.gov/jour/11/486/pdf/resnik148

6.pdf). With regard to the usability concept, Jin et al., (1997) refer it to the technical capacity (in terms of human features), i.e., its use and effectiveness to be used by a specific range of users, to complete a specific range of tasks through specific training and user support in a particular environment scenario.

Usability contains various components, and actually has no uniform specific indexes. The usability of product is actually used to evaluate the products for meeting comfort, efficiency and other demands from users, which are consistent with the design goals of ergonomics. ***Prosthetic leg is a typical man-machine system.*** The dynamic interactivity between the human body and the prosthetic leg (machines) brings about higher requirements for ergonomics design of prosthetic leg, in particular, proposes a special usability indicator of gait symmetry. However, currently a uniform standard for ergonomics evaluation of prosthetic leg function has not been established. According to the design mechanism of human engineering and prosthetic leg bionics, three major usability indexes, including **comfort, safety and efficiency** are generally used for ergonomics design evaluation (http://www.scielo.br/scielo.php?pid=S1678-58782011000300013&script=sciart text).

Successful rehabilitation of the amputee requires that the prosthesis be **acceptable** to him or her. Prosthesis acceptability depends on several factors including cosmesis, mass properties of the prosthesis, comfort, and function. Comfort and function are directly dependent on the quality of fit of the socket, the quality of suspension, the type of components used and the relative geometrical position of these components to each other. The position and orientation of these components, the major elements being the socket, joint(s), and terminator (e.g., foot), are defined as the alignment of the prosthesis. If an acceptable alignment of lower-limb prosthesis cannot be achieved, the limb may be rejected by the wearer. Often the patient complains of discomfort or pain associated with the socket when in fact the alignment of the prosthesis is the root cause. Failure to provide a satisfactory alignment may result in problems for the amputee, such as difficulty in walking, stump pain, or tissue breakdown. It is therefore important to make every endeavour to provide an acceptable alignment to the patient on every occasion that the need arises and that the alignment arrived at be the "***optimum alignment***." (http://www.rehab.research.va.gov/jour/86/23/2/ pdf/zahedi.pdf)

One of the single most determining factors of whether a person will use prosthesis is prosthetic socket design. Regardless of the cause**, prosthesis abandonment** is a serious problem that should be avoided whenever possible given the likelihood that repetitive stress syndrome may develop in individuals that rely heavily on one limb for daily tasks. The foundation for all prosthetic procedures is a well designed and considerate prosthetic socket (http://www.lakeprosthetics.com/published/The_Evolution_ of_Upper_Limb_Prosthetic_Socket.5.pdf)

Readjusting to life after amputation is likely to be challenging for most people. Difficulties in adjustment are typically associated with reports of depression, feelings of hopelessness, low self-esteem, fatigue, anxiety, and sometimes suicidal ideation. A multitude of related problems, including maladaptive coping behaviours (e.g., drug /alcohol consumption), greater disability, poorer social functioning, and loss of functional independence, may result from difficulties in psychological adjustment (Garafalo, 2000). Sequel of amputation has adopted an almost exclusive focus on the **negative impact** the event has on the persons' life and well-being. Recently, there has been an attempt to redress this imbalance by identifying factors that promote positive adjustment (Gallagher and MacLachlan, 2000).

Amputation and rehabilitation places a set of extra ***demands or challenges on the family system;*** most of these demands last for a long time. Many of these challenges cut across amputation type, age of the person with the amputation, and type of family in which the person lives (Rolland, 1994). There is also a whole set of emotional issues that confronts family members, including grief over the loss of abilities, worry about the future and the costs, feelings of guilt, blame, or responsibility, and trying to find a cause and a meaning for amputation (sorrowful event). Just as disability changes the life of amputees forever, it also changes partner's life style too. They take the role of being the emotionally stable. Partners are constantly battling with egos of the amputees, as they don't accept help graciously, nor ask for help, and refuse help that they could use (http://family.jrank.org/pages/396/DisabilitiesImpact-Disabilities-on-Families.html).

The ultimate challenge to the family is to meet the rehabilitation-related needs and simultaneously to meet the needs of the family and its members of having a normal life (Gonzalez et al., 1989). These factors also affect the ***Resource management*** potential of the affected individual.

A major challenge now and in the future as stated by Key and Firebaugh (1989) would be the integration of Resource Management with other theories to address theoretically and socially relevant issues. One such issue is family resource management in a crisis or stressful situation (McCubbin et al., 1980). Family resource management processes are particularly applicable to both avoiding ***crisis*** and ***stress*** in the first place and managing crisis and stress when it has occurred (Rice and Tucker, 1986).

Crisis is a short term phenomenon, but stress is connoted as long term and continuous. Stressor is any event that causes change within the family. It is a situation with which one has limited advance experience and is thus perceived as problematic (Hill, 2003). Chronic diabetes, vascular disease or an accident for a family member is one such event. Boss (1987) had stated that a stressor event is a stimulus that threatens the status quo and the stressor event or situation is the stimulus that forces some response. Here the response is agreeing for an amputation by the member. She further suggests that a stressor event may not act directly, but has an effect only as it is perceived. An injury, chronic disease and amputation are stressor events internal to the family system. They can be perceived as stressor or not by the family. ***Stress always precedes crisis***. When stress is unresolved or inadequate coping strategies are used and when resources are

absent or inappropriate, stress progresses to crisis. An amputee, detesting donning a prosthetic can tantamount to a crisis. A crisis is a disturbance in the system equilibrium so acute and strong that the family is at least temporarily immobilized. It cannot function (Boss, 2002). The affected individual and the family therefore are forced to embark on coping with the situation.

Coping refers to 'adaptation under relatively different conditions' states Dorian (2007). These adaptable processes focus on observable adaptable efforts and are posited to mediate or moderate the relation between stress and dysfunction. The more cohesive, flexible, bonded and adaptable the family is the better members are able to cope with stress.

Another critical coping resource is ***social support***. Social support is usually seen as a moderator between stressor events and the level of stress experienced. Foa in 1974 had viewed interpersonal relationships as an arena for the exchanges of love, status, information, services, goods and money resource. The theory assumed that human beings depend on each other to meet many needs for well being and that people seek social situations where they can exchange resources with each other. Foa and Foa (1974) thought that these six resources comprised a necessary and sufficient list of the resources exchanged in relationship and when the supply of any one of these resources falls below a certain level, ***well-being*** is impaired. Caplan also in 1974 had suggested that an effective social support system to have allowed a person to receive the following benefits: be respected and treated as a unique individual (status); know that others are interested in one's welfare (status); receive information and feedback (information); receive love and affection (love), be given services and help (Services); and receive supplies of money, materials (goods), tools, skills (services), and cognitive assistances (information). Crisis/stress management can thus be conceived of as the ability to find or create resources and use them in ways that fill the most critical limitations expanding one's perception of stress or crisis.

Resource management theory draws upon concepts from psychology, sociology, family science, business, economics, and home management. Family stress theory incorporates concepts from the social sciences as well as medicine and engineering. Integration of these two domains is potentially fruitful because, although the theories have some common concepts (e.g., resources, management), they focus on different processes. Resources management theory focuses on conscious decision-making to

achieve goals and plans while stress theory focuses on coping responses to crisis or stress situations (Garrison et at., 1990). In fact, Boss (1988) has defined coping as management, arguing that coping is the cognitive, affective, and behavioural process by which individuals and their system as a whole manage (rather than eradicate) a stressful event or situation.

Donning a prosthetic limb is definitely a stressful event in an amputee's life. If by any reason the prosthesis does not fit or the amputee is not supported by family or the social set up, the condition can lead to crisis. Above all getting acclimatized to the extra fitting, the artificial appendages and adjusting one's physical movements is a known risk factor. Hence many amputees detest the prosthesis. These problems are all the more pronounced in lower limb amputees as they are more common. The scientific study of Ergonomics mainly assists here. Rehabilitation after amputation is fundamentally linked with the individuals' ***psychological adjustment*** to the injury. Typically, however, the most immediate challenge facing an individual after an amputation is acquiring prosthesis and becoming proficient in its use. Well thought out socket designs and careful consideration of residual limb presentation sets the stage for patient success - maximizing range of motion, providing stability throughout daily activities, and comfortably distributing the forces exerted on the residual limb during movement and suspension (Lake, 2008). Clinically, this decision becomes detrimental years later when repetitive stress syndrome compromises the remaining natural limb, causing pain and loss of function. Other causes of prosthesis abandonment include functionality of component, weight, and time to fitting and follow up. Consequently, numerous studies concentrate primarily on ensuing physical adjustment and the prosthesis and factors that facilitate or impede this adjustment process, whereas affording little consideration to psychosocial, demographic, and disability related factors (Grise et al., 1993).

Scope and Need for the Study

An amputation is the surgical removal of part of the body. Amputations have an acute impact on activities of daily living and mobility. It can severely affect a patient's balance because their centre of gravity will shift towards the remaining leg. Prosthesis is a device designed to replace, as much as possible, the function or appearance of a missing limb or body part. Lower extremity prosthesis must permit comfortable ambulation and minimal expenditure of energy. Reduction of energy requirement depends on minimizing the shift of the centre of gravity of the body during gait by a

well-fitted socket and proper alignment. The socket contours and the over-all alignment to be incorporated into any lower-extremity prosthesis depend upon the interrelation of many factors. It is important to plan for alignment before the socket contours are considered because the orientation of the socket on the stump and the alignment of the socket on the prosthesis may affect considerably the method of fitting the socket.

Amputees possess by definition a functional asymmetry. Lower leg amputation generally includes asymmetrical weight-bearing with more weight on the non-prosthetic leg (Duclos, et al. 2008). This can be detrimental to an amputee's long term quality of life. This suggests that successful rehabilitation of an acute or chronic impairment extends beyond the acquisition of endurance, strength, range of motion, or learning about a new strategy (Miller and Deathe, 2004) - factors contributing to one's ***well being*** and ***quality of life***.

Scientific studies have been conducted to quantify attributes that may be important in the creation of more functional and comfortable lower-limb prostheses. The prosthesis socket, a human-machine interface, has to be designed properly to achieve satisfactory load transmission, stability, and efficient control for mobility. The biomechanical understanding of the interaction between prosthetic socket and the residual limb is fundamental to such goals. The purpose of this study is to evaluate the socket biomechanics, (including socket pressure measurement, friction-related phenomena and associated properties and limb tissue responses to external mechanical loads) other physical conditions at the interface and the alignment of the limb prosthesis.

The resourcefulness of a person is highly dependent upon his ability for mobility. This again is an ergonomic concept, where the person has to interact with the device and find satisfaction with the same. As Ergonomics deals with the health, safety and satisfaction of the human being, anything that is designed, has to be ***user friendly***.

Prosthetic technology is certainly advancing rapidly. For most people, these state-of-the-art devices are neither affordable nor well suited for day-to-day life. Yet it is found that amputees are apprehensive about ***access and adaptability of prostheses***, which they depend on to regain gait and postural balance absolutely necessary for normal living. The study aims to analyse the reasons pertaining to limitations in use of prosthesis on the one side and to highlight the aspects of its censure that do not qualify for being user friendly on the other.

Strength, balance, and coordination are the primary physical factors influencing single-limb stance on prosthesis. Additionally, fear, pain, and lack of confidence in the prosthesis must be considered when an amputee is demonstrating extreme difficulty in overcoming weight bearing on the prosthesis. It is important to recognize the need to promote adequate weight bearing and balance on the prosthesis prior to and during ambulation (Gailey, 2014). These facts all the more influence a negative impact on their bearing, day to day activities, social acceptance and the like.

Measurement of outcomes is a systematic approach for evaluating the quality of care and effectiveness of treatment that is provided to the patients with amputations. By incorporating outcome measures in daily practice, one can evaluate the various aspects of clinical care, such as confidence level with the prosthesis, socket comfort, functional level, for clinical care gratification and quality of life from the user (consumer) point of view (Vibhor, 2013).

The family system supports the individual on one score. The social support available introduces them to the new world of human – machine interface – the prosthesis. The amputees therefore have to adapt themselves to the 'give and take policy', where he or she is forced to practice ***reactive management,*** as ***adaptation*** involves making a better fit between the environment and the environed unit (Siegel, 1984). The nature of grief and the stages of the grieving process they had undergone are in keeping with the extent to which they evolve their own management strategies. By doing so, it is expected that the amputees would tackle both stress and crisis effectively. There is meagre data regarding the overall incidence and etiological background of lower limb amputation in India. ***Cohort*** is a group of people who share a common characteristic or experience within a defined period. Supportive studies and literature to supplement the status of a cohort – the amputees – and the means they adopt to meet the exigencies of living with an artificial limb is lamentably scarce. Knowing that the statistic of amputees, that too lower limb amputees, was on the rise and a Good Samaritan group of prosthetist team guided by Orthopaedics are on a war footing to ambulate this group, it was felt necessary to study both the groups. This era is witness to a joint-awakening in all stakeholders, including those into "robotics" who lend their support in favour of this cohort (Exhibit - 1).

Exhibit 1 : Awareness Through Print Media

Thus this group of people, who were amputated during the period of study, formed an ***Amputated Cohort*** and the technical team of prosthesis fabricators, the ***prosthetist cohort.*** Both contribute to and gain from the Science of Ergonomics. Being an ardent Research Scholar in Resource Management inspired a genuine interest to study the interplay of the two disciplines in rejuvenating the living standards of the concerned group, in the mean time analyse their attitudinal change towards self care too. With this back drop, this socially – relevant study on "**Accessibility and Adaptability of Limb Prosthesis –An Ergonomic Concern"** was launched with the following objectives:

Objectives

- *Investigate the causes of amputation*
- *Examine the compromises made by the amputees to lead normal living and manage stress*
- *Know the functional capability of the prosthesis users citing access and adaptability*
- *Understand the rehabilitative practices adopted by prosthetic teams*
- *Comprehend the role of Ergonomics in fabrication and use of Prosthetics.*

Hypothesis

- *The transtibial adapt better than transfemoral in Rehabilitative phase*
- *Age does not influence lower limb anthropometry in prosthetic design*
- *Duration of amputation and total limb length of amputees are not associated*
- *Prosthetic prescription is not based on individual anthropometry*
- *Cost factor and sophisticated bio-mechatronics largely influence consumer satisfaction and access*

Limitations of the Study

The study is typically aimed at studying only those samples with below-knee amputation. Only adults have been chosen for the study. Children below 18 years were not included because of frequent changing of prostheses, due to their growth phase.

The investigator had approached three different Centres for gait analysis – two in Tamil Nadu (CMC, Vellore and CLRI, Chennai) who refused permission and one in Karnataka (Bangalore) who permitted her to do. Despite obtaining ethical clearance and permission, the analysis could not be done as the Centre (laboratory) was closed for

renovation work and the investigator's study period got exhausted by the time the clearance was obtained. It will be taken up as a follow up study.

Upper limb amputees were not included in the study as the sample size were less in number compared to lower limb amputees and also because they were the frequent rejecters of prosthesis.

This study was focused on a **behaviour trajectory**, considering the **user as a" consumer**". The benefits they acquire or what they lose is thought of as **a discount, as their health** is an essential resource, which can help them sustain, overcome their discomfort and lead a quality living. It is also envisaged that the outcomes of the study would make the device **more "accessible"** than being **affordable** and pave a positive way for realistic and fruitful use of the device (prosthesis), for its **"designed use".**

It is hoped that the study would throw light on an important segment of the population whose acquired limb can witness green pastures in their life span of rehabilitation.