Chapter 1

INTRODUCTION

1.1 Introduction

Acupuncture is a part of traditional Chinese Medicine (TCM). It aims to restore and maintain health through the stimulation of specific points on the body. Acupuncture is among the oldest healing practices in the world. In the United States, where practitioners incorporate healing traditions from China, Japan, Korea, and other countries, acupuncture is considered part of complementary and alternative medicine (CAM).

In second century BC the sources of information on acupuncture were the Huang Di and Nei Jing. The human body is a miniature representation of the whole world said by Nei Jing and body's external and internal environment can be balance by state of health. From the earliest European it has been known that from 16th and 17th centuries the acupuncture came. The word acupuncture mainly from French Jesuits ,like acus means needle and puncture means puncture.

Now both the Chinese and Western scientists are interested in acupuncture. But the exact explanation can be given by Traditional acupuncture compared to western point of view.
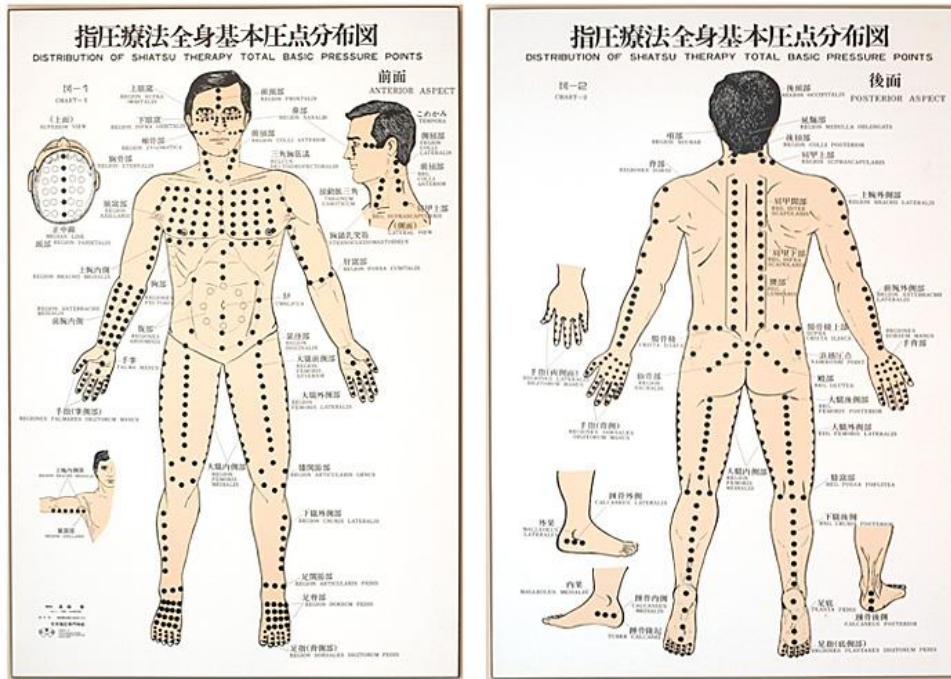
Figure 1 Acupuncture points. (Zhen Huang et al;2008).

1.2 Research Problem and Problem Statement

1) Still now it has not proven that acupuncture can be used for all types' diseases and also need to spread the effectiveness of acupuncture worldwide.

2) Quantitatively measurement by using engineering tool is needed for acupuncture, method of assessment also a important topic here.

1.3. Objectives

1) Body composition data need to measure and represent before and after acupuncture.

2) By using statistical tools need to analyze the result of body composition of the acupuncture therapy patient.

1.4 Hypothesis

1) Acupuncture therapy treatment will have some changes on body composition

2) Effectiveness of acupuncture therapy treatment can be represented quantitatively.

1.5 Scope of the Study

Scope of this study is restricted to Malaysian patient that undergo the acupuncture therapy treatment and only immediate response of the treatment is measured.

1.5 Significance of the Study

Mere believe in the alternative medicine needs to be proven quantitatively so that people can be convinced and not deceived by unsupported claims. As acupuncture therapy exist since long time ago, accreditation is necessary to assess the effectiveness of this method.

Chapter 2

LITERATURE REVIEW

2.0 Acupuncture

Now acupuncture is a famous alternative treatment in human medicine, veterinary medicine. It is becoming very popular due to this reason. (Habacher et al, 2006, Xie and Ortiz-Umpierre, 2006).

More than 210 articles have been published listed as acupuncture in the data base system named Pub Med. Many observational and uncontrolled studies have tested acupuncture effectiveness in exercise-related medicine, anesthesia, pain management, geriatric medicine, exercise-related medicine, control of surgical conditions such as abomasal displacement in domestic animals and different farm. (Xie and Ortiz-Umpierre, 2006).

Acupuncture is a technique for inserting needles into the body to introduce anesthesia or reduce pain. In detail, acupuncture basically is a procedure involved with stimulation of anatomical locations on or in the skin by using different types of techniques. Actually acupuncture is used for maintaining condition of body or treats human diseases for thousands of years. (Sheng-Hsiung Hsia et al, 2008).

Now different types of model are used to describe the mode of action on acupuncture .Acupuncture now has increased scientists curiosity. So now scientists shows their interest in acupuncture and they investigate the different points of acupuncture, also they have tested different clinical trials by which they can measure the efficiency of acupuncture using different points of it .Still now the mechanism of various meridians of acupuncture not clear at all (Sheng at el, 2008).

Previously a lot of research had been conducted regarding physiological effects of acupuncture on human bodies and animal. It has been proved that due to acupuncture, blood flow will increase and that meridians and acupuncture have high conductance (Hsiao Sheng et al; 2009).And there is also a relationship between meridians and acupuncture points with the perivascular space and connective tissue planes. At the side of National Center for Complementary and Alternative medicine (NCCAM) have the result of a number of possible mechanisms by which acupuncture have done (Konofagou et al;2009).

It has been proved that acupuncture has an effect throughout the nervous system and at the same time activates the pain killing biochemical such as endorphinsand immune system at a specific part of our body(Zhen Huang et al;2008).Also it has been shown that acupuncture can alter the brain chemistry by the effect of neurohormones and neurotransmitters and this will also affect the central nervous system which is related to involuntary body functions such as blood flow, body temperature immune reactions and sensation. (Tang-yi Liu et al; 2009).

From the previous history it has been proved that in China acupuncture has practiced over two millennia and after that becoming popular in west for different types of treatment for pain. (E.E. Konofagou1 et al,1998).

Now acupuncture also becoming popular as a alternative treatment for medicine in Western society. Recently it has been shown that about 15 million Americans used this treatment in a single year.Also from the report of the World Health Organization (WHO) that now in United States have approximately 10, 00 acupuncture specialists, and near 3,000 physicians practicing acupuncture(Tang-yi Liu et al; 2009).

It has been proved that the neuroanatomical regions which is involved in acupuncture treatment is not completely developed but it is likely be necessary for

development of the acceptance of acupuncture in medical community in Western countries. (Todd B, et al, 2005).

In China for the treatment of acute and chronic disorders more than two millennia now accepted acupuncture. Acupuncture is becoming popular day by day specially in the West for the relief from nausea and vomiting associated with substance dependency, chronic disorders, chemotherapy, and treatment of pain which is difficult to manage for treatment. So now acupuncture becomes an alternative treatment method all over the world but the fundamental aspects behind its therapeutic benefits are not clearly understood yet. (Elisa et al, 2005).

The main purpose of this study is to investigate the effect of acupuncture before and after acupuncture in term of resistance (R); reactance (X); impedance (Z); Phase angle; and capacitance (C) of female and male subjects that can be measured as bioimpedance (BI) parameters.

The body composition parameters included with Intracellular Water (ICW) ,Fat Free Mass (FFM); Total Body Water (TBW); Extracellular Water (ECW) Basal Metabolic Rate (BMR); and are calculated based on bioimpedance (BI) parameters. We used here ANOVA test and T test method for experiment.

2.1 Types of therapies

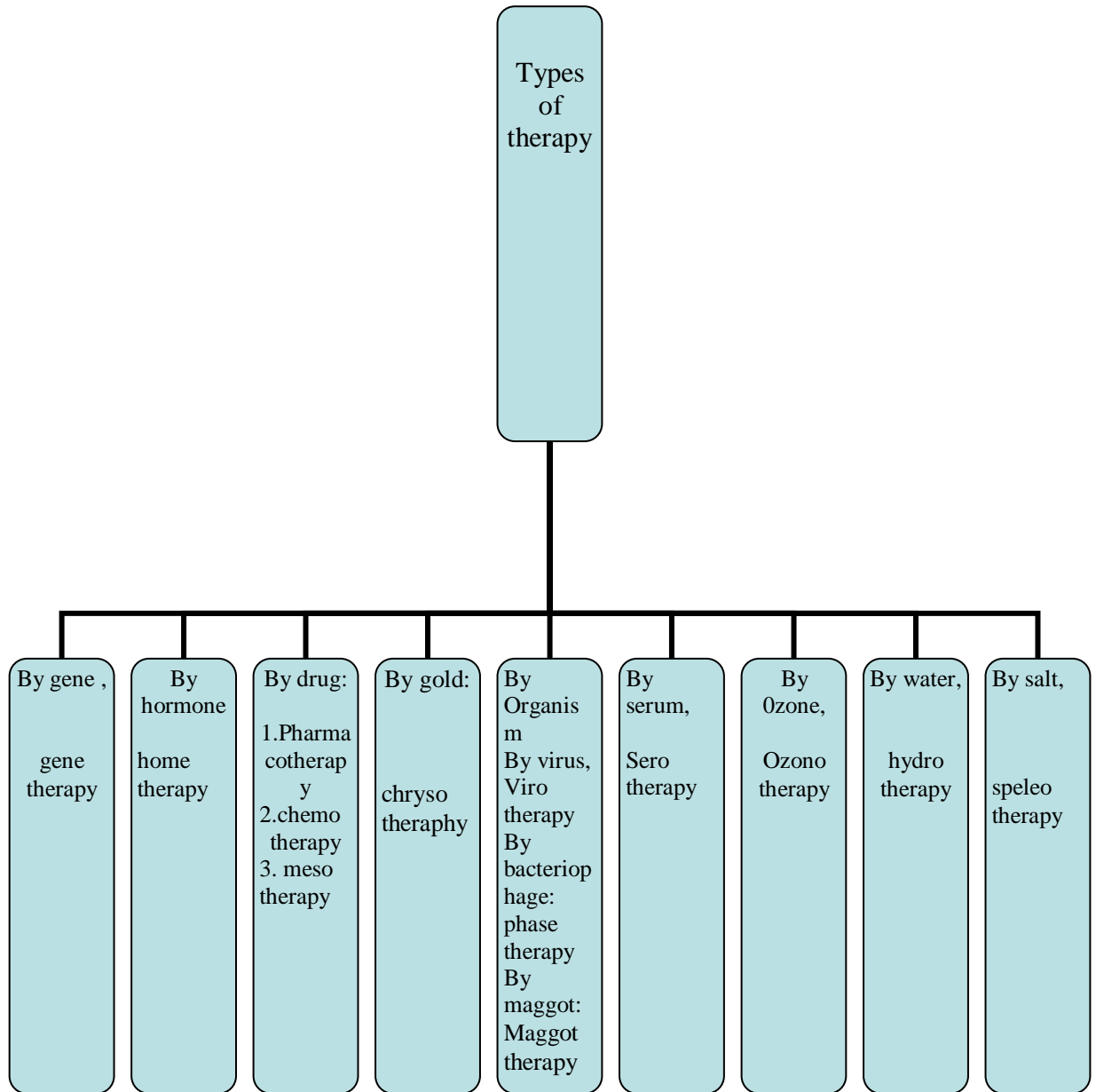According to the thing used for therapy/treatment treatments can be classified as,

Figure 2.1 Different types of therapy.

2.1 Types of therapy

By gene

2.1.1 Gene therapy

Gene therapy is used to treat disease,removal or insertion can be done for biological tissues or individual cells to define disease. By this technique we can identify the correct gene which is responsible for those specific diseases.

One of the most common things for gene therapy is inserting of specific gene in a specific genomic area of the body. On the other hand, directly applied the mutation or sometimes need to modify the normal genes that have the capacity to enables viral infections. Still now this techniques are used in some cases (Kamimura K et al,2011). Different types of gene therapy:

Mainly there are two main types for gene therapy:

2.1.1.1 Germ line gene therapy

In this type sperm eggs or germ cells are used for Germ cells, sperm or eggs, are used for functional genes, then they are to integrated into their genomes. After this the difference due to therapy may be heritable and can be passed on to new generations. This new approach can be highly efficient in counteracting gene disorders and some hereditary diseases. But some people prohibit this application for human beings for some ethical reasons (Zhang G, et al,2011).

2.1.1.2 Somatic gene therapy

The therapeutic genes are transferred into patients somatic cells, this is the principle of somatic gene therapy. In this type of therapy modification is restricted.
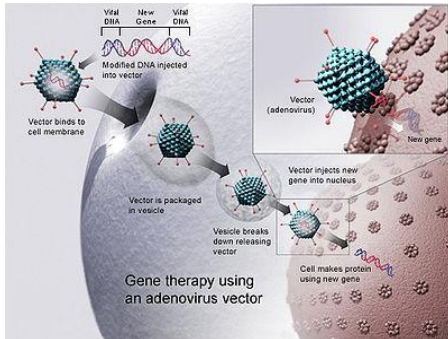

Figure 2.2 Gene therapy   using an Adenovirus vector A new gene is putting inside   into an adenovirus vector, This one represents modified   DNA(Harwood et al;1994).

What is gene therapy?

Basically it a technique by which we can identify the defective genes which are responsible for some diseases .Researchers can use one of the following technique to correct the faulty genes.

➢ A normal gene can be put inside into a location which is non specified   which should be within the genome and it will help to replace the non functional gene. Sometime an abnormal gene can be used to swap for a normal gene in the total homogeneous recombination.

➢ The abnormal gene can be also replaced by repair by selective mutation and this will help the gene to turn into its normal condition.

➢ Another process is the regulation of a specific gene can be changed.
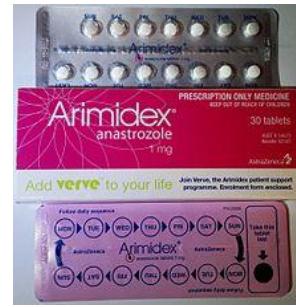
2.1.2 Hormone therapy or hormonal therapy

Hormonal therapy or hormone therapy is one kind of therapy in which hormone is used for medical uses. So the treatment which is related with hormone known as hormone therapy.(James L, et al;2006).

Hormone used for some specific diseases like cancer, aging, sex reassignment, intersex conditions, hormonal deficiencies, psychological treatment etc.Hormone therapy is one of the important treatments for cancer treatment. It Hormonal therapy is one of the major modalities of medical treatment for cancer. It involves with the endocrine system with exogenous administration of specific hormones, specifically some particular steroid drugs or which protest the production or activity of this types of hormone. Because for certain cancer cells steroid hormone are powerful drivers ,by changing the activity of certain hormone can create the growth of cancer cell or sometimes can kill the cell. (James L, et al, 2006).

Hormone therapy can be used for some different purposes like different types of cancers derived from some hormonally responsive tissues including the prostate, breast, adrenal cortex and endometrium. For treatment of amelionate certain types of cancer and paraneoplastic syndromes and also for chemotherapy hormone treatment can be used. The common example of hormone therapy is use of some selective estrogen response for the treatment of breast cancer.(Rebar EJ ,et al 2006).

Figure 2.3 Nolvadex (tamoxifen) 20 mg tablets   Arimidex (anastrozole) 1 mg tablets

2.1.3 By Drug

2.1.3.1 Pharmacotherapy

Pharmacotherapy is one kind of treatment in which drugs are used for the diseases. It is one of the larger categories for treatment. Normally pharmacists are quite expert in pharmacology and it is also their responsibilities for ensuring economic , appropriate and safe use of medicines, The pharmacists deal with direct patient care , sometime they are from multidiscipline and together they act like a primary source of drug information. In the US, it is mandatory for a pharmacist to fulfill all the requirements and also pass the examination, because normally pharmacies provide the basic information of all the drugs to the patients and some insurance companies take care of these pharmacies.

2.1.3.2 Chemotherapy (sometimes cancer chemotherapy)

Chemotherapy (sometimes cancer chemotherapy): is the treatment of cancer with anantineoplastic drug or with some combination of different drugs into a standardized treatment regimen. Most commonly, chemotherapy acts by killing cells that divide rapidly, one of the main properties of most cancer cells. This means that it also harms cells that divide rapidly under normal circumstances: cells in the bone marrow, digestive tract and hair follicles. This results in the most common side effects of chemotherapy: myelosuppression (decreased production of blood cells, hence

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also immunosuppression), mucositis (inflammation of the lining of the digestive tract), and alopecia (hair loss). Newer anticancer drugs act directly against abnormal proteins in cancer cells; this is termed targeted and is technically not chemotherapy.

Figure 2.4 a women being treated with docetaxelchemotherapy for cancer. (James L, et al, 2006).

2.1.3.3 Mesotherapy

Mesotherapy :(from Greek mesos, "middle", and therapy from Greek therapeia, "to treat medically") is a non-surgical cosmetic medicine treatment. Mesotherapy employs multiple injections of pharmaceutical and homeopathic medications, plant extracts, vitamins, and other ingredients into the subcutaneous fat. Mesotherapy injections allegedly target adipose fat cells, apparently by inducing lipolysis, rupture and cell death among adipocytes.

2.1.4 By Gold

Gold treatment is another kind of treatment in which gold salt is used. Actually From some chemical ionic compound gold salt is made. Chrysotherapy means the therapy in which gold is used. In 1535 this application of gold in medical side was first invented. Normally for rheumatoid arthritis and to reduce the inflammation gold therapy is effective. But generally for electroplating we use gold.
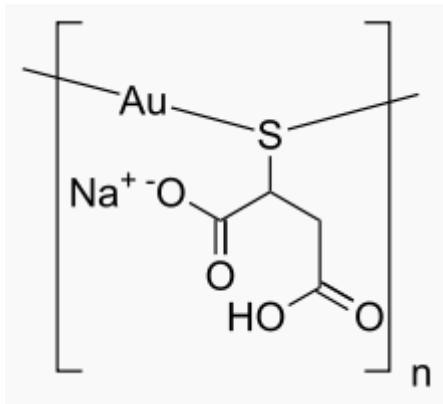

Figure 2.5 Sodium aurothiomalate

2.1.5 By Organisms

Virotherapy is one kind of treatment using virus for cancer fighting agents by doing some reprogramming virus to kill the cancerous cells, which the healthy cells will not affected. Adenoviruses and Herps simplex virus are two viruses' uses normally for this treatment. Normally this type of treatment used in various diseases but commonly for A DNA particular or a specified target cells. In 1950 doctors invented that a cancer patient who have been suffer long time for a non related viral diseases or the patient who have been vaccinated in recent times , their body will show some sign of improvement.

2.1.6   By Ozone

By ozone there is another kind of in which ozone is used. Normally the ozone from stratosphere is harmful for human being due to solar radiation but the ozone which is in ground level is good for human being. The application of ozone therapy normally applied for alternative medicine but there is no evidence its use in specific types of treatment.

2.1.7 Hydrotherapy

Hydrotherapy treatment normally known as hydropathy.Basically in this treatment water is used for treating illness and relief pain. In 19th century is has been established by practitioners water can also use for cure some diseases, and it is known as hydrotherapy, and the person who use water for cue is known as hydro therapist.

Water cure has since come to have two opposing definitions, which can cause confusion.

(a) Water cure therapy – one kind of therapy in which hydrotherapy is used.

(b) Water cure torture –one kind of torture in which patient need to drink a lot of water for treatment.

It has seen that hydra therapy came from European spas.Now underwater message, jets or mineral baths (Kneipp treatments, Iodine-Grine therapy, balneotherapy, Swiss shower) are used for water treatment.Hot tub, Jacuzzi, hot roman bath, water pool bath mineral bath also included with these. For this treatment pressure and temperature also used for therapeutic purposes , the main purpose of this is to stimulate blood circulation for certain types of diseases.

Figure 2.6 Hubbard Tub with wooden patient lift (G.Litscher et al ,2005).

2.1.8 By Salt

The therapy using salt is known as Speleotherapy. This Speleotherapy normally used for several types of diseases, normally or respiratory diseases. Asthmatic attacks or allergic reactions can be caused by cave air .Any kind of irritation can be reduced by this therapy. But there is no explanation how long the effect of this therapy can last.

From the therapist it has been known that by this therapy our body can heal itself. High amount of CO_2 is present in cave air, by nature this gas is non toxic, after when we exhale it and after that our body will produce energy. Especially this therapy in cave have a very good effect in human body according to medical treatment. The pregnant women who have asthma can be using this therapy very easily and it has no side effect. Speleotherapy is basically an alternative treatment.
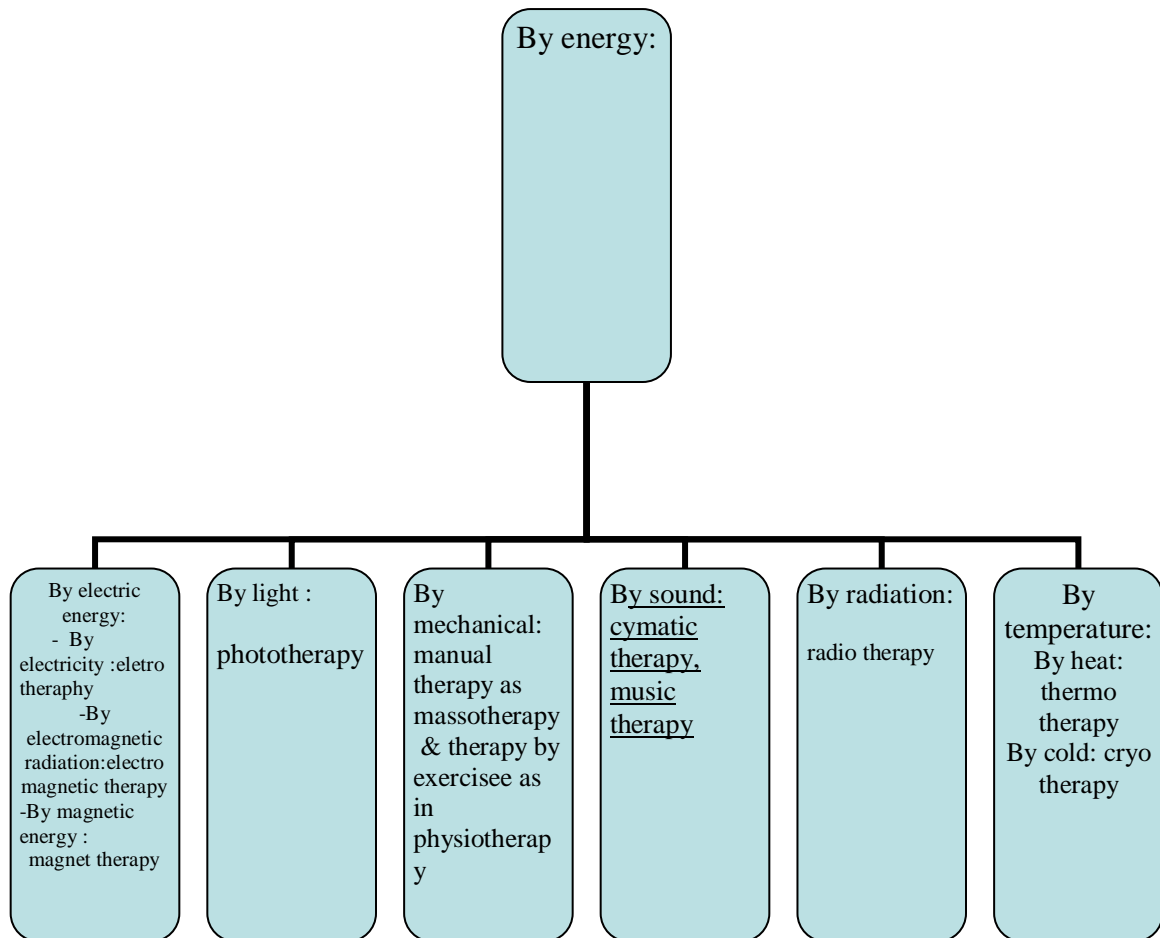
2.2 By energy treatments can be classified as:

By energy:

By electric energy:
- By electricity :eletro theraphy
-By electromagnetic radiation:electro magnetic therapy
-By magnetic energy :
magnet therapy

By light :
phototherapy

By mechanical: manual therapy as massotherapy & therapy by exercisee as in physiotherapy

By sound: cymatic therapy, music therapy

By radiation:
radio therapy

By temperature:
By heat: thermo therapy
By cold: cryo therapy

Figure 2.7 Different types of treatment according to energy.

2.2   By energy

2.2.1 By electric energy

In medical term when the electrical energy used for treatment is known as electrotherapy. Electrotherapy can be used for different types of treatment; also it can be used for different medical devices such as deep brain stimulators. For bone healing this therapy also very effective.

2.2.2. Light therapy or phototherapy

Light therapy is one kind of therapy also known as phototherapy in which specific wavelengths of light are used by using light-emitting diodes, lasers, dichroic lamps, fluorescent lamps, full-spectrum light these are usually controlled by other devices.

Light treatment can also be used for other purposes like hair growth, wound healing, sinus-related diseases and improvement in blood circulation and blood properties. The light therapy range normally used for this in the range 620–660 nm for red light therapy also low level laser therapy also used for this purpose.

Figure 2.8 Bright light therapy is a common treatment for seasonal affective disorder and for circadian Rhythm disorders.(Angela Jang, 2009).

2.2.3 By Mechanical manual therapy

Massotherapy is one kind of therapy , it can reduce the heart rate which can relax all the body muscles in our body .This therapy also useful for improves the lymphatic system, lower blood pressure, increases the release of the body's natural painkillers and improves blood circulation.

Different types of massage therapies are used for different purposes. Some therapies are used to relieve different types of stress and pain and others are used for keep body healthy and good. Massage therapy also have impact on nervous and skeletal systems, circulatory, lymphatic, muscular, skeletal and nervous systems.

By massage therapy our body can be healthy, stronger, and our body can quickly recover from injury and illness. Massage therapy actually related with body tissue to relieve pain and tension and to make relaxation condition in our body.

2.2.4 By Sound

Cymatic therapy or "cymatherapy", is another kind of therapy of alternative medicine by using acoustic waves. This therapy is developed by Sir peter Guy Manners in 1960s.

2.2.5 By radiation:..

Radiation therapy is one of the most popular therapy all over the world (specially in UK, Canada and Australia).Radiotherapy radiation oncology are used for cancer treatment for controlling malignant cells. Radiotherapy is normally applied for cancerous tumor to control its cell growth. It will damage the DNA of that exposed tissue by using ionizing radiation.

Radiotherapy also have different application for non malignant conditions ,like severe thyroid eye disease, treatment of trigeminal neuralgia, pigmented villonodular synovitis, pterygium and prevention of vascular restenosis, keloid scar growth, heterotopic ossification.

Figure2.9 Radiation therapy of the pelvis. Lasers and a mould under the legs are used to determine exact position.(Todd B, et al, 2005).

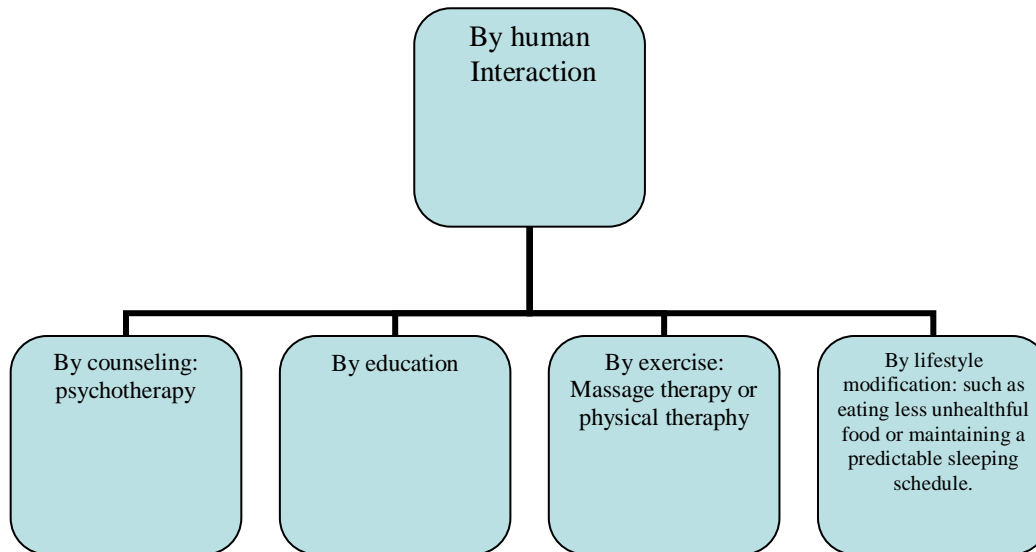## 2.3 By human interaction treatments can be classified as:

Figure 2.10 different types of treatment according to human interactions.

2.3 By human interaction

2.3.1 By counseling

Psychotherapy is a another kind of treatment in which trained professional will deal with a patient ,client, couple, family or couple of group. This type of treatment normally for psychological patients, but the practitioner must have license on the specific field.The main purpose of psychotherapy is improvement own well-being. And this therapy also deals with experiential relationship building, behavior change and communication for the improvement of mental health of the patient.

2.3.2 By Exercise

By exercise we can also develop our body condition. Massage therapy in another kind of treatment by which we can manipulate our deeper or superficial layers of muscle in our body and by this technique connective tissues will enhance to do work. Healing can done properly by massage therapy and also relaxation of our body will done properly.

Massage therapy involved with giving pressure in our body with may be unstructured, structured, moving or stationary , all these done by mechanical aids or manually.For massage therapy the target tissues may be tendons, fascia, ligaments, joints, skin, or other connective tissue or organs of the gastrointestinal system also lymphatic vessels. Massage can be done by hands, elbows fingers feet's and forearm. There are eighty different types of massage therapy are available. Types depend on patients requirements.

Figure 2.11   Massage in Frankfurt, Germany (Zhen Huang et al,2007).

2.4 Medicine

Medicine is one kind of healing technique in science. The word medicine came from the Latin word medicina. Medicina means the art of healing. It involves varieties of health care problems to prevent diseases and treatment of illness. Generally medicine we use in biomedical research, health science, treat injury and diseases and in medical technology to diagnose. (Vyacheslav Ogay1 et al, 2009).

2.5 Surgery

Surgery means operative treatment. Surgeons must have that power to decide when the operation is need and also many non surgical issues, especially in the surgical intensive care unit (SICU), here varieties of critical issues arise. Surgeons must have that capacity to manage pre operative, post operative and potential surgical patients on their hospitals wards.(Azriel Garty et al,2009).

In USA for surgical training after medical school five years residency is required. Seven or more years will require for become sub specialist. Additional one to three years will require for fellowship. Among them most competitive is post residency fellowship, additional two years of research will require for it. Compare to others surgical training is more time consuming and difficult.(Angela Jang, 2009)
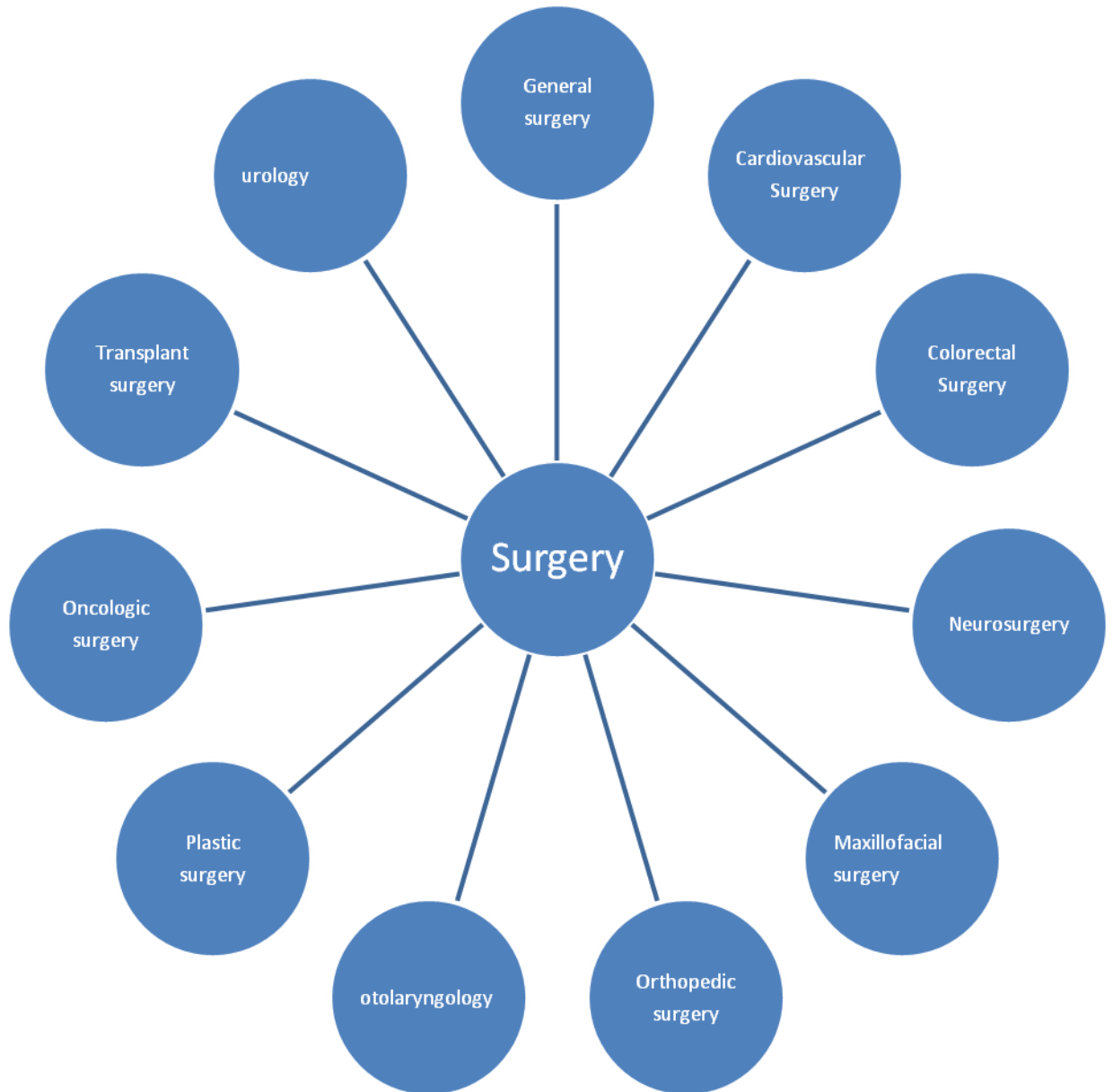
Surgery has many sub groups:

Figure 2.12 Different types of Surgery.

Including, trauma surgery, vascular surgery, pediatric surgery etc.Sometimes anesthesiology is taken as a part of division of surgery(actually it is not really a division). The other common medical specialists may involve in dermatology and ophthalmology. But they are not considered as sub specialist.

2.5 DIFFERENT TYPES OF SURGERY

2.5.1 General surgery

General surgery is a surgical specialty that focuses on abdominal organs, e.g., intestines including esophagus, stomach, small bowel, colon, liver, pancreas, gallbladder and bile ducts, and often the thyroid gland (depending on the availability of head and neck surgery specialists) They also deal with diseases involving the skin, breast, soft tissue, and hernias. These surgeons deal mainly in the Torso.(Lunca S, et al,2005)

Figure 2.13 A surgeon operating.(Lunca S, et al,2005)

2.5.2 Cardiovascular surgery

Cardiovascular surgery is surgery on the heart and/or great vessels performed by cardiac surgeons. Frequently, it is done to treat complications, correct congenital heart disease, or treat vascular heart disease from various causes including endocarditis, rheumatic heart disease and atherosclerosis. It also includes heart transplantation.

Figure 2.14 Two cardiac surgeons performing a cardiac surgery known as coronary artery bypass surgery. Note the use of a steel retractor to forcefully maintain the exposure of the patient's heart.(Beets-Tan, et al.,2001).

2.5.3 Colorectal surgery

Colorectal surgery involve with dealing with anus, rectum and colon. Proctology is another name of this field. This word proctology actually from Greek word Proktos which meaning is anus and the word Logos means study. Physician who is specialist in this field is known as proctologists or colorectal surgeons(Garrett, WE, et al.2006).

2.5.4 Oral and maxillofacial surgery

Oral and maxillofacial surgery is surgery to correct a wide spectrum of diseases, injuries and defects in the head, neck, face, jaws and the hard and soft tissues of the oral and maxillofacial region. It is an internationally recognized surgical specialty. (Maniglia A.J et at, 1989).

2.5.5   Orthopedic surgery or orthopedics

Orthopedic surgery or orthopedics (also spelled orthopaedic surgery and orthopedics in British English) is the branch of surgery concerned with conditions involving the musculoskeletal system. Orthopedic surgeons use both surgical and nonsurgical means to treat musculoskeletal trauma, sports injuries, degenerative diseases, infections, tumors, and congenital disorders.(Garrett et al,2006).

Figure 2.15 This fracture of the lower cervical vertebrae, known as a "teardrop fracture", is one of the conditions treated by orthopedic surgeons and neurosurgeons. .(Garrett et al,2006).

2.5.6   Otolaryngology or ENT

Otolaryngology or ENT(ear, nose and throat) is the branch of medicine and surgery that specializes in the diagnosis and treatment of ear, nose, throat, and head and neck disorders. Some people refer to it as head and neck surgery. Practitioners are called otolaryngologists–head and neck surgeons, or sometimes.(Ross LF, et al 1997).

Figure 2.16 Otolaryngologist performing an endoscopic sinus surgical procedure.(Ross LF, et al 1997).

2.5.7 Plastic surgery

Plastic surgery is a medical specialty concerned with the correction or restoration of form and function. Though cosmetic or aesthetic surgery is the best-known kind of plastic surgery, most plastic surgery is not cosmetic: plastic surgery includes many types of reconstructive surgery, hand surgery, microsurgery, and the treatment of burns.(Garrett WE et al, 2006).

Figure 2.17 Plastic surgery(Garrett WE et al, 2006).

2.5.8 Surgical oncology

Surgical oncology is the branch of surgery which focuses on the surgical management of cancer. The specialty of surgical oncology has evolved in steps similar to medical oncology, which grew out of hematology, and radiation oncology, which grew out of radiology.. The proliferation of cancer centers will continue to popularize the field, as will developments in minimally invasive techniques, palliative surgery, and neo-adjuvant treatments (Maniglia A.J et al,1889).

2.5.9 Organ transplantation

Organ transplantation is the moving of an organ from one body to another or from a donor site on the patient's own body, for the purpose of replacing the recipient's damaged or absent organ. The emerging field of regenerative medicine is allowing scientists and engineers to create organs to be re-grown from the patient's own cells (stem cells, or cells extracted from the failing organs). Organs and/or tissues that are transplanted within the same person's body are called autografts. Transplants that are performed between two subjects of the same species are called allografts. Allografts can either be from a living or cadaveric source.(Ross LF, et al 1997).

2.5.9 Urology

Urology is related with the urinary tracts of females and males and also related with the reproductive systems of males. The person who is specialist on this field is known as urologist and they are trained to treat ,diagnose and manage patients with this urological disorders. In human body the organs which will include with urology areadrenal glands, kidneys, ureters, urethra, the male reproductive organs and urinary bladder (Macchiarini P,et al 2008).

2.6   **Physical medicine and rehabilitation**

Rehabilitation is that branch of medicine that purpose to improve the quality of life and restore functional ability and improve the quality of life to those people who have physical disabilities or impairments.

The physician who has completed this training referred as rehab medicine specialist or physiatrist. Physiatrists involving with different types of functioning like injuries in bones, nervous system, muscles and tissues.

2.7 Traditional treatments

Traditional medicine actually involved with some unscientific knowledge system   but it was already developed by people in various societies before the modern medicine. It is also known as folk or indigenous medicine.For the prosperity of china TCM (traditional Chinese medicine) played an important role. Now TCM and western medicine together used in provide medical and health care.TCM have its unique and abundant medical function. Nowadays Chinese traditional medicine is assisted by power ultrasound (Baoqiang Wang et al, 2006)

In human civilization traditional medicine have a treasure and it also have an important carrier of the traditional culture of nations. Recently people prefer nature products more than chemical ones. That's why traditional medicine is now famous by worldwide. At the same time rapid attention is given for the progress of the communication and information technology and their traditional industries. (GUAN Tian et al, 2011). There are different types of traditional medicine like Ayurveda, Islamic medicine, herbal, ancient Iranian medicine ,Korean medicine, massage theraphy etc.

The World Health Organization (WHO) defines traditional medicine as, the health practices, approaches, knowledge and beliefs incorporating plant, animal and mineral-based medicines, spiritual therapies, manual techniques and exercises, applied singularly or in combination to treat, diagnose the diseases and prevent illnesses or maintain well-being. WHO also includes that inappropriate practices or use of traditional medicine have a dangerous or negative effects so further research is needed for safety and efficacy.

2.7.1 Ayurveda

Ayurvedic medicine is a complete knowledge for long life; it is basically a traditional medicine. It is from India. It is a form of alternating medicine. The word ayus mean "longevity", and Veda, meaning "related to knowledge" or "science". For practicing ayurvedic medicine a lot of medicinal preparation will require and also surgical procedures will also needed. Safety about ayurveda now a big question in U.S.It has been proved that with two U.S 20% of Ayurvedic treatments tested contained toxic levels of heavy metals such as arsenic, lead, and mercury.

2.7.2 Meditation

Meditation basically a self directed practice for relaxing and calming body and mind. Pain will reduce when the mind clams and also help anxiety and lower blood pressure. This method includes concentrate on a single word for a specific fix time.

2.7.3 Traditional Korean medicine

This medicine basically from Persia has a prolific and long story.tn recent years some experiment follow Iranian medicine for some remedies.

2.7.4 Massage therapy

Massage therapy deals with superficial and the deeper layers of connective tissues and muscle for enhance function and for healing process. Massage involves acting on structured, stationary, motion, moving, tension, unstructured, vibration done with mentally or mechanical aids.

2.7.5   Acupuncture

Acupuncture is an alternative medicine for treats disease, relieves pain, promotes general health or prevents disease and treats infertility. Acupuncture is one kind of traditional treatment which is done by putting needles in the body. Acupuncture was found in the Huangdi Neijing ,dated nearly 200 BCE. Most of the practitioner considers that the traditional Chinese medicine refers to the modern mainland Chinese practice. The acupuncture which is famous now in Korea, Japan or Taiwan is diverged from mainland Chinese method (Zhen Huang et al,2009)

The term acupuncture is mainly used for insertion of needles at some point then applies current through that needles to that acupuncture points. Not only these country in western society acupuncture also a famous alternative medical treatment.15 million Americans who has reported that they use this treatment for single year. From WHO(world health organization) they reported that now in united states there are approximately 10000 acupuncture specialist near 3000 practitioners acupuncturists are physicians.(Peter Whittaker, 2004) .

Figure 2.18 Needles being inserted into patient's skin. .(Qiu Maoliang et al ,1995).

The disease is normally spread by single causes like virus, genetic conditions or bacteria; this is the belief of science. At the same time there is a contrast between germ theory of diseases, human physiology and human anatomy. In Traditional Chinese one important word is metaphysical force, which is denoted by qi.It is believed by everyone that qi flows around and in the body channels which are known as meridians. (Qiu Maoliang et al,1995)
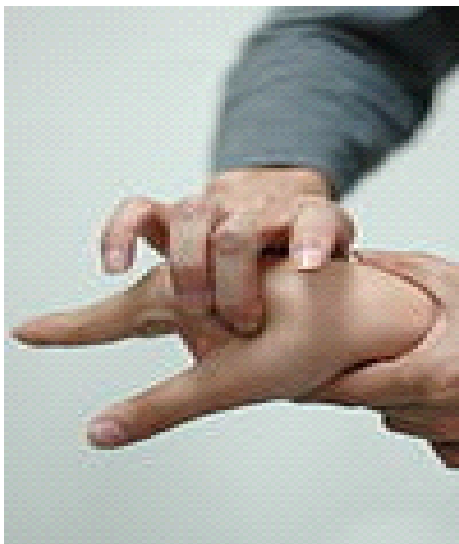

Figure 2.19   Acupressure pressure.(Zhen Huang et al,2009).

Then it is another believes that due to heart qi blood will circulate through the body. But from science it is believed that by heart pumping blood will flows through the body. Now for modern practioners qi is only as a metaphor. But other proponents consider it as an actual substance. The electrical activity of acupuncture has lacking for reporting protocols and standardized methodology, and it shows a poor quality.(Qiu Maoliang et al ,1995).

From sciences of human physiology or physics it has been prove that there is no force to qi. Only in bioelectricity the existence of qi is available. But research is rarely verified and connections of qi may vary. Nowadays people believed that early childhood or birth is one of the most important five elements develop in our body and it will create the symptom of illness. So for restore balance we need qi to describe acupuncture properly. (Qiu Maoliang et al ,1995).

2.8 Bioimpedance (BI) Parameters

Mainly there are mainly five bioimpedence parameters are used.

They are:

1.Resistance

2.Reactance

3.Impedance

4.Capacitance

5.Phase angle

2.8.1 Impedance, Resistance, Reactance

Nowadays the most popular method for measuring body composition is bioelectrical impedance analysis. In general in this method we need to use the resistance for calculate the current flow through the body for calculating total body fat in our body. Here

the impedance (Z) is depended on frequency and oppose of a conductor for the flow of alternating current. The ratio of voltage in an object to the current is known as impedance (Z).There is a vector relationship between reactance (Xc) and resistance (R). These can be represent as $Z^2 = R^2 + Xc^2$ (U.G. Kyle et al, 2004).

Alternating current can be affected by resistance(R).by using bioimpedence analyzer we can measure the resistance directly. Low resistance means large amount of fat free mass in human body. Small amount of fat free mass means high resistance. Extracellular mass (ECM) and intracellular mass (ICM) can be express by resistance. Due to the presence of capacitance or the energy storage characteristics of the body due to intact cell membrane, the alternating current can be affected by reactance (XC).Reactance can be also measure directly by the analyzer. The body's capacitance, the integrity and size of the body cell mass compartment can be measured from reactance. Similarly smaller amount of the body cell mass means low reactance .And large amounts of body cell mass (BCM) means high reactance. BCM (body cell mass) have different active components like organ cells, blood cells, immune cells, including muscle cells. (U.G. Kyle et al, 2004).

2.8.2 Body capacitance

The total energy storage capacity of the body cell mass compartment is known as body capacitance. A high capacitance means large quantities of intact cell membranes. The quality and number of cell membranes within the cell mass determine capacitance. Due to body composition the electrical current can effected instead of measuring the stored charge directly. The ratio o charge Q to voltage V on the body is known as the capacitance, $C = Q / V$ (P. Deurenberg et al, 1995).

2.8.3 Phase angle (PA)

The total body resistance and reactance and it is dependent of height is known as phase angle(PA).The equation of phase angle can be represent by Phase Angle(PA) = tan-1 (Xc/R).Lower phase angles means either breakdown of the cell membrane or cell death .similarly higher cell membrane means large quantities of body cell mass and intact cell membranes. (U.G. Kyle et al, 2004).

The nutrition health outcome and indication of health diseases can be represent by phase angle. Higher phase angle means optimal health which means good nutrition and consistent exercise. The average of phase angle is 6.7-7.7. and the optimal range is 7.8-9.4.

2.9 Body composition

In general body composition can be described as percentage of bone, fat and muscle in human body. In our body muscular tissues have less space compared to other tissues like fat tissues. Sometimes two people having same height and weight .but they look different each other from outside only due to their different body composition.

The National Institute of health recommends that a healthy female should have 14-31% fat and male should have 6-24% fat. From athletes is has been shown for male fat percentage 7 to 19 % and for female 10-25%, depending on their sports.
For judging health condition the percentage of fat (body fat percentage) is very important in addition to body weight (Aliona et al, 2007).

By clinical assessment of tissue and fluid compartments in human body composition normally analyzed. Our body is composed by fat, protein, water, and various vitamins and minerals (Roche et al, 1996).From body weight and body composition we can determine individual body shape. Different types of method are used for measuring body composition. (Roche et al,1996).

Six major components are responsible for body composition they are lipid, water, protein, bone minerals, soft tissue minerals and carbodrates.

The total body water mainly divided into two compartments like:

1) Extracellular   2) Intracellular

Fat free mass (FFM) includes with carbohydrates, soft tissue, fat, total body water, bone minerals and soft tissue minerals. But except bone all level of molecular compartment in fat free mass are present in lean soft tissue.(K Mohan Kishore et al, 2008).

Body fluids volume also consist of two things,

1) Extracellular fluid(ECF)

2) Intracellular fluid(ICF)

The ECF has two components;

1) The body plasma   and   2) Interstitial fluid (ISF).

The ICF is a fluid contained within cells.

Together these account for the most of the body water. Total body fat and fat free mass (FFM) can be measured by using body composition analysis and in other case it forms the part of nutrition assessment process. It provides more information compared to body mass index (BMI), because changes in body weight may cause to change in either component (Woo J. et al., 1997).Blood pressure and cardiovascular diseases risk factors also depend on body fat that way body composition study is an important topic.

(Stamler et al, 1975; Berchtold et al, 1981).

The nonfat parts also known as lean body mass (LBM) in which approximately protein 20%, water 73% and ash 1%.All the body's water and metabolic caloric expenditure are related with FFM. The meaning of LBM means body mass minus ether-extractable fat, and hence includes the stroma of adipose tissue (Forbes G.B., 1987).

FFM consist of almost all the body's water, all the metabolically active tissues and also the source of all metabolic caloric expenditure. LBM also means body mass minus ether-extractable fat, and hence includes the stroma of adipose tissue (Forbes G.B., 1987).

Fat tissues are included in body weight which's part is fat mass (FM). All the extractable lipids from adipose and other tissues in the body mean FM. In our body fats are stored in different places. Example liver, lungs, brain, heart etc.Some fats are needed for store energy, internal organs which act as a insulate heat loss and a component of nerves and cell membranes.(Berchtold et al., 1981)

Percentage of weight in determining the volume status is known as total body water (TBW) volume and is reported in liters. The distribution status of the TBW can be measure from Intracellular Water (ICW) and Extracellular Water (ECW) readings. The total body fluid can be explained by TBW. Basically it is changed as a percentage of weight relates to the age, sex also many tissues of the subject.TBW is influenced by muscle mass. TBW is greater if the muscle mass more. (Stamler et al., 1975)

Intracellular Water (ICW) is nothing without potassium based fluid. In cell membrane it will found and it also relates with the phase angle. More ICW means higher Phase Angle. ICW is cellular level, which have a result of body composition. ICW is responsive .ICW is a specific indicator for catabolism. The muscles and organs of the cells (brain, liver, and kidney) have less fat and more water (Berchtold et al., 1981)

Extracellular Water is basically sodium based volume of fluids. Normally is it available in the outside of the cell like interstitial, transcellular or plasma volume.

The amount of energy needed to the body is known as Basal Metabolic Rate (BMR) in order to perform the basic functions like heart breathing, breathing, digesting, muscle activity, blood circulation, and transportation of tissue and fluids. How many cells are

producing oxidative energy is known as metabolic rate. More energy will require for more cell and also needed higher rate of basal metabolic. It has been reported that in metabolic and epidemiological researches, the estimation of body composition is an important factor. It is characterized by nutritional disorders mostly in the condition of underweight and in aged. (Bos C et al, 2001).

2.9.1 Equation for body composition parameter

Reactance(X), resistance(R), phase angle , capacitance(C), and impedance(Z) can measure directly by using bioimpedence analyzer. At the same time patient's age ,gender, height ,weight are used for complete the results. Basal Metabolic Rate (BMR) calculation represents in whole 24 hours at a normal walking state total number of calories used in our body. Actually this calculation represents daily expenditure which in nearly 90% of daily caloric expenditure. Basal Metabolic Rate (BMR) also proportional with Fat Free Mass (FFM).This relationship is like this if FFM increases then BMR will also increase, similarly if FFM decreases then BMR will also decreases. BMR (cals/day) = 31.2 * FFM (kg). And this Basal Metabolic Rate (BMR) calculation was developed was developed by Grande et al. (1980).

Based upon the relationship between body cell mass (BCM) and intracellular water, the equation for Extracellular water(ECW) and Intracellular Water are described by Cohn S.H. et al, 1986 as below:

ICW (liters) = a * Height2 * X/ R^2 + b * Weight + c * Age + d…………………..(i)

ECW (liters) = TBW – ICW………………………………………………………….(ii)

Here, the variables a ; b ; c and d represents the constant coefficients and each instance regression analysis are calculated by these.

By knowing the other parameters like Weight (kg); Height (cm); Age (years);Resistance (in ohm) and Sex (Male = 1 and Female = 0) ,some body composition parameters can be calculated. all these parameters are calculated using values at 50 Khz.

(Lukaski et al, 1988) as mentioned in following table 2.11.1 :

Body composition parameters	Formula
Total Body Water (kg)	TBW = 0.372 (Height$^2 \div$ Resistance) + 3.05 (Sex) + 0.142 (Weight) – 0.069 (Age)
Fat Free Mass (kg)	FFM = TBW ÷ (Hydration constant) whereby, Hydration constant = 0.73
Fat Mass (kg)	FM = Weight - FFM
Body Fat Percentage (%)	Body Fat Percentage (%) = (FM ÷ Weight) x100%

2.9.2 Body Composition Measurement

Body composition can be measured by using Bioelectrical Impedance Analysis (BIA), Near-infrared Interactance (NIR), anthropometrics skin folds, Magnetic Imaging Resonance (MRI), Dual X-Ray Absorptiometry (DXA), Computed Tomography (CT) (Heyward et al, 1996).

2.9.2.1 Dilution methods

The principle that the amount of a tracer injected into an unknown volume or mass is similar for both before and after thorough integration in that volume or mass is known as dilute methods.

2.9.2.2 Hydro densitometry

The body consists of two separate components FFM and fat this is the theory from Hydro densitometry. From whole body each of these components should measure. Here each component like FFM and fat assumed to have known and unvarying densities.

2.9.2.3 In Vivo Neutron Activation Analysis

Neutrons activation techniques allow all the main elements of the body. The fast neutrons are needed or penetrate tissue. (~10 keV to 20 MeV).but most of the neutrons interactions are effected by thermal or low energy neutrons.

2.9.2.4 Anthropometry

Anthropometry is most important among al the techniques used for evaluate human body composition. It is easily performed at the bedside, has been widely used to assess the nutritional status of an individual and normally applied to the hospitalized patient. But this measurement usually performance are skin fold thickness and arm circumference.

2.9.2.5 In Vivo Neutron Activation Analysis

All the main elements of body are allows the neutron activation technique. The irradiation of the subject is necessary in vivo. An optimum tissue penetration is required for the fast neutrons. But most of the other neutrons are affected by thermal or low energy neutrons.

2.9.2.6 Whole Body Counting

To determine the natural radioactivity of the body at 40 K the whole body counters were developed at first order. In all natural potassium this percentage is 0.012%. Here the radioisotope emits then penetrates x-rays with 1.46 MeV and we can identify this by using detectors which is located around the body.

2.9.2.7 Dual-Energy X-Ray Absorptiometry

For measuring body composition Dual Energy X –Ray Absorptiometry is a promising technique. It's rising due to accessibility of these scanners. For normal patient we can use this technique easily. But it needs to apply in a very small dose (~1 μSv) and

also we need a very small time spent for scanning whole body. Normally it is less than 30 min.

2.9.2.8 Bioimpedance Methods

A standard frequency (50 kHz and 800 mA; BIA 109 Akern-RJL) are used for measuring bioelectrical measurement. Normally reactance and resistance value were recorded according to Segal et al. (Segal K.R. et al., 1985) and Lukaski et al. (Lukaski H.C.et al., 1986).the estimation of body composition can be relies by the geometrical relationship between length(L), specific resistivity, impedance (Z), volume (v)**.** Volume (V) of an electrical conductor can be express by v =L_2/Zz.

2.9.2.9 Computed Tomography

In computer Tomography bone, vascular tissues, adipose, muscle are determine. The cross sectional images of the body can be determined

by this computer tomography. A series of linear projections of X-ray opacity can form each cross sectional image.

2.9.2.10 Magnetic Resonance Imaging

CT images and Conventional X-ray radiographic are normally based on electron density. On the other hand nuclear magnetic resonance imaging (MRI) is based on physical state of the tissue as reflected in the magnetic relaxation times and also on the density of hydrogen nuclei.

2.10 Body Mass Index (BMI)

A ratio of body weight to height is known as body mass index (BMI).this a technique for measuring health risk using health/weight measurements. If we have excess weight than BMI will near 25-30 .the formula for BMI is weight (kg) is divided by Height2 (m).

2.11 Specific terms in bio impedance

Impendence can be defined as the response of living organism by an externally applied electrical current. Normally it can be measure as the opposition of the flow of the electrical currents through the human body. It is also in the opposite direction of electrical conductivity. Bioelectrical impedance measurement for human and animals is a non invasive method for measuring body composition and blood flow.

Sometimes this measurement depends on pulsatile blood volume changes in our aorta. Bioimpedance is related with development of the devices to measure circulating blood volume and cardiac output. Due to variation of breathing electrical conductivity may vary. In both research and clinical medicine

Table 2.11 Biological resistivity ρ

Tissue	Ω.cm
muscle	300-1600
lung	1275
blood	150
fat	2500
urine	30

2.12 Bioelectrical impedance analysis (BIA)

Bioelectrical impedance (BIA) is one of the most common methods for calculating our body composition. In mid 1980's the term bioelectrical impedance was first use and this method became popular day by day due to the advantages like low cost, portable, noninvasive and requires minimal subject.(Gudivaka R. et al , 1999).

For clinical and epidemiological issues the bioelectrical impedance analysis (BIA) is the best method. It is because of its reasonable costs, practicality, non-invasiveness and

repeatability (Lupoli L. et al., 2004).This method is active for middle-aged adults and for young (Segal K.R. et al., 1985; Lupoli L. et al., 2004; Segal K.R. et al , 1988).

Basically it is a simple instrument by which we can estimate our body fat. The main function of this device is to determine the electrical impedance or the flow of electrical current through the body tissues. From this total body water (TBW) can be estimate. For estimating fat free body mass we use this TBW by differences between body weight and body fat.(Segal K.R. et al ,1988).

BIA is mainly a painless low voltage and applies alternating current to our body. At a single intermediate frequency most bioimpedance devices work normally 50 kHz. Some component of intracellular fluid and extracellular fluid carry the applied current (Matthie, J. et al., 1998). Based on bioimpedance measurements at low (5 kHz) and high frequencies (100 kHz) prediction equations have been produced. (Segal, K. R. et al., 1991).

Research has been proved that BIA was quite variables and it is not a more accurate measurement method for calculating body composition. Now the new technologies improved BIA that is more reliable and more accurate for measuring body composition. (Segal K.R. et al, 1985).

BIA is used to determine total body water (TBW) and fat-free mass (FFM) in subjects exclusive of electrolyte abnormalities and important fluid. This equipment is portable and safe so the use of BIA also increased, the procedure is noninvasive, simple and noninvasive, and the results are quickly obtained and reproducible. (Kyle U.G. et al., 2004).

But it is also true it's not a "gold standard" or reference method. The result will depend on the test. This is a very simple instrument but we should careful using this device. Also we should the method of use which is given by the manufacturer.

For estimating body fat people normally use body fat meters. This body fat machine is a simple device to calculating our body composition, this machines is less accurate compared to other machines which normally use in clinic or for medical purposes. ((Lupoli L. et al., 2004).

Normally BIA is measured in supine position by lying barefoot on the bed. In wrist and ankle electrodes are located. By measuring the resistance to the current, the percent body fat can be estimate. For having a good and accurate data the subjects need to eating and drinking within 4 hours of the test and void (urinate) completely prior to testing.

Recently more accurate method has been established for bioelectrical impedance analysis. This device is suitable for both healthy subjects and patients but sometimes there is some deficiency in quality control procedure. We can determine fat free mass (FFM) and total body water (TBW) from subjects without any electrical abnormalities and significant fluid.((David Brodie et al, 1997).

Nowadays obesity health problem is all over the world that ill reduces life expectancy by increasing risk like osteoarthritis, coronary artery disease, certain types of cancer obstructive pulmonary disease and type II diabetes. In other sense too little body fat also can create health risk. Because for normal physiological functions we need a certain amount of fat. For the purpose of assessment of body composition and body fluid status bioelectrical impedance has become increasingly.

Recently body composition is an interest topics now a days for the nutritionists because of the nutrition status, specific diet, genetics exercise, disease these have major

components of the human body. These components can be considered as whole body levels molecular, atomic, and cellular and tissue-system. For bioimpedence analysis two things are very important, one fat free mass (FFM) another one fat mass, because fat is an important factor for health issue. (David Brodie et al, 1997).

2.12.1 PHYSICAL PRINCIPLES OF BIA

In human body we have only resistance and reactance parallel and series combinations. For measuring BIA human body consist of 5 cylinders (legs, trunk, arms), those are connected electrically in series. The measurement of resistance and reactance microscopic perspective is the vector summation of resistance and reactance in the position torso and limbs (P. Deurenberg et al, 2009).

.
Z = L / A

Where by

Z = impedance

L = length of the conductor (cm)

A= cross-sectional area (cm2)

L
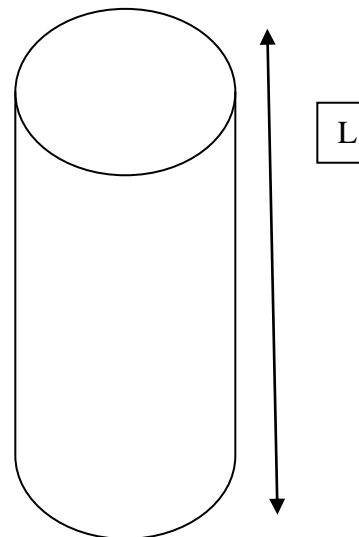
Figure 2.20 The resistance of a cylinder

45

Here,

$$Z = L / A \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(i)$$

Whereby

Z = impedance

L = length of the conductor (cm)

A = cross-sectional area (cm^2)

The impedance (Z) of the cylinder only depends on its cross section and length L. So the formula can be representing as: $Z = L / A$ (Monica Popa, et al ,2006)

The volume can be measure by using this formula

$$V = A \times L \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(ii)$$

Where, A = cross section and L = length of cylinder.

$Z = L / A$ can be written as $A = L / Z$ Then

formula then becomes:

$$V = L_2/Z \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(iii)$$

Then it will very easier to calculate the volume of the cylinder by using only length and electrical resistance.

Now in term of human body the formula can be rearrange as

$$TBW = Ht^2 / Z \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(iv)$$

Water content = body length^2 / impedance or

Total Body Water = Height ^{2} / impedance, abbreviated

This formula depends on the calculation of TBW.

Actually BIA measures actually the opposition of body tissues to the flow of a

small (less than 1 mA) alternating current. Two components make impedance (vectors). They are -

1) The resistance of the tissues themselves.

2) The additional opposition (reactance) due to the tissue interfaces, nonionic tissues and the capacitance of membranes.

Here the muscle tissue is equivalent with measured resistance.

Normally impedance measurement depends on the frequency of current typically 50 kHz, when a single frequency is used). Also multi frequency can be use for BIA. Also frequency spectrum can use to evaluate the differences in body composition due to nutritional and clinical status.(Daniela Curseu et al, 2006)

In practical case the value of BIA parameters varies from person to person depend on electrical and biological parameters. The instrument which normally use for BIA measurement is ix or a fix amount of current 800 μ A and the frequency also fix and that is 50 kHz. The two electrodes in which the current passes, one is known as sink or detector another one source. These two generates voltages according to Ohm's law between these two points in the body volume. Normally the electrodes placed on the ankle and wrist through all the conducting materials the current will flows through all the conducting materials which is present in the body in between that electrodes and sink.

Here living tissue means a volume conductor, the physical parameter of that current are predominantly charged ions for example potassium ions, sodium ions these are able to move within the volume (Alina Ionutas et al, 2007).The conductivity of blood and urine is high so that the muscles are intermediate this is also applicable fat , bone or air. Here current will flow through the conductors. If there is lower resistance to current flow where

there is a large conductor area like body trunk and higher resistance with smaller cross sectional area like forearm.

2.12.2 Methods of Bioelectrical Impedance Analysis

In general there are two methods used in Bioelectrical Impedance Analysis (BIA) as they are:

- ➢ Single Frequency BIA and
- ➢ Multi Frequency BIA.

2.12.2.1 Single Frequency BIA (SF-BIA)

In this method the surface electrodes placed on hand and foot which generally single frequency at 50 kHz, SF-BIA is passed in between them.different manufactures have used hand to foot. But some other BIA instruments are used or different locations such as foot to foot or hand to hand. (Jebb S.A. etal., 2000; Utter A.C. et al., 1999).The water outside of the cell (extracellular) and also about 25% of the water inside the cells (intracellular) (Jebb S.A. et al, 2000).

2.12.2.2 Multi-Frequency BIA (MF-BIA)

Multiple frequencies BIA use multiple frequencies. Dissimilar frequencies like 0, 1, 5, 50, and 100, 200 to 500 kHz in order to estimate TBW, FFM, ECW and ICW. It has been seen that SF   BIA is better in predicting total body water but MF-BIA is preferred in predicting extracellular fluid. Utter (A.C. et al, 1999).

2.13 Statistical Analysis

Statistical data is important to differentiate between inferential statistics and descriptive. Inferential statistics are applied in reaching conclusions from incomplete information and in other side descriptive statistics deals 25 with the enumeration, organization, and graphical representation of data.

The data of statistics is very useful to differentiate between the two major of Statistics such as descriptive and inferential statistics. Descriptive statistics deals with the organization, enumeration, and graphical representation of data while inferential statistics are applied in reaching conclusions from incomplete information.

The objective of the statistical analysis is to compute the probability. For this analysis normally we use analysis of variance (ANOVA), a t-test or a non-parametric method.

2.13.1 Analysis of Variance (ANOVA)

For analysis of quantitative data the most common method is ANOVA (analysis of variance). The purpose of this test is to calculate the probability of which is the differences among them due to change. For comparing between two treatments t test is used. But ANOVA can be use for complex situation also for comparing several means. Normally it is used for two or more treatment means. (A.C. et al, 1999).

In this method there are assumptions including the residuals which have a normal distribution here the variation is same in each group and the observations are independent in the same group. Sometimes, the post-hoc comparisons are required when the analysis does not show all means are significant different. (Jebb S.A. et al, 2000).

2.13.2 The t-test independent samples

To evaluate the differences in means between two groups we normally use t test. For differentiate between two test groups of patients, normally we use t test.in this case, here one group is placebo another group is control group. Generally T test is reported by p level which represents the error probability which is involved in research hypothesis.

It is related with the existence of a difference. In some research proposal we need to consider only one half of the probability distribution and after that we need to divide it by p levels which now will reported with t test.(U.G. Kyle et al 2008).

It's about the existence of a difference. Some researchers propose that we can consider only one half (or known as one "tail") of the probability distribution and then divide the standard pleve.lin the predicted direction. Here one is dependent variable another one is independent. The comparison between the means of the selected groups and specific values performed of the dependent variables.

2.13.3 The t-test for dependent samples

This test is useful in one type of design which in important source variation and can excluded easily from analysis. In this method two group of scores can be recognized to the individual differences subjects if both of observations (that are compared) are based on the sample of subjects who were tested twice (e.g., before and after a treatment).

When measurements are taken the same subject for the before and after some treatment such as massage therapy effect, the paired (dependent) t-test is normally used there (K Mohan Kishore et al, 2009).

To test the null hypothesis which is the average of the differences between a series of paired observations is zero this paired samples t-test is applied. Observations are paired .When they are performed on the same samples or subjects then observations are stated as paired.

For identify the differences between two conditions for an independent variables we use this method. In this method same participants are giving feedback in this experiment. The comparison between before and after having acupuncture therapy is an example of it.

The main hypothesis is that the pre measurement is different from the post, when the paired z (dependent) test. The last measurement taken from the subjects is known last measurement. The hypothesis can be represented by:

Ho: $\mu 1 = \mu 2$…………………………………………………………………(i)

H1: $\mu 1 = \mu 2$…………………………………………………………………..(ii)

Here, Ho= The null hypothesis of no difference between pre and post measurement. The significance level is 0.05.

CHAPTER THREE
Methodology
3.1 Introduction

This chapter contains the methodology used for this study. Bioimpedance analyzer is used to measure the bioimpedance parameters before and after acupuncture. The flow chart shows the step by step procedure for this thesis.

Subjects were recruited amongst resident in Tamun tun Dr.Ismail, KL

Consent form was filled up by the subjects

Conduct the subject's protocol for each exercise

The data base system was constructed

Subjects were measured and fill a personal particulars form before acupuncture

Data measured before acupuncture

Subjects undergone the acupuncture

Data measured after the acupuncture

Analyze data and measurement result using statistical analysis

Figure 3.1 Flowchart of Methodology.

3.2 Subjects/participants

Total numbers of Forty-six in male and female subjects are recruited for this study. The location of that acupuncture clinic is at Taman Tun Dr Ismail, Kuala Lumpur. They need to provide their age, height, weight, waist, hip, activity and purpose of having acupuncture treatment. The baseline measures of standing height and weight were taken before the measurement session. The height should measure without shoes it may duplicate near 0.5m similarly body weight should measure without shoes and with light cloths .Weight also near duplicate 0.5kg.Standing height and weight were used to calculate the BMI (kg/m2).

3.3 Conducting BIA Measurement

In our body we have lean tissues, in which electrolyte containing water is available, this will conduct with the electrical current, and the fat inside our body acts as a insulator, this is the basic principle of the method. By low impedance lean tissues, the impedance of the body can measured. Regression equations are then derived which related impedance to Fat Free Mass (FFM) or Total Body Water (TBW) measured by independent techniques.

At 50 KHz a proportion of the applied current is unable to penetrate the cell membranes and therefore passes only through the extra-cellular space. At this frequency BIA is only able to predict TBW and FFM in healthy subjects because of the close correlation between extra-cellular volume and TBW in these subjects.

3.3.1 Subject test position

The self-adhesive disposable electrodes are attached to the Right hand and Right foot, in order to avoid the battery current (low voltage) passing through the side of the body where the heart is situated. The Body stat Quad Scan 4000 unit has two main lead wires. It does not matter which of the two sets of main leads are connected to the right hand or right foot. They are therefore interchangeable. However, it also important to remember that , just behind the finger and toe we need to connect the red (injecting)leads, shown in Figure 3.1 and Figure 3.2. For convenience, the metal tab on the electrode should point in the direction from which the lead wire tension will occur as illustrated in the figures.
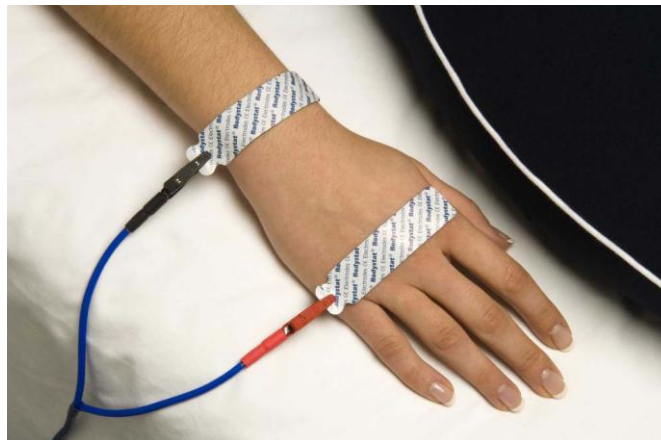
Figure 3.2 Right hand electrode connection
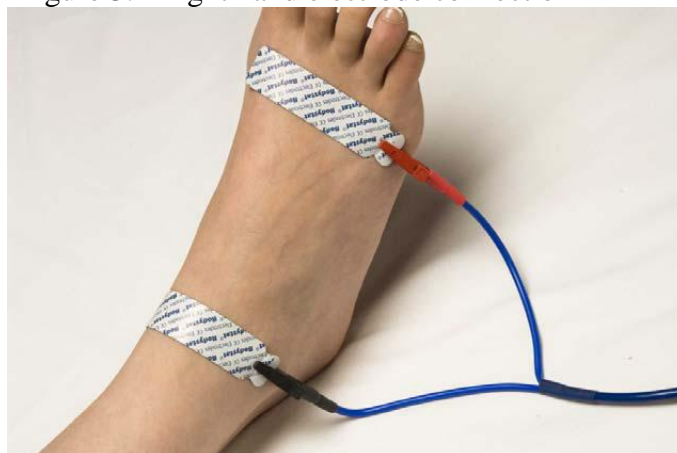
Figure 3.3 Right leg electrode connection

The RED leads are the source of power and sends the signal through the body - the injecting leads. The BLACK leads are the sensing or measuring leads. If the leads are not connected to the body correctly, the current cannot be transmitted effectively and therefore the impedance measurement will be inaccurate or the following message will be registered on the LCD screen.

Figure 3.4 Quad Scan 4000: The device used in this study.

Figure 3.5 Long Electrode used with Quad Scan 4000

3.3.2 Data measurement

Quad Scan 4000 Bioimpedance Analyzer is used to measure body composition parameter of the subjects. Before the reading is measured, some subject's information was put into the device by typing it using the key provided.

The total procedures are given below

1. At first patient must lie down in the correct position (supine).

2. Should be careful about that the patient's body parts should not touch each other

3. Now need to place electrodes in patient's right hand and right leg.

4. Then need to attach the crocodile clips to the electrodes (clips to the metal tab strip of the electrodes back to ankle and wrist)

5. Switch the Quad Scan 4000 unit ON.

6. Next step is to key in proper subject data.ie weight, height etc.

7. The patient should be in supine position for 3-4 minutes for entire procedure.

8. Press Enter key or measurement.

9. Results can be display within 10-11 seconds on the LCD display.

10. Now the electrodes need to disconnect the crocodile clips.

11. Electrodes need to remove.

12. Then the patient can sit or stand up.

13. Switch off the device the Quad Scan 4000.

14. The results actually stored in the memory of Quad scan, the result can be downloaded from the device by using Bluetooth and body stat software (in the device the most recent 100 tests are stored).

15. Before doing the first time, our laptop need to be pair with the device.

16. After downloading all data's we can convert all data in MS Excel format by using Microsoft Excel software.

17. Finally the SPSS 19 software needs to install in laptop for ANOVA and Pair T test analysis.

3.4 Statistical Analysis

Data were analyzed using the statistical analysis. The SPSS version 19.0 for Windows (SPSS Inc., Chicago U.S.A) and Microsoft Office Excel version 2007 were used to analyze data measurement. Microsoft Office Excel 2007 is a common application for Windows, ease of use and gives variety graph construction and display. This program was used to key the database.

"SPSS 19.0 for Windows" is very good interactive power , also very easy to use and it is basically a windows based statistical tool which is perfect for statistical analysis.SPSS is

one of the computer statistical programs that be used to analyze when conducting research, survey, analyzed large volume of social data and the other field of research and statistical purposes.

3.4.1 Analysis of Demographic Variables

Before doing the test and measurement, each patient needs to fill up the patient information form. In that form patients need to mention about their age, occupation, place of living, weight, height, number of treatment have done (acupuncture), and purpose of having acupuncture treatment. All these information they need to provide for demographic analysis. Now all the data need to convert in SPSS 19. After converting all data in SPSS 19, The steps are as follows:

analyze→Descriptive Statistic→Frequencies→select the variables from the left box→click ok→the result will be shown.
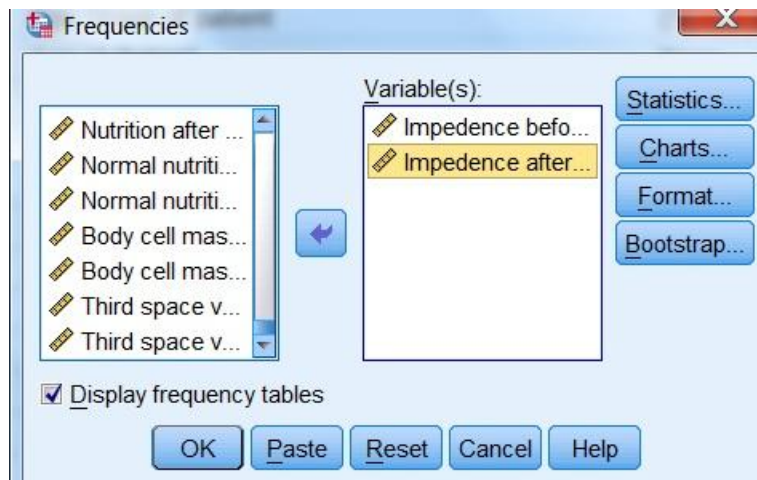
Figure 3.6 Window pop up Frequenices.

3.4.2 Analysis of Bioimpedance Parameters

The main purpose of this study is to investigate the effect of acupuncture in human body in terms of resistance (R); reactance (X); impedance (Z); Phase angle; and

capacitance (C) of female and male subjects that can be measured as bioimpedance (BI) parameters. The body composition parameters included Intracellular Water (ICW), Fat Free Mass (FFM), Total Body Water (TBW), Extracellular Water (ECW), Basal Metabolic Rate (BMR) etc. The body composition parameters are automatically calculated based on formulae stored in the device using the measured bioimpedance (BI) parameters. These parameters are divided into two main groups' i.e. main bioimpedance parameter and secondary bioimpedance parameters, for ease of analyses and reporting the result. This is shown in Table 3.1 below. Please list all the parameters in the table.

Table 3.1 Main and Secondary Bioimpedance Parameters

Main Bioimpedance Parameters	Secondary Bioimpedance Parameters
Impedance at 5KHz	Percentage of fat
Impedance at 50KHz	Min fat
Impedance at 100KHz	Max fat
Impedance at 200KHz	Percentage of lean
Resistance at 50KHz	Min lean
Phase Angle at 50 KHz	Max lean
Basal metabolic rate(BMR)	Percentage of water
Intracellular water	Min water
Normal value of intra cellular water	Max water
Extra-cellular water	Dry lean weight
Normal value of extra cellular water	Density
Total body water volume	Hydration
Min total body water volume	Third space value
Max total body water volume	Nutrition
Body cell mass	

In this analysis, mean, standard deviation, variance and Kurtosis coefficient are reported for some independent variable. Independent selected is gender, age group and BMI categories.

Following are the analysis done for the analysis of bioimpedance parameters. Firstly the mean, standard deviation, variance and Kurtosis coefficient are reported for all the bioimpedance variables. The analyses procedure is describe below.

- Choose Analyze→ Reports →Summarizes cases ….to open Summarize cases box

- Transfer the variables and group variables from the left hand box to the right box

- Choose statistics→transfer mean, median, and kurtosis from left side box (statistics) to right (call statistics) box→ click continue to return previous box→click ok to run the result.

Figure 3.7 Windows pop up for Summarize cases and Summary after report(grouping variable gender).Similarly need to repeat this for age group and BMI for primary also for secondary parameters.
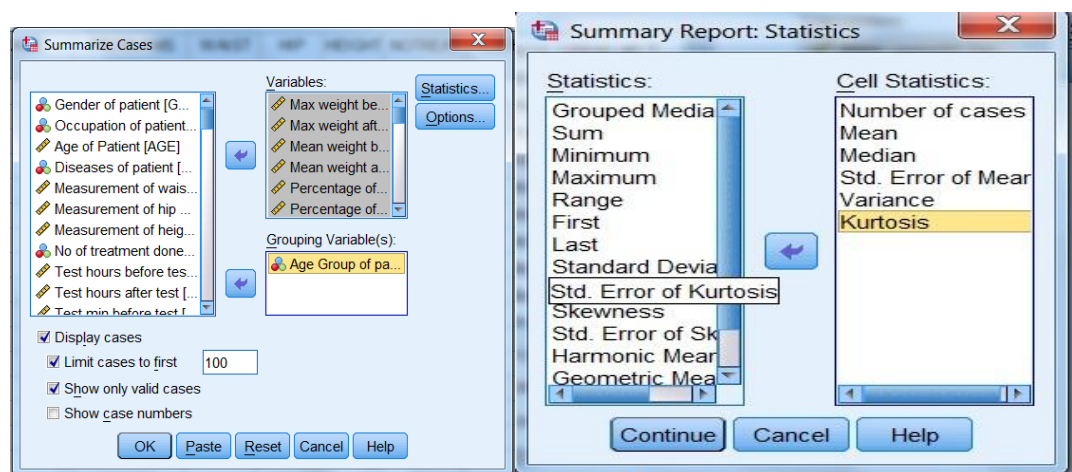
Figure 3.8 Windows pop up for Summarize cases and Summary after report(grouping variable age group of patient).
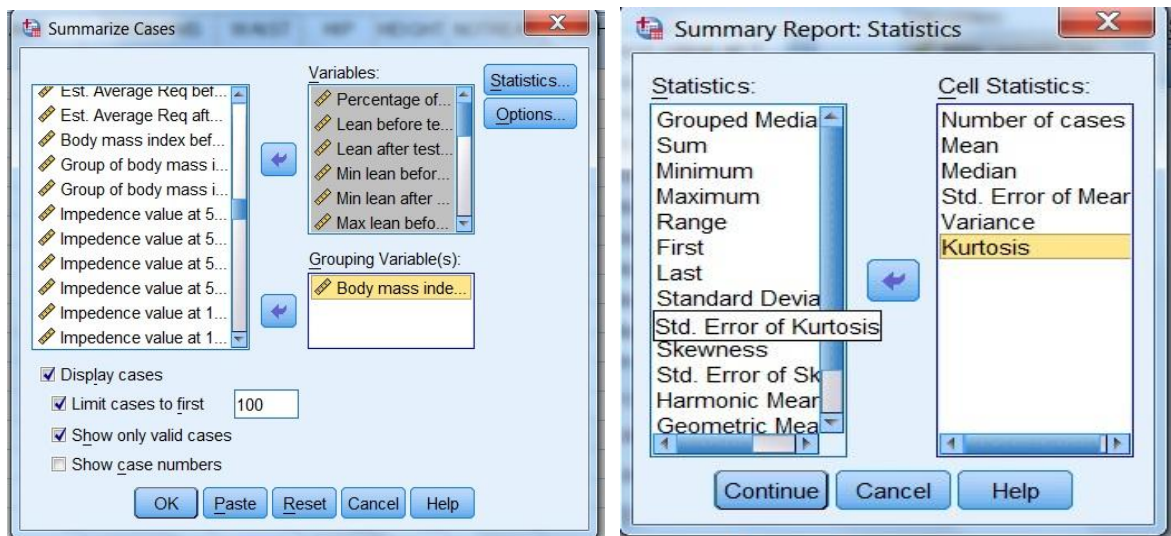
Figure 3.9 Windows pop up for Summarize cases and Summary after report (grouping variable BMI).

3.4.2 Comparison analysis

In this analysis, the comparison between bioimpedance parameters before acupuncture treatment and after acupuncture treatment is done. It is reported into main parameters and secondary parameters of bioimpedance. The pair t-test is used for the overall comparison without considering the interaction with independent variables. Procedure running the test is shown below.

Running the paired sampled t test:

➢ Choose Analyze→Compare Means→ Paired sampled T Test… to open the paired sampled T Test dialog box.

➢ Transfer the paired variables in the left hand box from the right box →click ok.
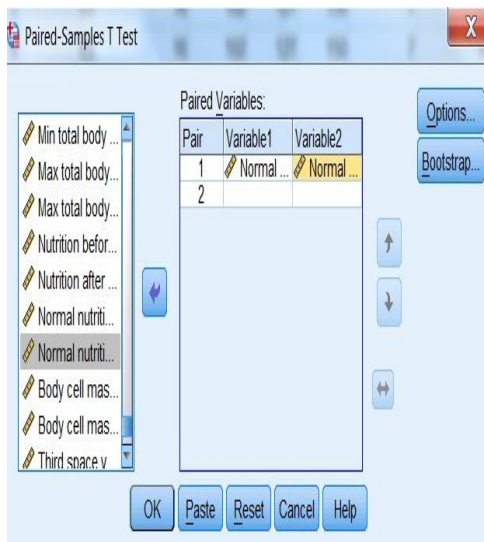
Figure 3.10 Windows pop up for Paired –Sampled T Test analysis.

The analysis for the effect of gender on the bioimpedance parameters before and after acupuncture treatment is done by using independent t-test. For the other independent variables, ANOVA is used. Procedures running both tests are shown below.

Running the independent sampled t test:

➢ Choose Analyze→Compare Means→ click the test variables from left side→click grouping variables from left side→define the group→click continue →back to the previous box →click ok for output.
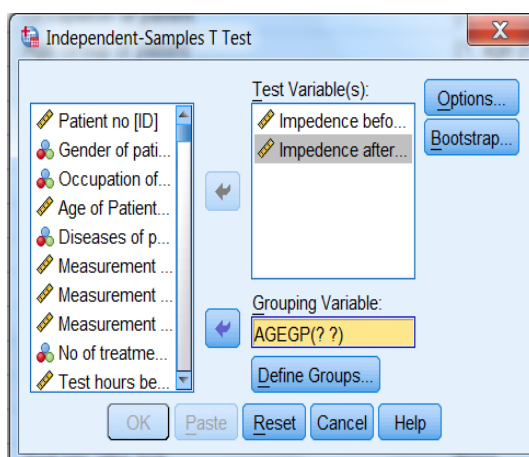
Figure 3.11 Windows pop up for Independent sampled t Test.

Running the one-way ANOVA:

➢   Choose Analyze→Compare Means→ One-Way ANOVA will appear→ select the dependent variables from left side box→ click factor →click ok(if the factor not more than two).
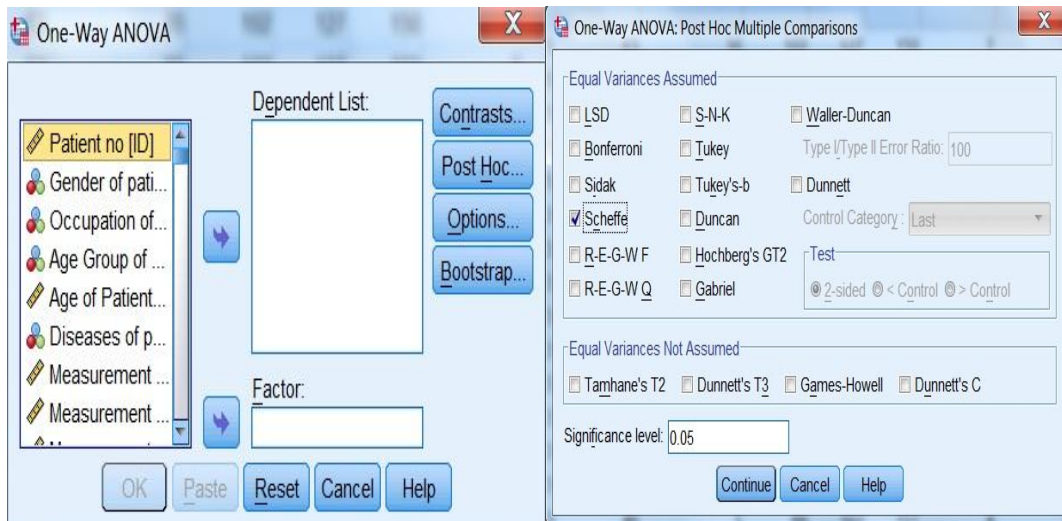
Figure 3.12 Windows pop up for One-Way ANOVA and POST hoc multiple comparisons.

If the factor more than two:

➢ Click Post Hoc→ One-Way ANOVA: Post Hoc Multiple Comparisons dialog box →click scheffe→put significance value .05→ then click OK turn the one-way ANOVA test.

CHAPTER 4

RESULTS

4.0 Introduction

The SPSS program is easy way technique which can generate decision-making from graphical output using variety report and analytical asset storage. Therefore, in this study, statistical analysis was carried out using the SPSS software program (SPSS version 19). The raw data for all measurements were prepared in Microsoft Office Excel 2007. Microsoft Office Excel is easy to use which also can generate variety of graph.

The results from the data measurement were included in this chapter. All the information and results were obtained from questionnaire and data measurement. The data measurement was obtained from Quad scan 4000 Impedance Analyzer. Database for raw data measurements were then prepared in Microsoft Excel, which were later imported to SPSS. The analysis of the database was conducted by using SPSS software. The descriptive and demographic data were performed to all the subjects.

The measured bioimpedance parameters consists more than one parameter. The main bioimpedance parameters are Resistance (R), Reactance (X), Impedance (Z), and Phase Angle, Intracellular water, Normal value of intracellular water, Extracellular water, Normal value of Extracellular water, Total body water, Min total body water volume ,Max total body water volume and Body cell mass. And the secondary parameters are Percentage of fat, Min fat, Max fat, Percentage of lean, Min lean, Max lean ,Percentage of water, Min water, Max water, Dry lean weight, Density ,Third space value and Nutrition. These body composition parameters are also calculated automatically from the device based on

impedance parameters such as Fat Mass (FM), Total Body Water (TBW), Basal Metabolic Rate (BMR), Fat Free Mass (FFM), Intracellular Water (ICW) and Extracellular Water (ECW). SPSS statistical tests such as independent samples t-test; dependent paired t-test; and ANOVA are used to analyze the data. The statistical scores at 5 percent (%) significant level are used to make the decision whether there is significant different between the test parameters.

4.1 Demographic Analysis

Total numbers of forty six male and female subjects were involved in this study. The questionnaire was designed to record a demographic data based on the purpose of having acupuncture treatment such as diabetes , stroke, reduce uric acid, back pain ,high blood pressure etc.   They need to provide some information about their height, weight, occupation, the purpose of treatment etc. A sample of questionnaire in attached in the appendix.

4.1.1 Gender of patient

Fig 4.1 shows the bar chart of gender of patient. There are two groups of subjects here, male and female. From the chart it has shown that total 80.45% is female patient and 19.6% is male patient.
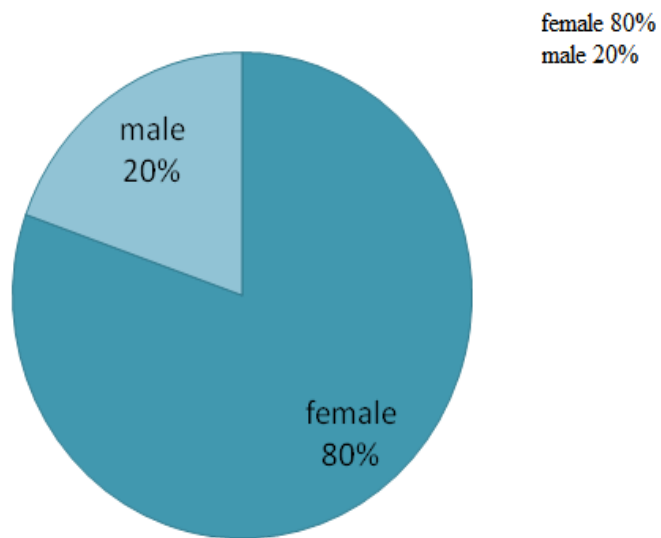
Gender of Patient

female 80%
male 20%

Figure 4.1 Pie chart of gender of patient

4.1.2 Occupation of the patient

Figure 4.2 shows pie chart of occupation among subjects. There are five groups of subject's occupation that consist of business man, house wife, worker, retired person, and students. In pie chart it has shown that business man comprise of 6.6%, housewife 19.6%, Worker 28.3%, Retired 26.1% and Student 19.6%.
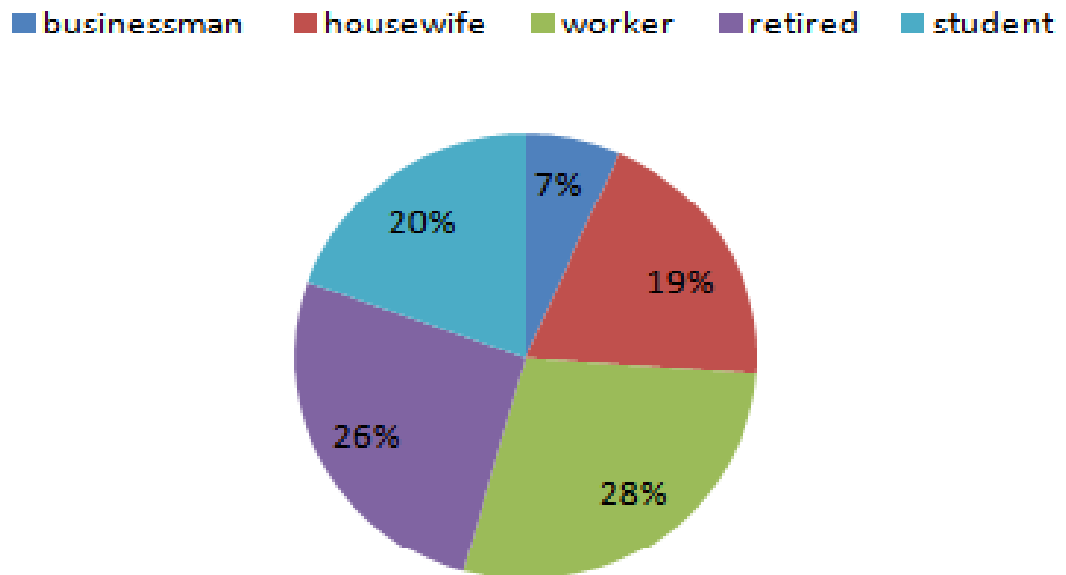
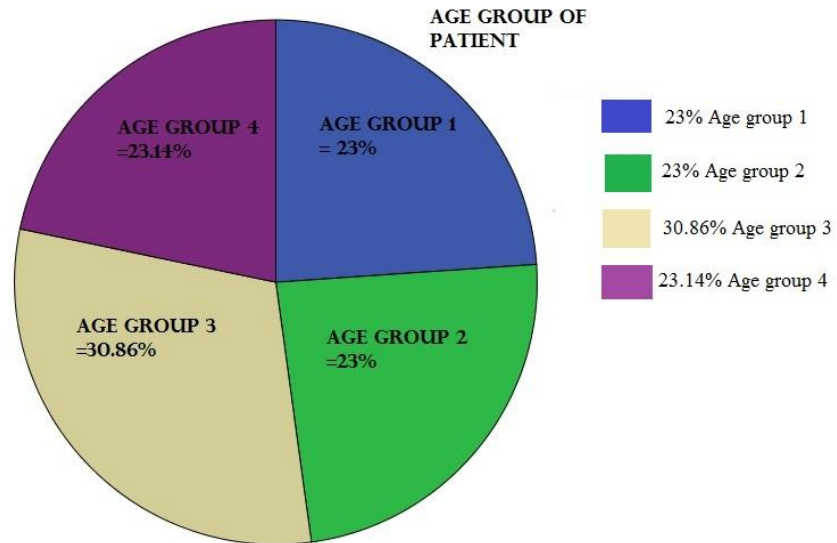Figure 4.2 Pie chart of occupation of patients

4.1.3 Age group of patient

Figure 4.3 Pie chart of age group of patient

The age range of the subjects is from 21 to 90 years old. It has been divided into 4 age groups. The age groups for subjects are 21 to 30 years old, 31 to 50 years old, 51 to 70 years old, and 71 to 90 years old. Figure 4.3 shows that the subjects are aged between 21 to 30 is 23%, aged between 31 to 50 is 23.0%, aged between 51 to 70 is 30.86 % , aged between 71 to 90 is 23.14 %.

4.1.4 Group of body mass index

The bar graph shows the percentage of body mass index before the test. There are five different groups. It has shown that underweight group total patient is 4.3%, normal group is 6.5%, overweight group is 62.6%, obese class 1 group is 9.1%, and obese class 2 group is 17.4% patient.
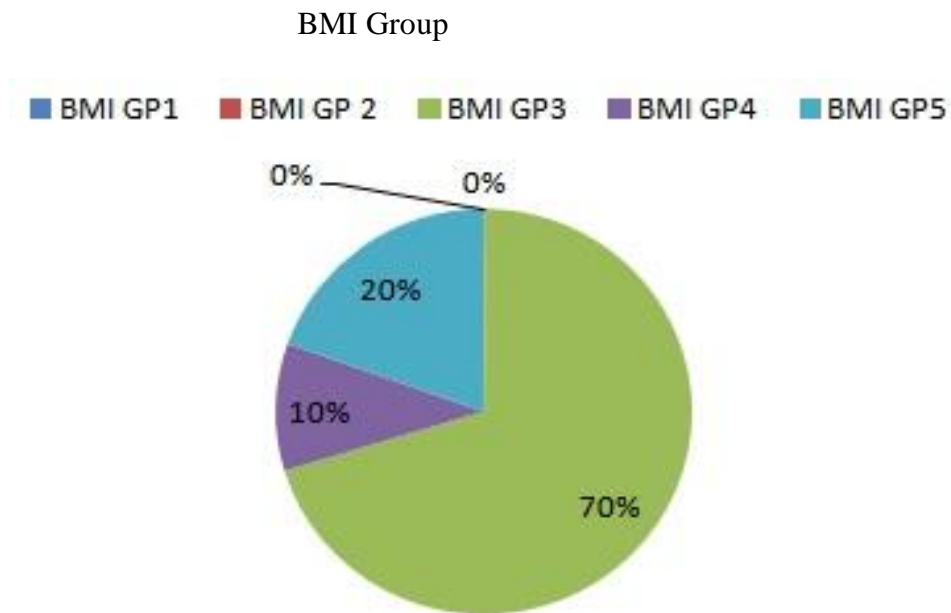
BMI Group

Figure 4.4 Pie graph of group of body mass index before test.

4.1.5 Diseases of patient

Figure 4.5 shows the percentage of the patients' diseases. The pie chart it has shown that Arthritis patient is 8.7%, High blood pressure patient is 8.7%, Diabetes patient is 17.4%, Migraine patient is 6.6%, Stroke patient 17.4%.And others like back pain, migraine, gastric, uric acid constipation etc are 41.30%.For analysis highest five percentage of diseases groups are taken.
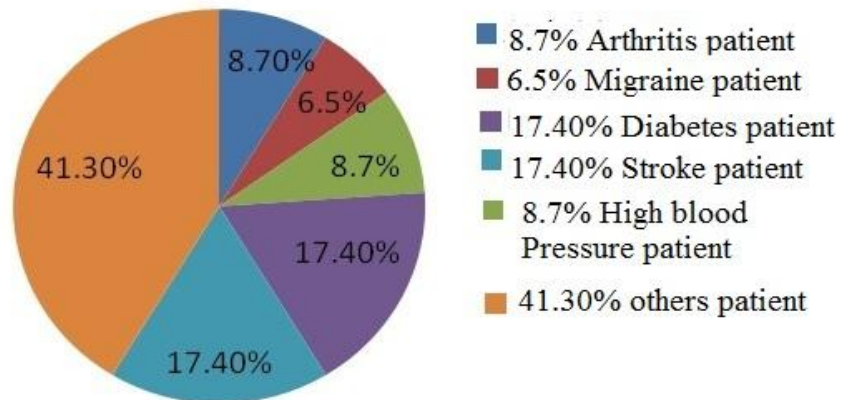

Figure 4.5 Pie chart of diseases of patient

4.1.6 No of treatment done

Figure 4.6 below shows the number of treatments have done on the patient. The pie chart has shown that only 1 to 2 times treatment have done 22% patients, 3 to 4 times 30% patients, 5 to 6 times 28% patients and 7 to 13 times 20% patients.
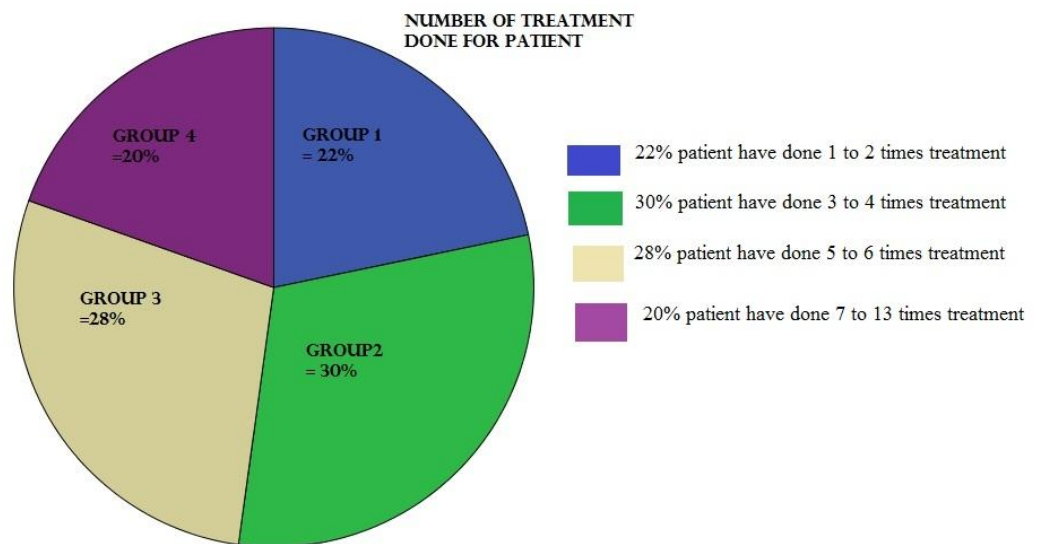

Figure 4.6 Pie chart of no of treatment done

4.1.7   Activity of patient

Figure 4.10 shows the bar chart of activity of patient who participate in the study. The graph shown that 23.9% is medium/high type people and 76.1% is very low type people.
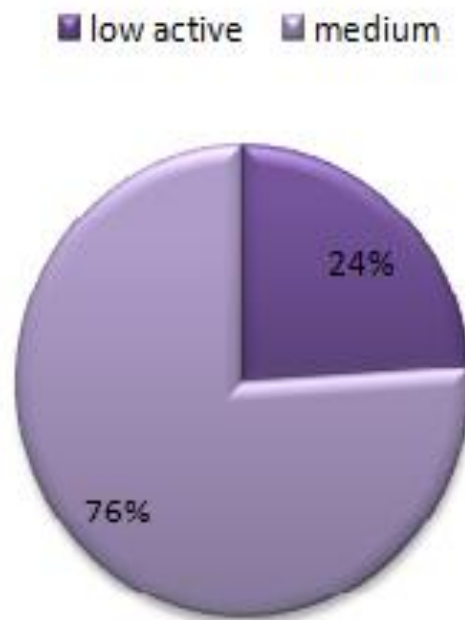

Figure 4.7 Pie chart of no of activity of patient.

4.2   Statistical comparison of Bioimpedance parameters

In this section the statistical comparison of Bioimpedance parameters are shown. For ease of reporting all the parameters are divided into two groups here. Primary and Secondary Bioimpedance parameters. Also need to consider the case before and after. At first need to consider overall .Table 4.2.1- 4.2.2 shows the overall statistical data for mean ,std. dev, kurtosis and variance. Then need to consider according to gender male and female. Table 4.2.3 to 4.2.6 shows that. Then according to BMI group.BMI group is divided into five groups here.BMI less than 20 in group 1, BMI 20 to 25 in group 2,BMI 25 to 30 in group 3, BMI 30 to 35 in group 4 and BMI more than 35 in group 5.