

## CHAPTER 2

### LITERATURE REVIEW

#### 2.1 Schizophrenia

##### 2.1.1 Symptoms and clinical feature

##### 2.1.1.1 Symptoms and signs

Symptoms of schizophrenia vary in type and severity. The symptoms are divided into two groups; positive and negative symptoms. Positive symptoms are those that are in addition to normal experiences and that people without schizophrenia will rarely experience; negative symptoms those that involve a degree of loss of experience (Sims, 2002). However, the patients may have symptoms from one or both categories.

*Positive symptoms* are categorized by delusions, hallucinations, thought disorder, and bizarre behavior (Addington & Adding, 1991). Hallucinations and delusions are sometimes referred to as the psychotic dimension of schizophrenia. Hallucinations may occur in any sensory modality (auditory, visual, olfactory, gustatory, or tactile), but auditory hallucinations are the most common and characteristic of schizophrenia (Critchley, 1987). The patient may hear voices commenting on his/her behavior, conversing with one another, or making critical and abusive comments. Delusions are false personal beliefs that are not subject to reason or contradictory evidence and are not explained by a person's usual cultural beliefs. (Jakobsen, 2005). In persecutory delusions, the patient believes he is being tormented, followed, tricked, or spied on. In delusions of reference, the patient believes that passages from books, newspapers, song lyrics, or other environmental cues are directed at him. In delusions of thought

withdrawal or thought insertion, the patient believes that others can read his mind that his thoughts are being transmitted to others, or that thoughts and impulses are being imposed on him by outside forces. Thought disorder and bizarre behavior are termed the disorganized symptom cluster; it involves disorganized thinking, evidenced primarily by speech that is rambling, shifts from one topic to another, and is non-goal-directed (Barrera & Berrios, 2009). Speech can range from mildly disorganized to incoherent and incomprehensible. Bizarre behavior may include childlike silliness, agitation, and inappropriate appearance, hygiene, or conduct. Catatonic motor behavior is an extreme form of bizarre behavior that can include maintaining a rigid posture and resisting efforts to be moved or engaging in purposeless and unstimulated motor activity.

*Negative symptoms* include blunted affect, poverty of speech, anhedonia, and asociality. With blunted affect (flattening of emotions), the patient's face may appear immobile, with poor eye contact and lack of expressiveness (Velligan & Alphas, 2008). Poverty of speech refers to a diminution of thought reflected in decreased speech and terse replies to questions, creating the impression of inner emptiness.

Anhedonia (diminished capacity to experience pleasure) may be reflected by a lack of interest in activities with substantial time spent in purposeless activity. Asociality refers to a lack of interest in relationships. Negative symptoms are often associated with a general loss of motivation and decreased sense of purpose and goals.

In some patients with schizophrenia, cognitive functioning declines, with impaired attention, abstract thinking, and problem solving. Severity of cognitive impairment is a major determinant of overall disability in these patients.

The symptoms typically impair the ability to function and are often severe enough to markedly interfere with work, social relations, and self-care (American Psychiatric Association, 2000). Unemployment, social isolation, deteriorated familial relationships, and decreased quality of life are common outcomes (Breier, 1991).

#### 2.1.1.2 Types of Schizophrenia

Schizophrenia may be a single disorder; however it may be a syndrome that comprises various underlying disease entities. Subtypes used to classify schizophrenias into more uniform groups include disorganized, catatonic, paranoid, and undifferentiated (Arehart-Treichel, 2010). Disorganized schizophrenia is specified by disorganized speech, disorganized behavior, and inappropriate affect or flat. Catatonic schizophrenia, physical symptoms, including either excessive or immobility motor activity and the assumption of bizarre postures, predominate. Paranoid schizophrenia is characterized by preoccupation with auditory hallucinations or delusions, without prominent inappropriate affect or disorganized speech. Paranoid schizophrenias tend to be less severely disabled and greater responsive to treatments (Breier, 1991). Symptoms of undifferentiated schizophrenia are mixed.

Schizophrenias are also be classified by the presence and severity of negative symptoms, such as blunted affect, lack of motivation, and deceased sense of goal

directed. Patients with this subtype are prominent negative symptoms unaccounted for by other factors (eg., depression, anxiety, an understimulating environment, drug side effects); these patients have typically more disabled, a poorer prognosis, and more resistant to treatment than those with positive subtype, who have hallucinations, delusions, and thought disorders but are free from negative symptoms (Addington & Addington, 1991). Among individual patients, subtype may change over time, generally from paranoid to disorganized or undifferentiated or from nondeficit to deficit (Addington & Addington, 1991).

#### 2.1.1.3. Clinical features

It may be the disease itself changes with time, because of actually analysing a phenomenon with several different causes that all present a common picture i.e. of disturbances of thought and behavior (Arndt et al., 1995). Different names and different criteria have been used to make the diagnosis at different times.

#### 2.1.2 Epidemiological data

The prevalence of schizophrenia is about 1 percent of the population (Kety et al, 1968). It appears to be greater among lower socioeconomic classes in urban areas, perhaps because its disabling effects lead to unemployment and poverty (Richard, 1995). The peak age of onset is 20 to 28 yr in men and 26 to 32 yr in women (Castle et al, 1991). However, onset in childhood, early adolescence, or late life is not uncommon (Kumra, et al., 2001).

### 2.1.3 Etiology and pathophysiology

#### 2.1.3.1 Etiology

The specific cause of schizophrenia is unknown, it has a biologic basis. A vulnerability-stress model, schizophrenia is viewed as occurring in persons with neurologically based vulnerabilities, is the most widely accept (Jones & Pilowsky, 2002). Onset and recurrence of symptoms are as products of interaction between these vulnerabilities and environment (Harrison & Owen, 2003). Other vulnerability of schizophrenia may be genetic; intrauterine, birth, or postnatal complications; or viral CNS infections (Mueser & McGurk, 2004). Maternal exposure to influenza in three month of pregnancy, and Rh incompatibility in a second pregnancy are associated with an increased risk of schizophrenia (Mueser & McGurk, 2004). Many clinical and experimental vulnerability markers have been proposed. Psychologically and behaviorally, vulnerability may be reflected by impaired social competence, cognitive disorganization or perceptual distortion, a low capacity to experience pleasure, and other general coping deficiencies (Mueser & McGurk, 2004; Selten et al., 2007). Before onset of symptoms, vulnerable persons may impair social, academic, and vocational functioning.

Although most patients do not have a schizophrenia family history, genetic factors have been implicated. Persons who have a first-degree of schizophrenia have about a 10% risk of developing the disorder, compared with a 1% risk among the general population (Cardno & Gottesman, 2000). More than 50% of co-twin with schizophrenia develops it (Gottesman & Shields, 1982). Sensitive neurologic and neuropsychiatric tests indicate that abnormal smooth-pursuit eye tracking, impaired

performance on tests of cognition and attention, and deficient sensory gating are more commonly in schizophrenic patients than general population (Freedman, 2010).

This is specifically in relation to parents, siblings, and children. With regards to twins or other multiple births, the chances they will share the disease is 50%. Genetic reports suggest that it is the X chromosome which determines whether or not a person is infected with schizophrenia, specifically, chromosomes 1, 3, 5, and 11 (Walsh et al., 2008), however further studies are needed in order to prove this theory.

Many environmental stressors are trigger the emergence or recurrence of symptoms in schizophrenia patient. Examples are stressful life events such as work, college, and ending a relationship and biologic stressors such as substance abuse (Bustillo, 2008). Stressful family relations can cause or result from frequent illness exacerbation.

#### 2.1.3.2 Pathophysiology

Even with various hypotheses, pathophysiology of schizophrenia remains uncertain: there are too many variants; not enough consistency in findings; and, despite research, a lack of documented proof.

The most well-known and respected hypothesis with regards to the pathophysiology of schizophrenia began in the 1990s and consisted primarily of the notion there is a problem with the dopamine levels in the brain of schizophrenics (Jones & Pilowsky, 2002). It is both a hormone and a neurotransmitter, which means that it activates five different receptors in the brain, aptly named D1, D2, D3, D4, and D5. It may not be

the only neurotransmitter involved in the pathophysiology of schizophrenia. Glutamate and serotonin have also been implicated (Jones & Pilowsky, 2002). Contributing to this hypothesis is the fact that drugs administered to aid dopaminergic activity bring on schizophrenic characteristics such as psychosis, in a patient, whereas drugs administered to block them help reduce, or eliminate symptoms of schizophrenia altogether (Jones & Pilowsky, 2002).

Though there are many theories and hypotheses regarding the pathophysiology of schizophrenia, there is, unfortunately, still no cure for the disease. The best a sufferer can hope for nowadays is to benefit from available medication which keeps the disease under control or in remission for the duration of time for which it is taken.

#### 2.1.4 Diagnosis

No single symptom is specific to schizophrenia, a diagnosis may be made when one or more of the following conditions present (American Psychiatric Association, 2000):

1. During one month or more, a significant portion of time is taken up by bizarre delusions that are hallucinations consisting of two or more voices conversing with each other or of a voice that affects a person's behaviors or thoughts or at least two of the following:

- delusions
- hallucinations
- grossly disorganized behavior
- catatonic behavior

- negative symptoms

2. For a significant portion of time, due to the disturbance, marked impairment is noticed in academics, interpersonal relationships, self-care, work or any other major area of functioning.

3. Symptoms are continuous and persist for at least six months.

4. The disturbance is not due to a Pervasive Developmental Disorder, substance abuse, general medical condition or another mental disorder.

### 2.1.5 Course and prognosis

#### 2.1.5.1 Course

The term 'course' refers to the pattern of progression of an illness over a period of time. Schizophrenia starts gradually with a prepsychotic phase of increasing negative symptoms (e.g., social withdrawal, deterioration in hygiene and grooming, unusual behavior, outbursts of anger, and loss of interest in school or work); A few months or years later, a psychotic phase develops (with delusions, hallucinations, or grossly bizarre/disorganized speech and behavior) (Andreasen & Olsen, 1982). Individuals who have an onset of schizophrenia later in their 20's or 30's are often female, have less evidence of structural brain abnormalities or cognitive impairment, and display a better outcome (Andreasen et al., 1998). Schizophrenia usually persists, continuously or episodically, for a life-time. Complete remission (i.e., a return to full premorbid functioning) is uncommon. Some individuals appear to have a relatively stable course, whereas others show a progressive worsening associated with severe disability (Bleuler, 1980).

The psychotic symptoms usually respond to treatment with antipsychotic medication, whereas the negative symptoms are less responsive to antipsychotic medication; often the negative symptoms steadily become more prominent during the course of schizophrenia (Ciompi, 1980).

#### 2.1.5.2 Prognosis

Factors associated with a good prognosis include good premorbid functioning (eg, good student, strong work history), late or sudden onset of illness or both, family history of mood disorders other than schizophrenia, minimal cognitive impairment, few negative symptoms, Paranoid or nondéficit subtype; factors associated with a poor prognosis include young age at onset, poor premorbid functioning, family history of schizophrenia, disorganized or déficit subtype with many negative symptoms (British Columbia Schizophrenia Society, 2006). Men have poorer outcomes than women; women respond better to treatment with antipsychotic drugs (British Columbia Schizophrenia Society, 2006). Schizophrenia can occur with other mental disorders. It has a particularly poor prognosis when associated with significant obsessive-compulsive symptoms; a better prognosis is with symptoms of borderline personality disorder, (American Experience, 2007).

Substance abuse is a significant problem in over 50% of schizophrenias (Ferdinand et al., 2005). Comorbid substance abuse is a significant predictor of poor outcome and may lead to drug noncompliance, repeated relapse, frequent rehospitalization,

declining function, and loss of social support, including homelessness (Gregg et al., 2007).

## 2.1.6 Treatment

### 2.1.6.1 Antipsychotic treatment

Medication is effective in reducing both positive and, to some extent, negative symptoms (Gray & Roth, 2007). Everyone responds differently to antipsychotic medication. In some cases, several different drugs must be tried before the right one is found.

The older types are called conventional or "typical" antipsychotics. Some of the more commonly used typical medications include:

- Chlorpromazine
- Haloperidol
- Perphenazine
- Fluphenazine

In the 1990's, new antipsychotic medications were developed (Kraepelin, 1999). These new medications are called second generation, or "atypical" antipsychotics.

One of these medications, clozapine (Clozaril) is an effective medication that treats psychotic symptoms, hallucinations, and breaks with reality (Wahlbeck et al., 2007).

But clozapine can sometimes cause a serious problem called agranulocytosis, which is a loss of the white blood cells that help a person fight infection. People who take clozapine must get their white blood cell counts checked every week or two. This

problem and the cost of blood tests make treatment with clozapine difficult for many people. But clozapine is potentially helpful for people who do not respond to other antipsychotic medications.

Other atypical antipsychotics were also developed. None cause agranulocytosis.

Examples include:

- Risperidone
- Olanzapine
- Quetiapine
- Ziprasidone
- Aripiprazole
- Paliperidone

#### 2.1.6.2 Family Therapy

Many schizophrenia patients attend therapy with their families. Some family members may also attend their own support groups where they can talk with other people who are living with someone with schizophrenia.

Education about the illness is crucial for both patient and family member. Learning how to identify changes in the patient, how to communicate with the patient, and how to be supportive to the patient are all skills that can be taught in family therapy (McFarlane et al., 2003). Schizophrenic patients who return to a high expressed emotion home are more likely to relapse than are patients who return to a low

expressed emotion home. For this reason, support for relatives of schizophrenia patients can be helpful for patients with schizophrenia and their family members.

### 2.1.6. 3 Psychological Treatments

The goal of psychotherapy is to develop a collaborative relationship between the patients, family members, and physician so that patients can learn to understand and manage their illness, take drugs as prescribed, and handle stress more effectively. Psychological treatments include individual psychotherapy, cognitive behavioral therapy, and social skills training.

#### *Individual Psychotherapy*

Psychoanalysis is a philosophy in which symptoms of mental illness are considered external expressions of unconscious problems (Moore & Fine, 1968). In psychoanalysis, an analyst and patient meet frequently to reveal and explore these unconscious conflicts. Psychoanalysis is hard work for both patient and therapist.

Psychotic patients are asked to discuss their symptoms and consider them in relation to their childhood experience—an exhausting and potentially impossible task. The stress of a psychoanalytic session is simply too much for many patients with schizophrenia to handle.

More recently, therapists have begun to use personal therapy to treat schizophrenia. Personal therapy is another form of individual psychotherapy in which patients work one-on-one with a therapist to learn coping and life skills. Different skills are taught at appropriate stages of a patient's recovery. For example, when a patient is just

backing home from the hospital, a therapy session might focus on identifying and managing stress. Later, a patient might learn how to talk about a problem with a family member.

### *Cognitive Behavioral Therapy*

Many mental illnesses are characterized by thoughts and behaviors that make people unhappy or uncomfortable. People who are depressed often think negatively about themselves and believe that they are worthless. Many schizophrenia patients experience delusions, or false beliefs that are resistant to change. The goal of cognitive behavioral therapy is to change these maladaptive thoughts and behaviors (Wykes et al., 2008).

In the past, cognitive behavioral therapy was used primarily to treat depression and anxiety disorders. Clinicians thought schizophrenic patients were too impaired to be treated with cognitive behavioral therapy. Therapists challenge the reality of hallucinations and delusions and ask patients to consider alternative explanations for their strange experiences (Wykes et al., 2008). The goal of this process is to decrease the impact of symptoms, keep patients out of the hospital, and improve their social interactions. Because this is such a new treatment for schizophrenia, there is little research to tell us how helpful it is.

#### 2.1.6. 4 Social Skills Training

Schizophrenia patients often have very poor interpersonal skills. They difficult to make appropriate eye contact, controlling the volume of their voice, and participating

in a conversation The goal of social skills training is to teach patients basic life skills, including how to interact with other people (O'Donohue & Krasner, 1995). Social skills training class focus on social interaction, like how to make good eye contact. Patients will learn about appropriate eye contact, practice using role play, and receive feedback from a therapist (O'Donohue, 2003). After the lesson, patients will be asked to use this new skill in the real world and talk in the next session about how it worked.

Social skills training also help patients learn a variety of basic skills, including taking care of basic hygiene, preparing meals, and money management (O'Donohue, 2003). Classes might include basic cooking lessons, fire safety, or how to write a check. Social skills training are very different from psychotherapy. However, some of the memory or attention problems that schizophrenia patients experience make learning new skills difficult.

## 2.2 Obesity in general people

### 2.2.1 Symptoms and clinical feature

Overweight and obesity refer to a person's overall body weight and whether it is too high. Overweight is having extra body weight from muscle, bone, fat, and/or water; obesity is having a high amount of extra body fat (Haslam & James, 2005). Weight gain usually happens over time.

The signs of overweight or obesity include:

- Clothes feeling tight and needing a larger size.
- The scale showing that he/she has gained weight.
- Around the waist is extra fat.
- A higher than normal body mass index, waist circumference, and waist hip ratio
- The fat distribution in body is identified among three types of obesity

Obesity is divided into three types:

1. Android obesity is male type obesity where excess fat is accumulated in the upper half of the body like the shape of an apple. The shoulders, face, arms, neck, chest and upper portion of the abdomen are bloated. The stomach gives a stiff appearance. So also the arms, shoulders, and breast are bloated. The back seems to be erect but the neck is compressed and there is protruding chest because of the bulk in the stomach. The lower portion of the body the hips, thighs, and legs are thinner beyond proportion in comparison with the upper part. In these persons the vital organs affected will be mostly the heart, liver, kidneys, and lungs. Although this typed of obesity is found more in males it is usual in females. Females, who are under hormone

treatment for their menstrual abnormalities or after childbirth, tend to this type of obesity. It occurs in females around menopause (Kareem, 2010). In this type, the excess flesh is less likely to reduce especially in female than males. Android obesity is a major risk for heart damage and heart disease because of high cholesterol.

2. Gynoid obesity is the type which is lower part of the body is the extra flesh. This type of obesity is also common to both sexes, however females are more affected. This type of obesity is similar to pears. The flesh is somewhat flabby in the abdomen, thighs, buttocks, and legs. The face and neck mostly give a normal appearance. Some persons, the cheeks may be drawn. As these persons grow old the whole figure assumes a stooping posture and the spine is never erect because of the heavy thighs and hips. Vital organs affected mostly are the kidneys, uterus, intestines, bladder, and bowels. The functions of these organs sometimes have a direct effect on the heart. This type of obesity, exercises or dieting is not help appreciably in reducing weight. Medicine is the only hope. The people with type have more patience and undertake proper treatment to achieve the goal of reducing weight and preventing further weight again.

3. The third type is besides android and gynoid so there is one more type of obesity. Some persons neither are android or to gynoid type. Whole body from head to toe looks like a barrel. Their gait is more to rolling rather than walking. The fat tissues in their body hinder the movement of all the internal organs and consequently affect their brisk functioning. Any exercise is difficult for people with this type due to

the enormous size of the body so such person have to follow a strict in diet and do plenty of exercise.

### 2.2.2 Epidemiological data

Obesity is more common in women; particularly these ageds are more than 50 years. (Howard et al., 2008). However, obese men have a higher mortality rate after that age (Howard et al., 2008). Obesity is also more common among minorities and low-income populations. In the US, 20% of adolescents are significantly overweight (Johansson et al., 2009.)

### 2.2.3 Etiology and pathophysiology

#### 2.2.3.1 Etiology

##### 2.2.3.1.1 Lack of energy balance

Energy imbalance most often causes overweight and obesity. It means that energy IN is more than energy OUT. Energy IN is the amount of energy or calories that get from food and drinks: energy OUT is the amount of energy that body uses for things like breathing, digesting, and being physically active (Zheng, 2009).

##### 2.2.3.1.2 An inactive lifestyle

Inactive physically, one reason for this is that many people spend hours in front of TVs and computers doing work, schoolwork, and leisure activities. In fact, more than 2 hours a day of regular TV viewing time has been linked to overweight and obesity (Gortmaker et al., 1990). Other reasons for not being active include relying on cars instead of walking, fewer physical demands at work or at home because of modern

technology and conveniences, and lack of physical education classes in schools for children.

People who are inactive are more likely to gain weight because they don't burn up the calories that they take in from food and drinks (Guestposter, 2010). An inactive lifestyle also raises risks of coronary heart disease, high blood pressure, diabetes, colon cancer, and other health problems (Guestposter, 2010).

#### 2.2.3.1.3 Environment

Current environment doesn't support healthy lifestyle habits. In fact, it encourages obesity. Some reasons include lack of neighborhood sidewalks and safe places for recreation. Not having area parks, trails, sidewalks, and affordable gyms makes it hard for people to be physically active. Other factors include work schedules, oversized food portions and lack of access to healthy foods.

#### 2.2.3.1.4 Genes and family history

Studies of identical twins that have been raised apart show that genes have a strong influence on a person's weight. Overweight and obesity tend to run in families. Chances of being overweight are greater if parents are overweight or obese.

Genes also may affect the amount of fat store in body and where on body carry the extra fat. Because families also share food and physical activity habits, a link exists between genes and the environment (Brook, 1977).

Children adopt the habits of their parents. A child who has overweight parents who eat high-calorie foods and are inactive will likely become overweight (Brook, 1977). However, if the family adopts healthy food and physical activity habits, chance of a child to be overweight or obese is reduced.

#### 2.2.3.1.5 Health conditions

Some hormone problems may cause overweight and obesity, such as underactive thyroid (hypothyroidism), Cushing's syndrome, and polycystic ovarian syndrome (Risen et al., 1993).

#### 2.2.3.1.6 Medicines

Certain medicines may cause gain weight. These medicines include some corticosteroids, antidepressants, and seizure medicines (Bray, 2004). These medicines can slow the rate at which the body burns calories, increase the appetite, or cause the body to hold on to extra water. All of these factors can lead to weight gain (Haslam & James, 2005).

#### 2.2.3.1.7 Emotional factors

Some people eat more than usual when they are bored, angry, or stressed, over time, overeating lead to weight gain and may cause overweight or obesity.

#### 2.2.3.1.8 Smoking

Some people gain weight when they stop smoking (Martin, 2010). One reason is that food often tastes and smells better after quitting smoking (Martin, 2010). Another reason is because nicotine raises the rate at which burns calories, so people burn fewer calories when they stop smoking (Martin, 2010). However, smoking is a serious health risk, and quitting is more important than possible weight gain.

#### 2.2.3.1.9 Age

As people get older, they tend to lose muscle, especially if they are less active. Muscle loss can slow down the rate at which their body burns calories. If they don't reduce their calorie intake as they get older, they may gain weight (Waehner, 2010).

Midlife weight gain in women is mainly due to aging and lifestyle, but menopause also plays a role (Peeke, 2010).

#### 2.2.3.1.10 Pregnancy

During pregnancy, women gain weight so that their babies get proper nourishment and develop normally. After giving birth, some women find it hard to lose the weight (Boyles, 2010). This may lead to overweight or obesity, especially after a few pregnancies.

#### 2.2.3.1.11 Lack of Sleep

Studies find that the less people sleep, the more likely they are to be overweight or obese (Layton, 2010). People who report sleeping 5 hours a night, for example, are much more likely to become, obese compared with people who sleep 7–8 hours a night.

People who sleep fewer hours also seem to prefer eating foods that are higher in calories and carbohydrates, which can lead to overeating, weight gain, and obesity over time (Cappuccio, 2010).

#### 2.2.3.2 Pathophysiology

The pathogenesis of obesity has moved during recent decades. The psychological and behavioral elements remain important because the final common act that leads to either obesity or its amelioration is the behavior of altered food intake and/or physical activity. A study of cellular and metabolic features that are important forces acting on behavior has become of increasing concern (Hirsch, 2010). New methods for the study of energy metabolism have led to a dissection of the role of food intake vs. energy expenditure in the pathogenesis of obesity (Lean, 2000).

When body weight is altered by 10% in both obese and nonobese subjects, there are startlingly reproducible changes in the expenditure of energy (Hirsch, 2010). This was shown when subjects were studied over many months in a metabolic setting at the Rockefeller University Hospital. When body fat mass was made to increase 10% above "usual" weight, there was an unanticipated increase in energy expenditure

of roughly 10 kcal/(kg·d) fat free mass (Wolff, 1997). When body fat declined and was maintained at a new lower level 10% below usual body weight, a similar decrease in energy expenditure occurred and persisted (Hirsch, 2010). These changes lead to an approximate alteration of 15% in total energy expenditure and may be significant in the maintenance of usual body weight whether the individual is obese or nonobese (Hirsch, 2010). Thus, energy expenditure can vary with the level of fat storage, and this variation of expenditure may act to maintain the amount of stored triglyceride at a "set" level but one that is obviously different in obese and nonobese subjects (Hirsch, 2010).

#### 2.2.4 Diagnosis

Diagnosis of obesity is made by comparing the patient's weight with ideal weight charts. A direct measure of body fat can also be made with an instrument known as calipers. Calipers are a scissor-shaped device used to measure the thickness of a person's flesh at the back of the upper arm; this measurement can be used to tell whether a person has an excess of fatty tissue. Women whose body weight consists of more than 30 percent fatty tissue are regarded as obese. Men with 25 percent fatty tissue in their body weight are considered to be obese (Balentine & Mathur, 2010).

Doctors may also note the way in which a person's body fat is distributed. Some patterns of distribution are associated with certain complications of obesity. For example, a person who is "apple-shaped" has a higher risk of cancer, heart disease, and diabetes than someone who is "pear-shaped" (Sperling, 2010). An "apple-shaped"

person is one whose weight is concentrated around the waist and abdomen. A "pear-shaped" person is one whose extra weight tends to be around the hips and thighs.

The body mass index, waist-circumference, and waist-hip-ratio are diagnostic tests for current overall fatness by comparison. For medical purposes, body mass index is used to determine if weight is in the healthy range because it is a simple and widely used method for estimating body fat mass. Body mass index is calculated by dividing weight in kilograms by height in meters squared. So physical examination, including a measurement of weight and height, is usually sufficient to diagnose obesity.

- Body mass index between 23 and 24.99 ( $\text{kg}/\text{m}^2$ ) is overweight (Gallagher, 2004).
- Body mass index between 25 or higher is obese (Gallagher, 2004).

Asian populations develop negative health consequences at a lower body mass index between than Caucasians. In Asian, 23.0-  $\text{kg}/\text{m}^2$  or more is the cut-offs for overweight and  $\geq 25.0 \text{ kg}/\text{m}^2$  is the cut-offs for obesity (Snehalatha et al., 2003; Gallagher, 2004).

## 2.2.5 Course and prognosis

### 2.2.5.1 Course

The life activity changes in obesity because the influence of the neural-endocrine metabolic disturbances (Leter, 1948): it alternates circulation, respiration, and digestion. These changes are connected on the one hand with change of central regulation, and on the other with secondary anatomic and organs and functional modifications of tissues. For example, atherosclerotic disturbances in obese is linked

with the fact that they arise and progress on background of already pronounced dystrophic disturbances. The reactions to the superimposition proceed at a considerably slower rate. Therefore, coronary atherosclerosis produces phenomena of functional insufficiency, attacks of angina pectoris at a relatively later time. The somewhat benign course of atherosclerosis in obesity and the relative ease and speed of improvement in the patient condition dictate the unremitting need, energetic treatment in the earlier stages of adiposis. Many of electrocardiograms have shown pronounced coronary insufficiency that disappeared after a short period (1 to 2 months) of diet therapy (Egorov et al., 1959). The same response has occurred in cardiopulmonary insufficiency and in the peripheral circulation.

Obesity also impacts on the digestive organs. It often found rather persistent changes in gastric mobility and secretion. Hypersecretion and hyperactivity proceeded with few signs or symptoms. Ulcers and gastritis are rare. The pancreatic enzymes in obese people are subject to qualitative shifts, changes occur in the qualitative ratios of the basic enzymes amylase, lipase, and trypsin (Li & Renier, 2007). In addition, overweight and obesity are major risk factors for a number of chronic diseases, including diabetes, cardiovascular diseases and cancer.

#### 2.2.5.2 Prognosis

The 'prognosis' of obesity usually refers to the likely outcome of obesity. The prognosis of obesity may include the duration of obesity, chances of complications of obesity such as hypertension, sex hormone binding globulin levels low (serum), thrombophilia ; probable outcomes, prospects for recovery, recovery period for

obesity, survival rates, death rates, and other outcome possibilities in the overall prognosis of obesity (Lean, 2005). Naturally, such forecast issues are by their nature unpredictable.

Although the prognosis for short-term weight loss has improved with the advent of new dieting and exercise strategies and the development of behavior modification programs, the long-term prognosis for losing excess weight and keeping it off remains poor (Hemmingsson, 2010). Morbidity and mortality rates for obese individuals increase in direct proportion to increases in the body mass index (Barnes et al., 2007).

#### 2.2.6 Treatment

Successful weight-loss treatments include setting goals and making lifestyle changes, such as eating fewer calories and doing physical activity regularly. Medicines and weight-loss surgery also are options for some people if lifestyle changes are not enough.

##### *2.2.6.1 Set realistic goals*

Setting realistic weight-loss goals is an important first step to losing and maintaining weight

- Lose just 5 to 10 percent current weight over 6 months. This will lower risk of coronary heart disease (CHD) and other conditions (Shai et al., 2010).
- The best way to lose weight is slowly. A weight loss of 1 to 2 pounds a week is do-able, safe, and will help people keep off the weight (Venuto, 2010). It also will give them the time to make new, healthy lifestyle changes.

- If body weight lost 10 percent, has kept it off for 6 months, and is still overweight or obese, may want to consider further weight loss (Shai et al., 2010).

#### 2.2.6.2 Lifestyle changes

For long-term weight-loss success, it is important for people and their family to make lifestyle changes (Pi-Sunyer, 2006) :

- Focus on balancing energy IN (calories from food and drinks) and energy OUT (physical activity)
- Follow a healthy eating plan
- Learn how to adopt healthy lifestyle habits

Over time, these changes will become part of everyday life.

#### 2.2.6.3 Calories

Cutting back on calories (energy IN) will help lose weight. To lose 1 to 2 pounds a week, adults should cut back their calorie intake by 500 to 1,000 calories a day (Shick et al., 1998). In general, having 1,000 to 1,200 and 1,200 to 1,600 calories a day will help most women and men lose weight safely respectively (Shick et al., 1998).

#### 2.2.6.4 Healthy Eating Plan

A healthy eating plan gives body the nutrients it needs every day. It has enough calories for good health, but not so many that people gain weight. A healthy eating plan also will lower risk of heart disease and other conditions. A healthy eating plan is low in saturated fat, *trans* fat, cholesterol, sodium (salt), and added sugar (Ness-Abramof & Apovian, 2006). Healthy foods include:

- Fat-free and low-fat milk and milk products, such as low-fat yogurt, cheese, and milk.

- Lean meat, fish, poultry, cooked beans, and peas.
- Whole-grain foods, such as whole-wheat bread, oatmeal, and brown rice.

Other grain foods include pasta, cereal, bagels, bread, tortillas, couscous, and crackers.

- Fruits, which can be canned (in juice or water), fresh, frozen, or dried.
- Vegetables, which can be canned (without salt), fresh, frozen, or dried.

#### 2.2.6.5 Physical Activity

Being physically active and eating fewer calories will help people lose weight and keep weight off over time. Physical activity also will benefit in other ways. It will

(Barnes et al., 2007):

- Lower your risk of heart disease, heart attack, diabetes, and cancers (such as breast, uterine, and colon cancers)
- Strengthen heart and help lungs work better
- Strengthen muscles and keep joints in good condition
- Slow bone loss
- Give more energy
- Relax and cope better with stress
- Fall asleep more quickly and sleep more soundly
- Enjoyable way to share time with friends and family

The four main types of physical activity are aerobic, muscle-strengthening, bone strengthening, and stretching. People can do physical activity with light, moderate, or vigorous intensity.

People vary in the amount of physical activity they need to control their weight. Many people can maintain their weight by doing 150 to 300 minutes (2 hours and 30 minutes to 5 hours) of moderate-intensity activity per week, such as brisk walking (Gwinup, 1987). People who want to lose a large amount of weight (more than 5 percent of their body weight) may need to do more than 300 minutes of moderate-intensity activity per week (Gwinup, 1987). This also may be true for people who want to keep off weight that they have lost. People don't have to do the activity all at once; they can break it up into short periods of at least 10 minutes each (Haskell et al., 2007).

People should get at least 60 minutes or more of physical activity every day. Most physical activity should be moderate-intensity aerobic activity. Activity should vary and be a good fit for age and physical development. Many people lead inactive lives and may not be motivated to do more physical activity. When starting a physical activity program, some people may need help and supervision to avoid injury.

People, who are obese or inactive, should start physical activity slowly and build up the intensity a little at a time. When starting out, one way to be active is to do more everyday activities, such as taking the stairs instead of the elevator and doing household chores and yard work. The next step is to start walking, biking, or

swimming at a slow pace, and then build up the amount of time for exercise or the intensity level of the activity.

To lose weight and gain better health, it is important to get moderate-intensity physical activity. Choose activities that an individual enjoys and that fit into a daily life. A daily, brisk walk is an easy way to be more active and improve one's health. Use a pedometer to count the daily steps and keep track of how much one's walking. Try to increase the number of steps each day. Other examples of moderate-intensity physical activity include dancing, gardening, and water aerobics.

For greater health benefits, try to step up level of activity or the length of time. For example, start walking for 10 to 15 minutes three times a week, and then build up to brisk walking for 60 minutes, 5 days a week.

#### 2.2.6.6 Behavioral changes

Changing behaviors or habits related to food and physical activity is important for losing weight. The first step is to understand which habits lead to overeat or have an inactive lifestyle. Below are some simple tips to adopt healthier habits (Gaspar, 2010).

*Change environment:* Overeat when watching TV, when treats are available at work, or when with a certain friend. People also may find it hard to motivate themselves to do physical activity regularly. However, these habits can change.

- Doing activity instead of watching TV such as dance to music or go for a walk.
- After get a cup of coffee should leave the office break room.

- Head straight to an exercise class on the way home from work.
- Put a note on calendar to remind about taking a walk or go to exercise class.

*Keep a record:* A record of food intake and the amount of physical activity that people do each day will help inspire them. People also can keep track of weight. For example, when the record shows that meeting physical activity goals, people will want to keep it up. A record also is an easy way to track how they are doing, especially if they are working with a registered dietitian or nutritionist.

*Seek support:* Ask for help or encouragement from friends, family, and health care provider. People can get support in person, through e-mail, or by talking on the phone. They also can join a support group.

*Reward success:* Reward for success in weight-loss goals or other achievements with something people like to do, not with food. Choose rewards that people will be enjoy, such as a movie, music CD, an afternoon off from work, a massage, or personal time.

#### 2.2.6.7 Medicines

Weight-loss medicines approved by the Food and Drug Administration (FDA) may be an option for some people. If it is not successful at losing 1 pound a week after 6 months of using lifestyle changes, medicines may help. People should only use these medicines as part of a program that includes diet, physical activity, and behavioral changes.

Weight-loss medicines may be suitable for adults who are obese. People who are overweight or obese that risk for heart disease and other health conditions also may benefit from medicines (Maglione & Tu, 2005). The FDA has approved two prescription weight-loss medicines for long-term use: sibutramine (Meridia<sup>®</sup>) and orlistat (Xenical<sup>®</sup>) (Maglione & Tu, 2005). These medicines cause a weight loss between 4 and 22 pounds, although some people lose more weight. Most of the weight loss occurs within the first 6 months of taking the medicine (Maglione & Tu, 2005).

#### 2.2.6.8 Surgery

Weight-loss surgery may be an option for people who have extreme obesity when other treatments have failed. Weight-loss surgery also is an option for people who are obese and life-threatening conditions, such as (Tice, 2008):

- Severe sleep apnea
- Obesity-related cardiomyopathy
- Severe type 2 diabetes

## 2.3 Schizophrenic patients with overweight/obesity

### 2.3.1 Epidemiological data

One common problem for schizophrenic patients is obesity, with an estimated 40-60% of this population being obese or overweight (Catapano & Castle, 2004). Obesity among the mentally ill may contribute to adverse medical and psychological consequences as well as medication non-compliance and poorer quality and enjoyment of life (Catapano & Castle, 2004).

In the pre-antipsychotic era, Kraepelin (1919) noted that some patients with schizophrenia exhibited bizarre eating habits, and not uncommonly were obese. It is worth noting that this tendency to weight loss during more active phases of the illness has been borne out by results from a recent meta-analysis of multiple antipsychotic drug trials, which noted that placebo-treated patients on average lost weight (Allison et al., 1999). Nevertheless, there are a number of reasons that patients with schizophrenia might be prone to obesity, including the effect of symptoms such as paranoia and negative symptoms such as apathy and social withdrawal, which may independently contribute to schizophrenic patients' lack of adherence to proper diet and their overall sedentary lifestyle (Davidson et al., 2001).

Moreover, the economic conditions of chronically mentally ill individuals also contribute to poor dietary habits. One theory about the major vector of the obesity epidemic correlates obesity trends with the growth of the fast-food industry (Schlosser, 2001). Fast food is an affordable option for those on limited budgets, yet unfortunately is often very high in saturated fat and total calories.

In addition to the health care costs of obesity, social stigma, discrimination, and low self-esteem are common problems among patients with obesity (Aramburu et al., 2002). This stigmatization can lead to psychological distress and could exacerbate illness in the vulnerable, psychotic individual. The stigma of mental illness combined with that of being overweight or obese is a significant burden for patients suffering from both conditions.

### 2.3.2 Etiology and pathophysiology

#### 2.3.2.1 Etiology

Obesity is a complex multifactorial chronic disease that develops from the interaction between genotype and the environment. Obesity in individuals with mental disorders such as schizophrenia has been attributed to various factors, including a sedentary lifestyle, poor nutritional choices or lack of access to healthy foods, the effects of both the mental disorder itself and the medications used to treat it, and lack of access to adequate preventative medical care (Thakore & Leonard, 2009) .

Excess body weight increases the risk for many medical problems, including type 2 diabetes mellitus, coronary heart disease, osteoarthritis, hypertension, and gallbladder disease. Abdominal or visceral obesity is particularly associated with increased risk for insulin resistance and/or the metabolic syndrome and for type 2 diabetes mellitus, and persons with schizophrenia have greater visceral adiposity than healthy individuals (Thakore, 2004).

The clinical problem of obesity has become more apparent with the availability of second-generation, or ‘atypical’, antipsychotics. Their advantage over the older ‘neuroleptics’ have principally been in their lower propensity for extrapyramidal side effects, including tremor, rigidity, and akathisia. However, one of the most troubling adverse effects of the second-generation antipsychotics is treatment-associated weight gain. The second-generation antipsychotics available today differ in their propensity for weight gain and the degree of weight change can also vary from patient to patient.

Efficacy may also differ from drug to drug, and patient to patient, making medication selection and monitoring for weight gain a complex issue and can give rise to significant therapeutic dilemmas. Moreover, obesity can be an obstacle to adherence to medication, as evidenced by a mail survey of persons with schizophrenia where body mass index status and subjective distress from weight gain were predictors of noncompliance (Weiden et al., 2000)

This chapter addresses what the clinician can do to ameliorate the problem of overweight and obesity observed in patients with mental disorders, particularly schizophrenia. When using antipsychotics, especially those most associated with weight gain, ongoing monitoring is essential. Certain patients, such as children, adolescents, and those with their first episode of schizophrenia, are at higher risk for weight gain, even when using the second-generation antipsychotic medications that are ordinarily considered as ‘weight-neutral’ (Lieberman et al., 2005). Early monitoring can identify early weight gainers; these patients are at significant risk for substantial weight gain.

Second-generation antipsychotics are a major source of concern regarding weight gain. Attempts have been made to identify specific receptor-binding profiles of antipsychotics to aid in the prediction of propensity for weight gain, however there is much individual variation, and most of the information available at present comes from clinical observations. In a comprehensive meta-analysis of weight change after 10 weeks of treatment at a standard dose of antipsychotics, mean increases in body weight were calculated for the different medications. Clozapine and olanzapine had the largest weight gains of 4.45 and 4.15 kg, respectively (Coveli et al., 2004).

Risperidone was associated with a more modest 2.10 kg gain. Ziprasidone appeared essentially weight neutral with a mean gain of 0.04 kg (Thakore, 2004). Quetiapine also has a moderate to high propensity toward gain, particularly over the long term, as demonstrated in a prospective, naturalistic study (Casey, 1996). Aripiprazole, the newest second-generation antipsychotic medication to become commercially available, is generally considered to be weight neutral (Citrome et al., 2005).

Switching antipsychotics can lead to weight loss. Ultimately, there will need to be a favorable balance of benefit to risk. Deciding whether to continue treatment with a particular antipsychotic or switch the patient to another can pose substantial dilemmas for the clinician. The choice to 'switch or stay' is a highly individualized decision.

Evidence-based medicine philosophy states that relevant clinical trials can inform the clinician in making thoughtful individualized treatment decisions but there are no guarantees of weight gain or loss or drug efficacy. With these caveats, consideration

should be given to switching to a more weight-neutral medication when encountering rapid weight gain with a particular antipsychotic. Report of 3 studies in which outpatients experiencing were switched to 6 weeks of open-label ziprasidone, patients switched from olanzapine experienced a mean weight loss of 1.76 kg, those switched from risperidone had a lesser reduction in weight (-0.86 kg), and those switched from first-generation antipsychotics had a non-significant increase (+0.27 kg) (Weiden, 2003).

In an 8-week study where patients were switched from other antipsychotics to open-label aripiprazole (92% were receiving olanzapine or risperidone prior to the switch), the mean weight loss from baseline ranged from 1.3 kg to 1.7 kg, the incidence of weight loss of at least 7% of total body weight ranged from 7% to 15%, and the incidence of weight gain of at least 7% of total body weight ranged from 3% to 5%, depending on the switching technique (Byerly, 2009).

Early weight gain may be predictive of future substantial weight gain. One can use the time course for weight gain with olanzapine for early identification of those at risk before substantial weight gain has occurred. Patients taking olanzapine who gain 5% or more of their body weight within the first 4–12 weeks of treatment and who are going to remain on olanzapine will require more active behavioral and/or pharmacologic interventions than patients who gain weight more slowly or not at all (Thakore, 2004). Although weight gain may plateau after 40 weeks or so, by that time one-half of patients receiving olanzapine will have gained up to 10 kg, and some substantially more than that (Thakore, 2004). The pattern of weight gain with

quetiapine is also consistent with the idea that it can occur early (within 12 weeks) (Meats, 1997). Within the approved range, antipsychotic dose does not appear to be predictive of weight gain for olanzapine but there may be differences at higher-than-approved doses (Allison et al., 1999). For risperidone, in a short (6-week) trial, higher doses were associated with more weight gain. Data regarding a dose relationship with weight gain with quetiapine is conflicting (Meats, 1997). Low initial body mass index ( $< 25$ ) may be a predictor of some future weight gain in some patients with any of the second-generation antipsychotic medications.

Children and adolescents, and patients in their first episode of psychosis may be at heightened risk for weight gain with antipsychotic medication. In a 52-week randomized double-blind clinical trial in patients early in their course of psychotic illness, 80% of patients in the olanzapine group, 50% in the quetiapine group, and 58% in the risperidone group, gained at least 7% of their baseline weight at week 52 (McEvoy et al., 2007).

Monitoring of patients receiving psychotropic medications for weight and metabolic parameters is crucial. The most frequently assessed parameter in the recommendations is weight. At a minimum it is obtained at baseline, monthly for the first 3 months, and then quarterly. However, monitoring weight at each and every patient visit will allow the clinician to catch a problem early, before substantial weight gain has set in, and underscore to both the patient and the clinician the importance of physical fitness. Additionally, patients and/or caregivers can be educated about monitoring weight and report back to the clinician.

### 2.3.2.2 Pathophysiology

Novel antipsychotic medications and conventional antipsychotic medications affect a number of central neurotransmitter systems that may have an impact on satiety and feeding behavior. Many of the receptor systems blocked by antipsychotic medications are those that are stimulated by medications that promote weight loss.

Antipsychotic medications block dopamine D2 and noradrenergic 1 receptors, the same sites stimulated by amphetamines and sympathomimetic amine drugs used to promote weight loss (Vita & De, 2007). Additionally, psychotropic drugs influence serotonin (5-HT) and histamine H1 neurotransmission, both of which have been reported to affect food intake and cause fluctuations in weight (Murphy, 2006). In examining the binding profiles of antipsychotic agents, the receptor affinity characteristic most closely correlated with weight gain among novel antipsychotic medications was H1 antagonism (Wirshing et al., 1999). Although H1 blockade also causes sedation, the mechanism by which H1 receptor antagonism may increase weight is peripheral interference with normal satiety signals from the gut, resulting in overeating (Knight, 1985; Rockwell et al., 1983).

Both low-potency conventional agents and those novel antipsychotic medications with higher weight gain potential have substantial affinity for this receptor (Schotte et al., 1993); however, what may contribute to the greater weight gain seen with some of the novel antipsychotics is the additional effect of 5-HT<sub>2C</sub> antagonism. Since the advent of clozapine, novel antipsychotics have been designed primarily to be both

relatively weak D2 antagonists and potent antagonists at 5-HT<sub>2A</sub> receptors, yet these agents also have substantial affinity for the closely related 5-HT<sub>2C</sub> receptor.

It is known that compounds that stimulate 5-HT transmission reduce food consumption and cause weight loss (e.g., m-chlorphenylpiperazine, fenfluramine, sibutramine) whereas drugs that decrease 5-HT transmission increase food intake and are associated with weight gain (Goodall et al., 1988; Samanin & Garattini, 1990). It is unclear which 5-HT receptor type is responsible for stimulating food intake and weight gain (Aulakh et al., 1992), but data implicate antagonism of 5-HT<sub>2C</sub> receptors as a possible site where novel antipsychotics might have an impact on weight (Tecott et al., 1995).

Another mechanism by which novel antipsychotics may have an impact on weight is via effects on peptide hormones. Leptin is a hormone produced by adipose tissue that is thought to signal the size of the pool of adiposity to the brain and thereby decrease feeding behavior. In humans, circulating leptin correlates closely with body mass index (Kraus et al., 1999). Mice and humans deficient in leptin are obese, whereas parenteral administration of exogenous leptin reverses the abnormalities in food intake and weight in leptin-deficient individuals (Pellemounter et al., 1995).

An early paper examining clozapine-treated patients found increases in both adipose tissue and circulating levels of leptin (Bromel et al., 1998). In a subsequent study which found that leptin was increased in patients treated with clozapine or olanzapine but not with haloperidol, the investigators speculated that the normal hormonal

feedback mechanism was impaired in patients taking those novel antipsychotic medications (i.e., they continue to overeat despite high circulating leptin levels) (Kraus et al., 1999). Moreover, an 8-week study found significant increases in body weight, serum leptin levels, and percentage of body fat in patients treated with olanzapine, but not in the drug-free comparison group (Eder et al., 2001).

The effects of antipsychotic-related weight gain have both medical and psychiatric components. In particular, medication compliance is adversely affected by excessive weight gain, with weight gain being a wellknown cause of treatment nonadherence (Bernstein, 1988; Silverstone et al., 1988) and subsequent psychotic relapse (Rockwell et al., 1983).

During the 2000 American Psychiatric Association meeting, investigators at the ColumbiaSt. Luke's Obesity Research Center released survey data examining this link between obesity and antipsychotic medication compliance. They found that obese patients were 13 times as likely to request discontinuation of their current antipsychotic agent because of concerns about weight gain and 3 times as likely to be noncompliant with treatment compared with nonobese individuals (Weiden et al., 2000). Patients who gain weight on antipsychotics also utilize health care resources more than patients who do not experience weight gain (Allison & Mackell, 2000).

The first step in the battle against obesity and novel antipsychotic medication-associated weight gain is to appreciate the severity of this ubiquitous problem. Much as clinicians became aware of tardive dyskinesia as a long-term extrapyramidal side

effect related to conventional antipsychotic therapy, there is increasing concern among mental health professionals about the long-term impact of weight gain. The initial choice of antipsychotic agent appears to play a significant role in the development of weight gain.

Moreover, the concomitant use of other agents associated with weight gain, such as lithium or valproate, has been demonstrated to increase weight gain at 1 year to 16 pounds in risperidone-treated inpatients and over 27 pounds in olanzapine-treated inpatients (Meyer, 2002). A new antipsychotic that came to the United States market in the last quarter of 2002, aripiprazole, looks promising in terms of its weight gain profile (Wirshing & Meyer, 2009), adding another medication to the armamentarium of novel antipsychotic agents with low propensity for weight gain. In this age of second-generation antipsychotic medications, we need to routinely ask patients if they notice a change in their waist size or increased appetite, and intervene early, when weight gain is modest (i.e., 5 pounds).

Prevention in this case may be the greatest cure. Physicians should routinely measure weight at each visit, and body mass index should be recorded. An even more important predictor of diabetes and the dysmetabolic syndrome (also known as syndrome X, a quartet of symptoms including hypertriglyceridemia, diabetes, hypertension, and abdominal obesity) (Groop & Orho-Melander, 2001) is waist circumference, a reflection of visceral adiposity (Park et al., 2001).

Central adiposity is more highly associated with diabetes, the dysmetabolic syndrome, and subsequent increased risk of coronary artery disease. A waist circumference of 40 inches in males and 35 inches in females should prompt referral for more thorough health screening of lipids, glucose, and blood pressure. These combined medical consequences of obesity may thus offset to some extent the benefit gained from the antipsychotic agent's life-saving potential (Fontaine et al., 2001). Patients with schizophrenia should be given nutritional counseling and recommendations for an exercise regimen, given their propensity for poor dietary habits and sedentary lifestyle. Primary care practitioners, family members, and other caregivers should be alerted to the risk of obesity during treatment with certain novel antipsychotics, as the potential complications of weight gain in patients with schizophrenia can be serious.

It is also essential that patients be educated regarding the weight gain liability of their antipsychotic medication to minimize the risks of obesity and its related health consequences. Multiple cases of new-onset diabetes (Wirshing et al., 2001), hyperlipidemia (Meyer, 2001; Wirshing et al., 2001), and sleep apnea have been reported as potentially associated with antipsychotic-related weight gain (Furst et al., 2002), although there may also be effects of certain novel antipsychotics on glucose tolerance and lipids independent of their effects on weight.

### 2.3.3 Impact of problem

Among persons with schizophrenia, obesity is associated with comorbid hypertension and diabetes and reduced health-related functioning as dyslipidemia (Dickerson et

al., 2006; Aquila, 2002). The life expectancy of persons with schizophrenia is 20% shorter than that of the general population (Newman & Bland, 1991), and their mortality rate appears to be increasing (Goff et al., 2005). Cardiovascular disease and other obesity-related medical conditions play an important role in this increasing mortality rate (Goff et al., 2005).

Adherence with therapy is often poor in patients with schizophrenia. Studies suggest that approximately 40–50% of patients stop taking their medication within 1 year, and about 75% do so within 2 years (Perkins, 1999; Perkins, 2002). This non-adherence is a principal cause of relapse and hospitalization for schizophrenia (Perkins, 2002). Poor adherence is often related to adverse effects of medication (Perkins, 1999; Perkins, 2002). Side-effects of antipsychotic therapy that have been linked to poor adherence include extrapyramidal symptoms, neuroleptic dysphoria, akathisia, sexual dysfunction and weight gain (Perkins, 2002). Although surveys have found strong patient preferences for atypical antipsychotics over conventional neuroleptics (Perkins, 2002), the weight gain associated with some agents is often perceived as a major disadvantage. In a survey conducted in the UK, for example, weight gain was the second most commonly reported adverse effect associated with atypical antipsychotics, and almost two-thirds of patients who reported weight gain considered it to be 'bad' or 'very bad' (Allison, 1999). More recently, a survey of 341 patients with psychosis found that weight gain was rated as 'quite' or 'extremely' distressing by a higher proportion of patients (74%) than any other adverse event (Fakhouri, 1999). Moreover, studies that have specifically examined the impact of weight gain on treatment adherence suggest that weight gain may increase the risk of non-adherence

(Perkins, 1999). In one such study, obese patients were three times more likely than nonobese patients to miss doses of atypical antipsychotics, and 13 times more likely to discontinue treatment because of weight gain (Weiden et al., 2000). Other studies have found that, when patients were informed about the risks associated with different antipsychotic medications, they preferred agents that did not produce weight gain, even if these were less effective or associated with other adverse effects (Sachs & Guille, 1999).

Overweight and obesity are themselves associated with increased use of health care resources, and this compounds the already substantial costs involved in the management of schizophrenia. In one study, involving 277 patients with schizophrenia, obese patients were significantly more likely to use emergency room or general medical services, and there were linear relationships between body mass index and the number of days hospitalized for reasons unrelated to mental health problems, and the number of general medical visits (Sachs & Guille, 1999). Moreover, 46% of obese patients reported two or more comorbidities, compared with only 26% of normal weight or overweight patients. In a second study (Weiden et al., 2001), patients who reported significant weight gain (>6.8 kg) were significantly more likely to use acute medical services than those with no or moderate weight gain. Furthermore, total medical costs were highest in patients with significant weight gain. Estimates of the direct and indirect costs of obesity in the United States amount to almost \$ 100 billion annually (Aquila, 2002).

#### 2.3.4 Pharmacological management

The literature thus far suggests that some of the novel antipsychotic medications cause less weight gain than others; thus it may be possible to switch patients on agents associated with the most weight gain to those with lower weight gain liability (Allison et al. 1999; Wirshing et al. 1999); however, prior to switching, it is important to recall that the most difficult symptoms to control are those of psychosis.

A switch of antipsychotic medication makes sense particularly if the patient is nonresponsive to the current antipsychotic. As discussed, weight gain can be a significant cause of nonadherence with a medication regimen; thus, in cases where a patient refuses to take medication due to weight gain concerns, a switch is advisable (Bernstein, 1988; Silverstone et al., 1988). A switch study sponsored by Pfizer demonstrated that subjects switched from olanzapine to ziprasidone lost a statistically significant 2.2 kg on average over 6 weeks (Kingsbury et al., 2001).

Moreover, recent preliminary data from a Janssen-sponsored study suggest improvements in both weight and markers of glucose tolerance in patients switched from olanzapine to risperidone (Berry & Mahmoud, 2001). There is no current evidence that medications other than clozapine are highly effective in treatment-refractory patients, so caution must be exercised in deciding to switch a patient from clozapine. There have been few studies involving the administration of weight loss agents to psychotic patients.

Nizatidine, a histamine H<sub>2</sub> blocking agent, was recently compared with placebo as an adjunct to olanzapine treatment, and modest reductions in weight gain were seen in patients receiving 300 mg of nizatidine versus placebo; however, weight gain still occurred in these olanzapine-treated patients (Werneke et al., 2002).

Metformin, an oral hypoglycemic agent utilized for treatment of type II diabetes that increases insulin sensitivity in insulin-resistant patients, may also be useful as a weight loss agent (Baptista et al., 2001; DeFronzo & Goodman, 1995; Fontbonne et al., 1996; Morrison et al., 2002). Of course, caution must temper enthusiasm for the results from these small studies, and more prospective, better-powered intervention studies are desperately needed.

Conclusion, obesity is a growing problem in the United States in the general population, and this epidemic also Plagues our patients with schizophrenia. Antipsychotic medications, the illness itself, poverty, and lack of adequate medical care all contribute to overweight and obesity in this patient population.

Mental health practitioners need to take the initiative to minimize this problem by initially choosing antipsychotic medications with more favorable weight gain profiles; rigorously monitoring weight and related parameters, such as blood glucose and lipids; and educating patients about diet and exercise to equip them with the skills to avoid obesity and its health consequences. Adjunctive pharmacological interventions for obesity in the chronically mentally ill population are as yet unproven, although they may prove to be helpful, but simple behavioral interventions should always be

attempted to help patients lose weight and prevent the long-term morbidity and mortality associated with overweight and obesity.

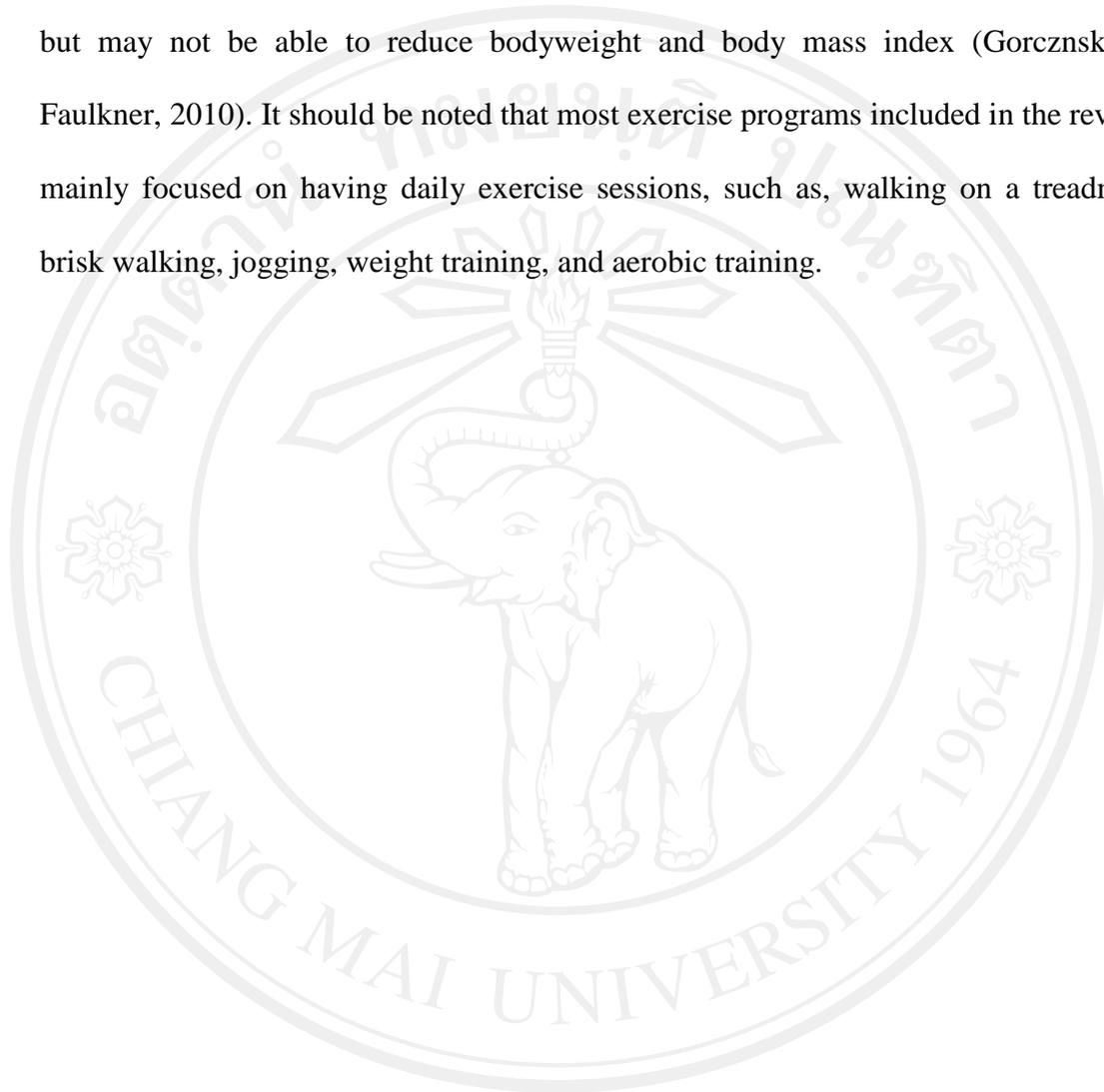
### 2.2.5 Literature review of psychological treatment

Non-pharmacological interventions seem to have an important effect on weight gain prevention and control, and should be encouraged and adapted to patients. Exercise program is necessary for long term while exercise participation may also promote psychological well-being in this patient group independent of weight gain (Daley, 2002).

Several lines of evidence have supported the use of cognitive/behavioral treatment for obesity in schizophrenic patients. Cognitive/behavioral programs in two randomized-controlled trials of weight gain prevention and three randomized-controlled trials of bodyweight reduction have shown consistent findings of their efficacy (Faulkner et al., 2007). These results are in concordance with the findings of a review that individual therapy, group therapy, cognitive/behavioral therapy, and nutritional counseling are effective for both recent-onset and chronic schizophrenia (Alvarez-Jimenez et al., 2008). A program including both nutrition and exercise counseling is also effective for severe mentally ill patients with obesity. It is now widely accepted that psychosocial treatment for weight gain prevention or bodyweight reduction should be a part of schizophrenic management program (Allison et al., 2009; Dixon, 2010).

Although exercise has played an important role on weight management programs, the effectiveness of this single intervention is still questionable in schizophrenia with

obesity. A systematic review of 3 randomized-controlled trials have found that exercise programs may improve negative schizophrenic symptoms and physical health but may not be able to reduce bodyweight and body mass index (Gorczeni & Faulkner, 2010). It should be noted that most exercise programs included in the review mainly focused on having daily exercise sessions, such as, walking on a treadmill, brisk walking, jogging, weight training, and aerobic training.



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## 2.4 Walking and pedometer walking

### 2.4.1 What is fitness walking?

Fitness walking is not a leisurely stroll. It is brisk walking designed to strengthen cardiovascular system (heart and lungs) and/or to lose weight (Mwape, 2010). For this reason, it is also called aerobic walking because aerobic exercises accelerate heart rate and target a major muscle group.

It loses weight and build and tone of muscles. It is not feel great and looks great. Exercise walking is not a leisurely stroll. It is brisk walking that will raise heart rate and quicken breathing. After a few weeks of walking, muscles in the lower half of body notice leaner, firmer (Herring, 2010). Specifically, buttocks, calf muscles, quadriceps and hamstrings will become more toned.

It does not only improve an appearance, but also improve cardiovascular system, making heart and lungs more efficient and strong. The benefits of walking don't stop there. It increase metabolism so that body burn more calories throughout the day. People also feel better emotionally

There is little risk of injury to joints and muscles, because exercise walking is a low-impact activity (Waehne, 2010). This means that it isn't as hard on body as other sports like running. Truly, walking is a near-perfect exercise.

#### 2.4.2 General benefits of fitness walking

Walking improves budget and the environment. The benefits of fitness walking improve physical and emotional health. The more individual walks, the less he/she drives. Choosing to walk to favorite places instead of driving has a positive impact on environment.

#### 2.4.3 Health benefits of fitness walking

The health benefits of walking include improved metabolism, emotions and moods. In addition, people reduce or prevent our risk of coronary heart disease (Roizen, 2010).

Ten health benefit of walking include:

1. *Walking prevents type 2 diabetes:* The Diabetes Prevention Program showed that walking 150 minutes per week and losing just 7% of your body weight (12-15 pounds) can reduce your risk of diabetes by 58% (Shirley, 2010).

2. *Walking strengthens heart* (National heart, lung and blood institute, 2006): Mortality rates among retired men who walked less than one mile per day were nearly twice that among those who walked more than two miles per day. Women who walked three hours or more per week reduced their risk of a heart attack or other coronary event by 35% compared with women who did not walk.

3. *Walking is good for brain:* In a study on walking and cognitive function, researchers found that women who walked the equivalent of an easy pace at least 1.5 hours per week had significantly better cognitive function and less cognitive decline than women who walked less than 40 minutes per week (Yaffe, 2001). Think about that!

4. *Walking is good for bones:* Research shows that postmenopausal women who walk approximately one mile each day have higher whole-body bone density than women who walk shorter distances, and walking is also effective in slowing the rate of bone loss from the legs (Krall & Dawson-Hughes, 1994).

5. *Walking helps alleviate symptoms of depression:* Walking for 30 minutes, three to five times per week for 12 weeks reduce symptoms of depression as measured with a standard depression questionnaire by 47% (Blog, 2010).

6. *Walking reduces the risk of breast and colon cancer:* Women who performed the equivalent of one hour and 15 minutes to two and a half hours per week of brisk walking had an 18% decreased risk of breast cancer compared with inactive women (Johnson, 2010). Many studies have shown that exercise can prevent colon cancer, and even if an individual person develops colon cancer, the benefits of exercise appear to continue both by increasing quality of life and reducing mortality.

7. *Walking improves fitness:* Walking just three times a week for 30 minutes can significantly increase cardiorespiratory fitness.

8. *Walking in short bouts improves fitness:* A study of sedentary women showed that short bouts of brisk walking (three 10-minute walks per day) resulted in similar improvements in fitness and were at least as effective in decreasing body fatness as long bouts (one 30-minute walk per day) (Murphy & Hardman, 1998).

9. *Walking improves physical function :* Research shows that walking improves fitness and physical function and prevents physical disability in older persons

#### 2.4.4 Walking techniques

By closely following technique and form described, people can significantly improve their performance. This is what elite walkers do that was collected from works of Taylor (2009), Bumgardner, (2010), and Gorman (2010):

##### *Legwork:*

1. A common mistake for beginners when trying to walk fast is lengthening the stride (overstriding). Overstriding is biomechanically inefficient and can slow down.
2. Instead of over striding to walk faster, concentrate on a powerful push off while the front foot lands closer to the body.

##### *Footwork :*

1. Walk heel to toe and not flatfooted to increase speed.
2. Contact the ground with heel.
3. Roll the foot forward over the center of foot.
4. Push off with toes.

##### *Hips:*

1. Hips are rotated forward and backward as walk.
2. Waist should twist. Racewalkers can look funny because of the hip rotation but restricted hip movement decreases your speed.

##### *Torso:*

Torso is upright. Leaning forward or back will slow down

##### *Arm work:*

1. Elbows are at 90 degrees.
2. Hands are relaxed.

3. Swing arms forward and back and keep them close to body. Hands should not cross the midline of body to maintain efficiency.

4. Speed up your arm swing to increase speed and legs will follow.

*Head, neck, and shoulder:s*

Shoulders and neck are relaxed. Head should be upright, eyes looking forward.

#### 2.4.5 Pedometer

A pedometer is a pager-sized device worn on belt that simply records the number of steps take based on people body's movement. Some pedometers are analog devices that simply measure steps. Some are fancier digital models that track the distance walk, plus the calories people burn. People really need is a simple step counter so they can monitor if they walk the recommended 10,000 steps per day (Bumgardner, 2010).

##### 2.4.5.1 How many steps do need per day?

Ten thousand steps a day are for long term health and reduced chronic disease risk(Collis, 2010). For successful, sustained weight loss needs12,000 - 15,000 steps a day (Collis, 2010).

##### 2.4.5.2 How do pedometers work?

Pedometers, also known as step-counters, count movements that a body makes, such as walking, jogging, running or jumping up and down. Each one has a type of mechanism in it that counts a step when the impact of foot striking the ground is registered.

Many pedometers use a spring-mounted lever arm system. When foot strikes the ground, one end of the lever moves down and makes contact with a metallic surface, closes an electric circuit and counts a step.

Accelerometer-based pedometers, also known as piezoelectric, contain tiny crystals that get stressed when foot strikes the ground, which causes a voltage to be generated and registers a step.

#### 2.4.5.3 How to use a pedometer

Pedometer walking is effective and motivational. Research shows that those who wear them are able to increase their daily step count by 2,000 steps, which equals one mile. If they would like pedometer walking to help them become more physically active, lose weight and improve fitness level, consider taking the 10,000 steps a day challenge.

#### 2.4.5.4 How to wear a pedometer

The device should be clipped on waist, above knee and should be parallel to the ground (Ehrens, 2010). Most models come with a safety leash that should also be worn to prevent them from falling off.

#### 2.4.5.5 Clinical evidence of pedometer walking

As mention, physical activity is important for health. Among obese individuals who are trying to enhance or maintain weight loss efforts, moderate-intensity physical activity for 60-90 minutes/day may be required (Hill & Wyatt, 2005). Pedometers

have been used as tools to measure ambulatory activity and to motivate individuals to be more active. Wearing a pedometer can be an effective way to increase awareness (Rooney et al. 2003).

People already get only 3,000 or more steps with daily activity, and are still gaining unwanted weight. To burn off extra calories for weight loss, a walk of 10,000 steps per day most days of the week would be able to control weight (Heckert, 2009). Wearing a pedometer all day, may see how many steps are really getting in. Stop thinking distance and start thinking steps. Some of the studies of pedometer-based walking interventions are as follows:

1. Chan et al. (2003) examined the relationship between an objective measure of walking (pedometer-determined steps/day) and general indicators of health, a prior diagnosis of one or more components of the metabolic syndrome, in a generally sedentary working population. Fewer steps/day were associated inversely with body mass index, waist circumference. Unfortunately, the result could not compare pre and post intervention. It emphasized on relationship between step/day and the indicators of health. Therefore, effect of walking on obesity should be clear directly.

2. A cross-sectional study by Richardson et al. (2008) showed pedometer-based walk without a dietary that individuals who walked more tended to be thinner than those who walked less. Using a fixed-effects model and combining data from all 9 cohorts of walking program, the pooled estimate of mean weight changed from baseline was  $-1.27$  kg (95% confidence interval [CI],  $-1.85$  to  $-0.70$  kg). Longer duration of the intervention was associated with greater weight change. Walking programs that used a pedometer as a motivational tool resulted in a moderate amount

of weight loss in overweight or obese sedentary adults. Researchers concluded that, by average, the participants in a pedometer-based walking program without dietary change could expect to lose about one pound every 10 weeks, which translated to about five pounds over the course of a year. The analysis also found that programs of longer duration were associated with greater weight loss. However, the data pointed out that increased physical activity can be expected the results in health benefits independent of weight loss.

3. Musto (2008) studied the effect of pedometer programs in increasing physical activity in sedentary individuals. This study was a longitudinal, quasi-experiment design. Participants were recruited from a 12-week work site pedometer program. The addition results showed significant within active group improvement ( $P \leq .01$ ) in waist circumference. Significant between group changes were observed in weight ( $P \leq .01$ ) and body mass index ( $P \leq .01$ ).

4. Pal et al. (2009) evaluated whether the daily use of pedometers could increase physical activity and improve health outcomes in sedentary overweight and obese women. Twenty six overweight and obese middle-aged women were randomized into two groups: The control group was not able to record their steps daily, whilst the pedometer group, were asked to record the number of steps on a daily basis for 12 weeks. This pilot study showed that the combination of having step goals and immediate feedback from using a pedometer was effective in increasing physical activity. It might be a result in weight loss to benefit this population.

For the above mention evidence, walking, especially with pedometer, may be an effective and practical strategy for weight reduction. However, this method has not been carried out in schizophrenic patients with obesity and they are not research to prove the effect of walking with pedometer directly.

## **2.5 Motivational enhancement therapy (MET)**

### **2.5.1 Definition**

MET or motivational interviewing is “a client-centered, directive method for enhancing intrinsic motivation to change by exploring and resolving ambivalence” (Rollnick & Mille, 2010). It can be intrinsic or extrinsic. It is often associated with emotions, as they are closely related. Compared with nondirective counselling, it is more focused and goal-directed. The examination and resolution of ambivalence is its central purpose, and the counselor is intentionally directive in pursuing this goal.

### **2.5.2 The spirit of MET**

The spirit of MET and techniques are vital to distinguish that recommended to manifest that spirit. Clinicians and trainers who become too focused on matters of technique can lose sight of the spirit and style that are central to the approach. There are as many variations in technique there are clinical encounters. The spirit of the method, however, is more enduring and can be characterized in a few key points (Miller, 1983).

2.5.2.1 Motivation to change is elicited from the client, and not imposed from without. Other motivational approaches have emphasized coercion, persuasion, constructive confrontation, and the use of external contingencies (e.g., the threatened

loss of job or family). Such strategies may have their place in evoking change, but they are quite different in spirit from motivational interviewing which relies upon identifying and mobilizing the client's intrinsic values and goals to stimulate behavior change.

2.5.2.2 It is the client's task, not the counsellor's, to articulate and resolve his or her ambivalence. Ambivalence takes the form of a conflict between two courses of action (e.g., indulgence versus restraint), each of which has perceived benefits and costs associated with it. Many clients have never had the opportunity of expressing the often confusing, contradictory and uniquely personal elements of this conflict. The counsellor's task is to facilitate expression of both sides of the ambivalence impasse, and guide the client toward an acceptable resolution that triggers change.

2.5.2.3 Direct persuasion is not an effective method for resolving ambivalence. It is tempting to try to be "helpful" by persuading the client of the urgency of the problem about the benefits of change. It is fairly clear, however, that these tactics generally increase client resistance and diminish the probability of change (Miller et al., 1993; Miller & Rollnick, 1991).

2.5.2.4 The counselling style is generally a quiet and eliciting one. Direct persuasion, aggressive confrontation, and argumentation are the conceptual opposite of motivational interviewing and are explicitly proscribed in this approach. To a counsellor accustomed to confronting and giving advice, motivational interviewing

can appear to be a hopelessly slow and passive process. The proof is in the outcome. More aggressive strategies, sometimes guided by a desire to "confront client denial," easily slip into pushing clients to make changes for which they are not ready.

2.5.2.5 The counsellor is directive in helping the client to examine and resolve ambivalence. Motivational interviewing involves no training of clients in behavioural coping skills, although the two approaches not incompatible. The operational assumption in motivational interviewing is that ambivalence or lack of resolve is the principal obstacle to be overcome in triggering change. Once that has been accomplished, there may or may not be a need for further intervention such as skill training. The specific strategies of motivational interviewing are designed to elicit, clarify, and resolve ambivalence in a client-centred and respectful counselling atmosphere.

2.5.2.6 Readiness to change is not a client trait, but a fluctuating product of interpersonal interaction. The therapist is therefore highly attentive and responsive to the client's motivational signs. Resistance and "denial" are seen not as client traits, but as feedback regarding therapist behaviour. Client resistance is often a signal that the counsellor is assuming greater readiness to change than is the case, and it is a cue that the therapist needs to modify motivational strategies.

2.5.2.7 The therapeutic relationship is more like a partnership or companionship than expert/recipient roles. The therapist respects the client's

autonomy and freedom of choice (and consequences) regarding his or her own behavior.

There are, nevertheless, specific and trainable therapist behaviors that are characteristic of a motivational interviewing style. Foremost among these are:

- Seeking to understand the person's frame of reference, particularly via reflective listening.
- Expressing acceptance and affirmation.
- Eliciting and selectively reinforcing the client's own self motivational statements expressions of problem recognition, concern, desire and intention to change, and ability to change.
- Monitoring the client's degree of readiness to change, and ensuring that resistance is not generated by jumping ahead of the client.
- Affirming the client's freedom of choice and self-direction

The point is that it is the *spirit* of motivational interviewing that gives rise to these and other specific strategies, and informs their use. A more complete description of the clinical style has been provided by Miller and Rollnick (1991).

### 2.5.3 Motivational enhancement therapy (MET)

MET is a four-session adaptation of the check-up intervention (Miller et al, 1992). It was developed specifically as one of three interventions tested a multisite clinical trial of treatments for alcohol abuse and dependence. Two follow-up sessions (at weeks 6 and 12) were added to the traditional two-session check-up format to parallel the 12-week (and 12 session) format of two more intensive treatments in the trial.

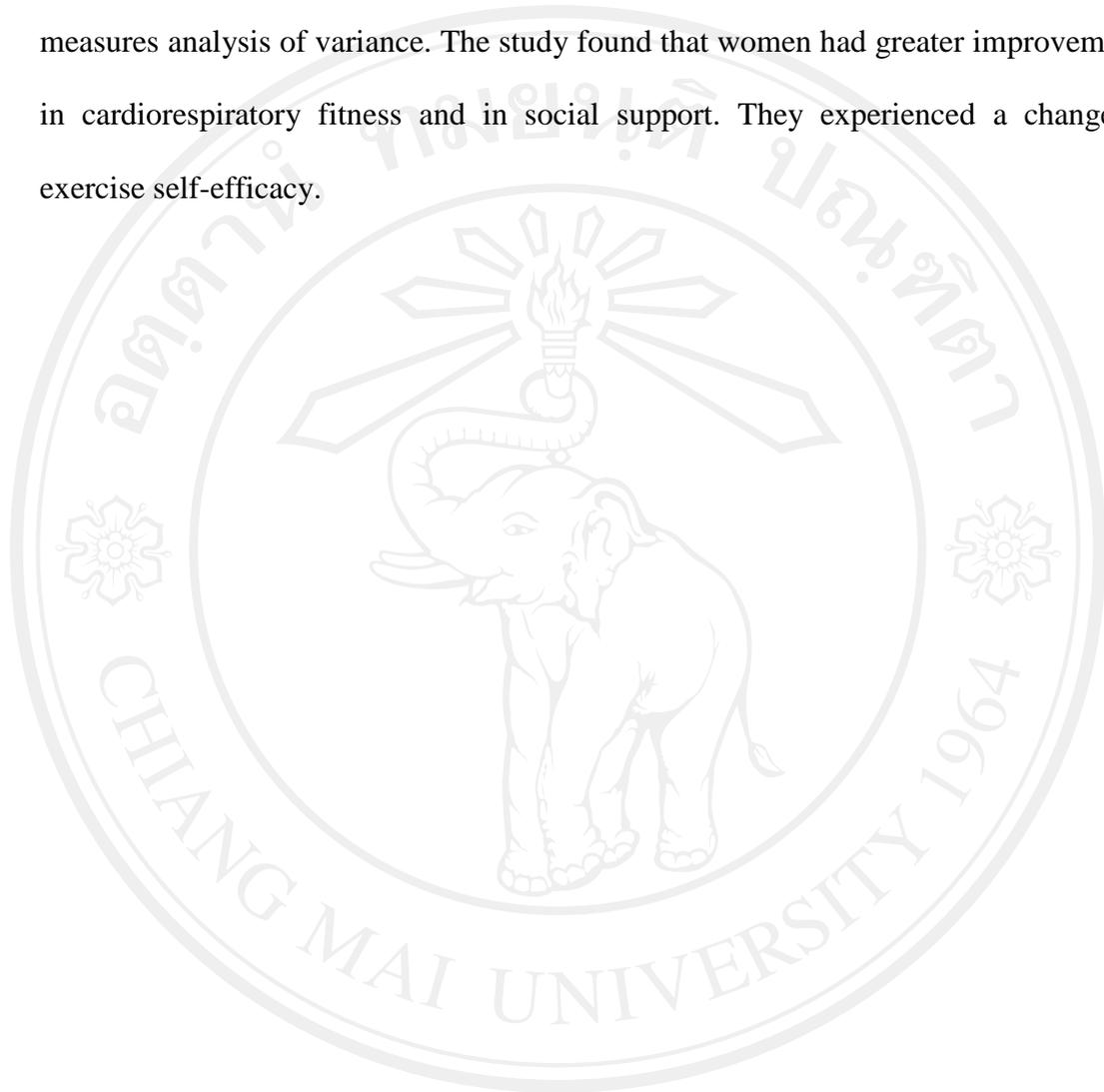
Motivational interviewing is the predominant style used by counsellors throughout MET.

2.5.4 There are four general principles behind MET (Miller et al., 1992):

1. Express empathy, guides therapists to share with clients their understanding of the clients' perspective.
2. Develop discrepancy, guides therapists to help clients appreciate the value of change by exploring the discrepancy between how clients want their lives to be vs. how they currently are (or between their deeply-held values and their day-to-day behavior).
3. Roll with resistance, guides therapists to accept client reluctance to change as natural rather than pathological.
4. Support self-efficacy, guides therapists to explicitly embrace client autonomy (even when clients choose to not change) and help clients move toward change successfully and with confidence.

MET techniques appear to markedly encourage selected changes in health behaviors (e.g., exercise, eating habits). Perry and friends (2007) explained that walking can significantly increase cardiorespiratory fitness and thereby reduce the incidence of heart disease in women. However, there is a lack of research aimed at increasing walking in rural women, a high-risk group for heart disease and one for which exercise strategies may pose particular challenges. In the study, researchers evaluated Heart-to-Heart (HTH), a 12-week walking program designed to increase fitness in rural women through walking. The primary outcome of cardiorespiratory fitness and

secondary outcomes of self-efficacy and social support were measured pre-intervention and post-intervention. Group differences were analyzed with repeated-measures analysis of variance. The study found that women had greater improvements in cardiorespiratory fitness and in social support. They experienced a change in exercise self-efficacy.



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## 2.6 Self-efficacy and physical exercise self-efficacy

### 2.6.1 Overview

Physical exercise self-efficacy is perception or confidence of ability to perform a given exercise task (Jones, 2010), that exercise influence over events that affect their lives. Self-efficacy beliefs determine how people feel (Bandura, 1993), think, motivate themselves and behave (Bandura, 1994). Such beliefs produce these diverse effects through four major processes including cognitive, motivational, affective and selection processes (Schunk, 1989). A strong sense of efficacy enhances human accomplishment and personal well-being in many ways (Luis, 2010). People with high assurance in their capabilities approach difficult tasks as challenges to be mastered rather than as threats to be avoided. Such an efficacious outlook fosters intrinsic interest and deep engrossment in activities. They set themselves challenging goals and maintain strong commitment to them. They heighten and sustain their efforts in the face of failure. They quickly recover their sense of efficacy after failures or setbacks. They attribute failure to insufficient effort or deficient knowledge and skills which are acquirable. They approach threatening situations with assurance that they can exercise control over them. Such an efficacious outlook produces personal accomplishments, reduces stress and lowers vulnerability to depression.

In contrast, people who doubt their capabilities shy away from difficult tasks which they view as personal threats. They have low aspirations and weak commitment to the goals they choose to pursue. When faced with difficult tasks, they dwell on their personal deficiencies, on the obstacles they will encounter, and all kinds of adverse outcomes rather than concentrate on how to perform successfully. They slacken their

efforts and give up quickly in the face of difficulties. They are slow to recover their sense of efficacy following failure or setbacks. Because they view insufficient performance as deficient aptitude it does not require much failure for them to lose faith in their capabilities. They fall easy victim to stress and depression.

### 2.6.2 Sources of self-efficacy

People's beliefs about their efficacy can be developed by four main sources of influence (Saffold, 2005). The most effective way of creating a strong sense of efficacy is through mastery experiences. (Bandura, 2008; Saffold, 2005). Successes build a robust belief in one's personal efficacy. Failures undermine it, especially if failures occur before a sense of efficacy is firmly established.

If people experience only easy successes they come to expect quick results and are easily discouraged by failure. A resilient sense of efficacy requires experience in overcoming obstacles through perseverant effort. Some setbacks and difficulties in human pursuits serve a useful purpose in teaching that success usually requires sustained effort. After people become convinced they have what it takes to succeed, they persevere in the face of adversity and quickly rebound from setbacks. By sticking it out through tough times, they emerge stronger from adversity.

The second way of creating and strengthening self-beliefs of efficacy is through the vicarious experiences provided by social models (Bandura, 1994). Seeing people similar to oneself succeed by sustained effort raises observers' beliefs that they too possess the capabilities to master comparable activities required to succeed. By the

same token, observing others' fail despite high effort lowers observers' judgments of their own efficacy and undermines their efforts. The impact of modeling on perceived self-efficacy is strongly influenced by perceived similarity to the models. The greater the assumed similarity the more persuasive are the models' successes and failures. If people see the models as very different from themselves their perceived self-efficacy is not much influenced by the models' behavior and the results it produces.

Modeling influences do more than provide a social standard against which to judge one's own capabilities. People seek proficient models that possess the competencies to which they aspire. Through their behavior and expressed ways of thinking, competent models transmit knowledge and teach observers effective skills and strategies for managing environmental demands. Acquisition of better means raises perceived self-efficacy.

Social persuasion is a third way of strengthening people's beliefs that they have what it takes to succeed (Saffold, 2005). People who are persuaded verbally that they possess the capabilities to master given activities are likely to mobilize greater effort and sustain it than if they harbor self-doubts and dwell on personal deficiencies when problems arise. To the extent that persuasive boosts in perceived self-efficacy lead people to try hard enough to succeed, they promote development of skills and a sense of personal efficacy.

It is more difficult to instill high beliefs of personal efficacy by social persuasion alone than to undermine it. Unrealistic boosts in efficacy are quickly disconfirmed by

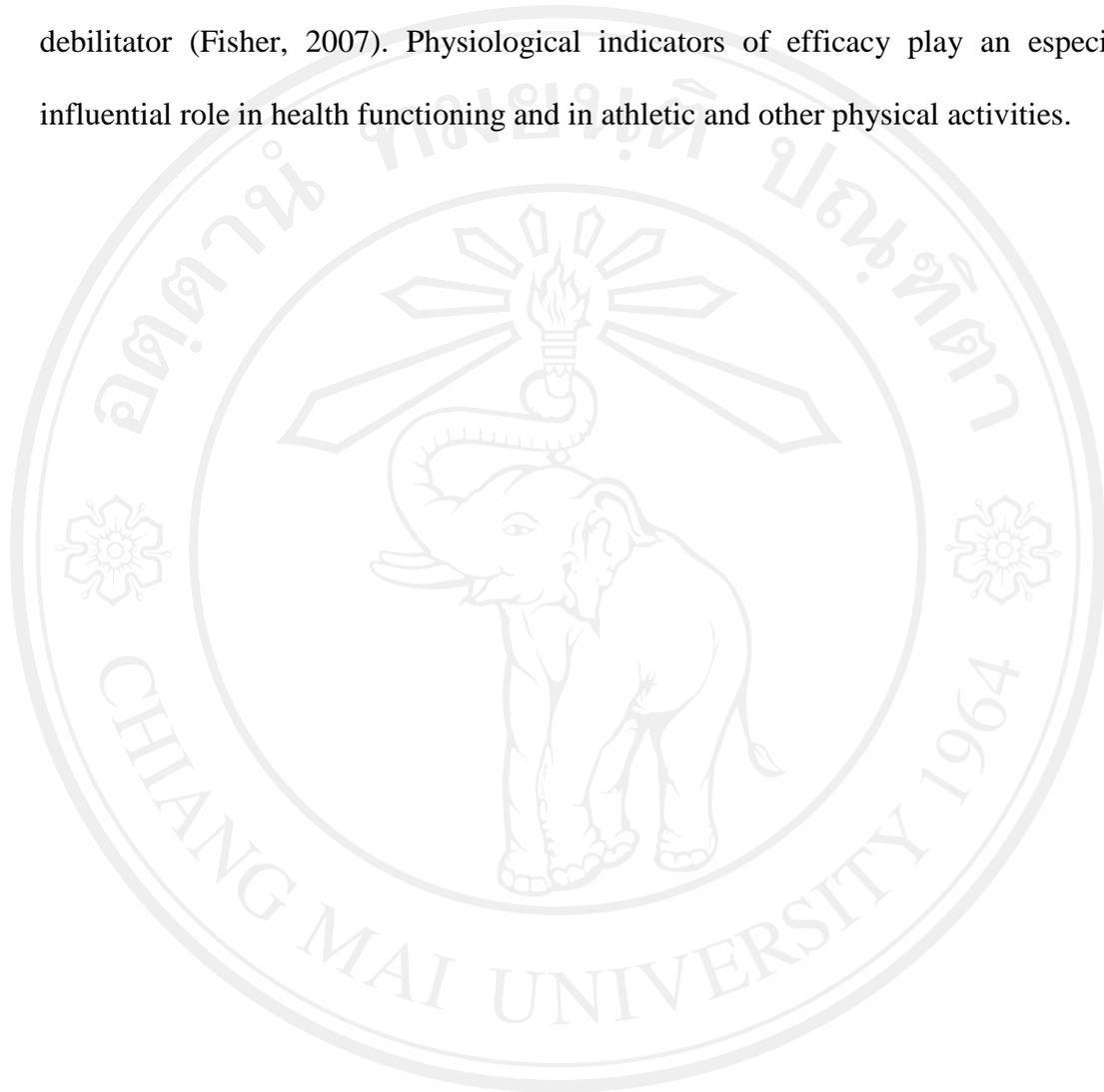
disappointing results of one's efforts. But people who have been persuaded that they lack capabilities tend to avoid challenging activities that cultivate potentialities and give up quickly in the face of difficulties. By constricting activities and undermining motivation, disbelief in one's capabilities creates its own behavioral validation.

Successful efficacy builders do more than convey positive appraisals. In addition to raising people's beliefs in their capabilities, they structure situations for them in ways that bring success and avoid placing people in situations prematurely where they are likely to fail often. They measure success in terms of self-improvement rather than by triumphs over others.

People also rely partly on their somatic and emotional states in judging their capabilities. They interpret their stress reactions and tension as signs of vulnerability to poor performance. In activities involving strength and stamina, people judge their fatigue, aches and pains as signs of physical debility. Mood also affects people's judgments of their personal efficacy. Positive mood enhances perceived self-efficacy, despondent mood diminishes it. The fourth way of modifying self-beliefs of efficacy is to reduce people's stress reactions and alter their negative emotional proclivities and is interpretations of their physical states (Bandura, 1991). Self-efficacy mechanism in physiological activation and health-promoting behavior.

It is not the sheer intensity of emotional and physical reactions that is important but rather how they are perceived and interpreted. People who have a high sense of

efficacy are likely to view their state of affective arousal as an energizing facilitator of performance, whereas those who are beset by self-doubts regard their arousal as a debilitator (Fisher, 2007). Physiological indicators of efficacy play an especially influential role in health functioning and in athletic and other physical activities.



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