CHAPTER II

Review of Literature
INFERTILITY

The World Health Organization (WHO, 2004) defines infertility as follows:

Infertility is the inability to conceive a child. A couple may be considered infertile if, after two years of regular sexual intercourse, without contraception, the woman has not become pregnant.

Infertility primarily refers to the biological inability of a person to contribute to conception. Infertility may also refer to the state of a woman who is unable to carry a pregnancy to full term. There are many biological causes of infertility, some of which may be bypassed with medical intervention (Makar & Toth, 2002). Women who are fertile, experience a natural period of fertility before and during ovulation, and they are naturally infertile during the rest of the menstrual cycle. Fertility awareness methods are used to discern when these changes occur by tracking changes in cervical mucus or basal body temperature. Definitions of infertility differ, with demographers tending to define infertility as childlessness in a population of women of reproductive age, while the epidemiological definition is based on "trying for" or "time to" a pregnancy, generally in a population of women exposed to a probability of conception (Gurunath, Pandian, Anderson, & Bhattacharya, 2011). A couple who has tried unsuccessfully to have a child after a certain period of time (often a short period, but definitions vary) is sometimes said to be sub fertile, meaning less fertile than a typical couple. Both infertility and sub fertility are defined as the inability to conceive after a certain period of time (the length of which vary), so often the two terms overlap (McGowan, Burger, Baker, Kretser, & Kovacs, 1981). Besides, lifestyle, environmental factors (Benoff, Jacob, & Hurley, 2000; Sharpe, 2000), like smoking (Zenzes, 2000) can affect gamete and embryo development leading to sub infertility.

Type of Infertility:

Primary infertility as the “Inability to conceive within two years of exposure to pregnancy (i.e. - sexually active, non-conception and non-lactating) among women between 15 and 45 years old”(WHO,2001).

Secondary infertility refers to the inability to conceive following a previous pregnancy (WHO, 2001). Secondary infertility happens when a couple or woman with one or more children conceived with no prior medical intervention, has trouble conceiving
naturally again. Secondary infertility can be just as emotionally painful as primary infertility, globally; most infertile couples suffer from primary infertility (Inhorn, 2003).

*Idiopathic infertility*  Idiopathic infertility is a condition of couples unable to conceive for more than two years, with no abnormalities seen on repeated investigations of tubes or ovulation, luteal phase, cervical mucus, semen, sperm–oocyte interaction or intercourse (Seshagiri, 2001).

Primary infertility is more common in Iran (61.37%). Of 250 infertile couples studied by Duhok Iraq, 77.2% had primary and 22.8% had secondary infertility (Razzak & Wais, 2002). In Egypt the rates of primary and secondary infertility were 70.7% and 29.3% respectively among infertile couples (Serour, El Ghar, & Mansour, 1991). In Larsen study, primary infertility in Central Africa ranged from 6.9% to 3.1% and secondary infertility ranged from 18.9% to 26.5% (Larsen, 2000). The prevalence rate of infertility in the rural population of Gabon was 5.7% for primary and 20% for secondary infertility (Schrijvers, Dupont, & Meheus, 1991).

**Prevalence**

Infertility affects between 60 million and 168 million people worldwide; generally one in ten couples experience primary or secondary infertility (Butler & Khanna, 2003; Vayena, Rowe, & Peterson, 2002). The majority of those who suffer live in the developing world (Vayena, Peterson, Adamson, & Nygren, 2009). Universally, the prevalence rate is rising significantly among women with no children (Fidler & Bernstein, 1999). Worldwide rates of infertility vary dramatically corresponding to the incidence of preventable conditions leading to infertility from 5% to 30% in sub-Saharan Africa (Daar & Merali, 2002; Vayena et al., 2009). Rates of primary infertility are generally between 1% and 8% with rates of secondary infertility reaching as high as 35% (Vayena et al., 2002). The "Infertility Belt" stretching across central and southern Africa has the world's highest rates of infertility (Butler & Khanna, 2003; Van Balen & Inhorn, 2002).

There are multiple difficulties inherent in assessing the occurrence of infertility. First, assessment and measurement is complicated by the fact that the condition is generally experienced by a couple, not as an individual. There is also a social bias in identifying
infertility. Finally, no objective test or universally accepted definition for the condition exists. There is general consensus that rates of infertility are underestimated because of difficulty in measuring prevalence, potentially flawed methods for measurement, and cultural biases which create hidden categories of the condition (Daar & Merali, 2002).

Boivin, Bunting, Collins & Nygren (2007) reviewed studies on prevalence of infertility and proportion of couple seeking medical help for infertility. Review included 25 population surveys which included 172413 women. Review revealed that prevalence rate was ranged between 3.5% and 16.7% for developed nations and 6.9% and 9.3% in less developed nations, with an estimated overall median prevalence of 9%. In 17 studies sampling 6410 women, the proportion of couples seeking medical care was, on average, 56.1% (range 42–76.3%) in more developed countries and 51.2% (range 27–74.1%) in less developed countries. The proportion of people actually receiving care was substantially less (22.4%). Based on these estimates and on the current world population, it is predicted that 72.4 million women are currently infertile; of these, 40.5 million are currently seeking infertility medical care. The current evidence indicates a 9% prevalence of infertility (of 12 months) with 56% of couples seeking medical care. These estimates are lower than those typically cited and are remarkably similar between more and less developed countries.

Oakley, Doyle & Maconochie (2008) studied 60000 women randomly through population based postal questioner survey to know the prevalence of infertility rate and treatment for the same in women between 40-55 years age group.

Results showed that 2.4% of women aged 40–55 years had unresolved infertility with no pregnancies, and further 1.9% had been pregnant but not given birth to living baby. The prevalence of unresolved fertility did not differ among birth cohorts. Sixteen percent of women reported ever consulting a doctor because of infertility and 8% reported receiving treatment to conceive. Across the whole sample, 4.2% of women reported that they had achieved at least one pregnancy as a result of treatment. Younger women were more likely to report consultations than aged (18% versus 13%) and treatment (9% versus 6%) for infertility, and reported pregnancies as a result of infertility treatment (6.7% versus 2.7%) respectively. Among those who
reported medical consultations, women born more recently first consulted at a later age compared with those born earlier.

**Causes of Infertility**

Infertility has a wide range of causes stemming from three general sources: physiological Dysfunctions, preventable causes, and unexplained issues. Anatomical, genetic, endocrinological and immunological problems can all cause or contribute to infertility (Daar & Merali, 2002). Causes of female infertility include: tubal blockage, abnormal ovulation, congenital malformation, and endometriosis (Lee et al., 2006). Male factors include sperm counts, motility, and quality; and ejaculatory dysfunctions. Unexplained male or female infertility may be caused due to physiological conditions, infection, lifestyle factors, advancing maternal age, and environmental and occupational hazards (Daar & Merali, 2002).

Most primary and secondary infertility in developing countries is attributable to infectious disease and subsequent damage or blockage of the fallopian tubes (Vayena et al., 2002). It is estimated that tubal blockage is responsible for up to two-thirds of infertility (Vayena et al., 2009). Infection-related infertility can be caused by undiagnosed or poorly treated genital tract infections, sexually transmitted infections (STIs), or postpartum or post abortion infection. Infectious and parasitic diseases such as pelvic tuberculosis, schistosomiasis or malaria can also cause infertility (Datta, 2002; Vayena et al., 2009). Finally, infection resulting from genital cutting can also cause infertility (Giwa-Osagie, 2002).

The most common preventable causes of infertility are sexually transmitted infections, Especially, Chlamydia and gonorrhea (Butler & Khanna, 2003; Datta, 2002; Fidler & Bernstein, 1999). Sexually transmitted diseases are a leading cause of infertility. They often display few, if any visible symptoms, with the risk of failing to seek proper treatment in time to prevent decreased fertility (Wilson, Mottram, & Vassilas, 2008).

These are among the most easily transmitted STIs with one in every two acts of unprotected intercourse with an infected partner resulting in gonorrhea transmission and one in five acts of unprotected intercourse with an infected partner resulting in transmission of Chlamydia (Evens, 2004).
While prevalence of chlamydial infection is estimated between 2% and 27% of sexually active females, the true prevalence of Chlamydia is unknown and almost surely underreported because the infection is asymptomatic in half of infected men and three-quarters of women (Fidler & Bernstein, 1999). On a population scale these STIs could have a large impact on fertility; Swinton et al. estimate that a 20% incidence of untreated gonorrhea in sexually active adults may reduce population growth as much as 50% due to infection-caused infertility (Daar & Merali, 2002). Fortunately, screening can identify these two diseases and both can successfully be treated (Evens, 2004).

Undiagnosed or inadequately treated Chlamydia and gonorrhea in women can lead to pelvic inflammatory disease (PID) which can lead to infertility. In men, chronic chlamydial genital infection can also possibly lead to infertility (World Health Organization, 2001). It is estimated that 40% of women in developed countries with inadequately treated Chlamydia develop PID with 20% of those becoming infertile due to tubal scarring. These rates could be higher in developing countries (Fidler & Bernstein, 1999).

The potential for Chlamydia and gonorrhea to contribute to infertility rates is startling when the incidence and prevalence of these STIs is considered. Worldwide it is estimate that 62 million cases of gonorrhea and 92 million cases of genital Chlamydia every year may cause infertility (Evens, 2004).

Other preventable causes of infertility include "lifestyle factors", a diverse group of issues such as obesity, weight gain and loss, eating disorders, malnutrition, excessive exercise, and use of nicotine, alcohol or caffeine. While these factors are important, their effects on infertility are considerably less than those of infection (Fidler & Bernstein, 1999). An increasingly common cause of infertility in the developed world is advancing maternal age. As maternal age increases egg quality and ovulatory function diminish while risk of reproductive disorders such as endometriosis increases (Fidler & Bernstein, 1999). As women delay childbearing in favor of pursuing education and vocation at opportunities they face potentially increased difficulty in becoming pregnant. Environmental and occupational hazards constitute other cause of infertility. The link between these hazards and decreased fertility is not clearly established and is difficult to measure. However, there are more than 50 chemicals
found in the workplace and environment which are known to be associated with adverse reproductive outcomes in men and women (Fidler & Bernstein, 1999). Additionally, there is a significant possibility for additional negative chemical-related harms; about 60,000 chemicals and 4 million chemical mixtures in commercial use today have been tested for reproductive effects (Fidler & Bernstein, 1999). Several occupations are associated with significantly higher rates of infertility and exposure to chemicals such as nitrous oxide, glycol ethers, organic solvents, soil fumigants, pesticides, arsenic, aflatoxins and endocrine disruptors such as dichlorodiphenyltrichloroethane (DDT), polychlorinated biphenyls (PCBs), and dioxins are all associated with higher than average rates of infertility (Fidler & Bernstein, 1999). Environmental exposure to reproductive toxicants may affect significantly greater numbers of people than toxicants encountered in specific occupational settings as individuals may come into contact with chemicals in a variety of ways including: direct exposure, industrial emissions, pesticides and their residues, ingested foods, or contaminated water (Fidler & Bernstein, 1999).

The causes of infertility discussed above are rooted in the Western, bio-medical paradigm and it is important to understand that infertility is understood differently in each socio-cultural context in which it is experienced. Traditional knowledge in Anglophone Africa acknowledges both male and female causes of infertility, however in patriarchal societies men are protected and women almost always blamed for involuntary childlessness (Gijsels, Mgalla, & Wambura, 2001; Giwa-Osagie, 2002). In Latin America, strong social stigma attached to infertility and machismo attitudes create a atmosphere where women blame themselves for infertility (Luna, 2002). In the Far East, Confucian texts recognize three elements that control reproduction, a male component, a female, and an element which comes from both male and female. Largely and usually women are blamed and often seen as retribution for past wrong doing either on the part of the man, woman or one's ancestors (Qiu, 2002). When attempting to explore infertility from a social science perspective it is vital to investigate local perceptions in order to capture a culturally relevant understanding of infertility. While there are some global similarities in perceptions regarding infertility, such as the pervasive notion that women are usually to blame for unwanted childlessness, there is also variation in perceived causation and significance (Van Balen & Inhorn, 2002). A combined cause of infertility is found in about 10–30% of
couples (Jones & Toner, 1993; Thonneau P et al., 1991). It is, therefore, important to investigate both partners and inappropriate to assume that infertility is exclusively a female or a male problem.

**Female Infertility**

*Causes and Factors*

Causes or factors of female infertility can basically be classified regarding whether they are acquired or genetic, or strictly by location. Although causes (or factors) of female infertility can be classified as acquired versus genetic, female infertility is usually more or less a combination of nature and nurture. Also, the presence of any single risk factor of female infertility such as smoking, does not necessarily cause infertility, and even if a woman is definitely infertile then the infertility cannot definitely be blamed on any single risk factor even if the risk factor is (or has been) present (Au, Sierra-Torres, & Tyring, 2003).

According to the American Society for Reproductive Medicine (ASRM), Age, Smoking, Sexually Transmitted Infections, and being overweight or underweight can all affect fertility. In broad sense, acquired factors practically include any factor that is not based on a genetic mutation, including any intrauterine exposure to toxins during fetal development, which may present as infertility many years later as an adult (Bunting & Boivin, 2010). The following acquired factors may cause infertility.

**Age:** A woman's fertility is affected by her age. The average age of a girl's first period (menarche) is 12-13 (12.5 years in the United States (Anderson, Dallal, & Must, 2003); 12.72 in Canada (Al-Sahab, Ardern, Hamadeh, & Tamim, 2010), 12.9 in the UK (Hamilton-Fairley & Chamberlain, 2004), but, in post menarchal girls, about 80% of the cycles are unovulatory (lack of ovulation) in the first year after menarche, 50% in the third and 10% in the sixth year (Apter, 1980). A woman's fertility peaks in the early and mid twenties, after which it starts to decline, with this decline being accelerated after the age of 35. However, the exact estimates of the chances of a woman to conceive after a certain age are not clear, with research giving differing results. The chances of a couple to successfully conceive at an advanced age depend on factors, like the general health of a woman, but also the fertility of the male partner.
**Tobacco smoking:** Tobacco smoking is harmful to the ovaries, and the degree of damage is dependent upon the amount and length of time a woman smokes or is exposed to a smoke-filled environment. Nicotine and other harmful chemicals in cigarettes interfere with the body’s ability to create estrogen, a hormone that regulates folliculogenesis and ovulation. Also, cigarette smoking interferes with folliculogenesis, embryo transport, endometrial receptivity, endometrial angiogenesis, uterine blood flow and the uterine myometrium (Dechanet et al., 2011). Some damage is irreversible, but stop smoking can prevent further damage. Smokers are 60% more likely to be infertile than non-smokers. Smoking reduces the chances of IVF producing a live birth by 34% and increases the risk of an IVF pregnancy miscarrying by 30%. Also, female smokers have an earlier onset of menopause by approximately 1–4 years (Dechanet et al., 2011).

**Body weight and eating disorder:** Twelve percent of all infertility cases are a result of a woman either being underweight or overweight. Fat cells produce estrogen (Nelson & Bulun, 2001). Too much body fat causes production of too much estrogen and the body begins to react as if it is a birth control, limiting the odds of getting pregnant. Too little body fat causes insufficient production of estrogen and disruption of the menstrual cycle. Both under and overweight women have irregular cycles in which ovulation does not occur or is inadequate. Proper nutrition in early life is also a major factor for later fertility (Sloboda, Hickey, & Hart, 2011). A study indicated that approximately 20% of infertile women had a past or current eating disorder, which is five times higher than the general lifetime prevalence rate (Freizinger, Franko, Dacey, Okun, & Domar, 2010).

A review by Koning et al., (2010) concluded that overweight and obese sub fertile women have a reduced probability of successful fertility treatment and their pregnancies are associated with more complications and higher costs.

**Chemotherapy:** Chemotherapy poses a high risk of infertility. Chemotherapies with high risk of infertility include procarbazine and other alkylating drugs such as cyclophosphamide, ifosfamide, busulfan, melphalan, chlorambucil and chloromethine (Brydøy, Fosså, Dahl, & Bjørø, 2007).
**Other factors that can cause acquired infertility:** Women with diabetic condition are at increased risk of infertility, reflected by delayed puberty and menarche, menstrual irregularities (especially oligomenorrhea), mild hyperandrogenism, polycystic ovarian syndrome, fewer live born children and possibly earlier menopause.

**Genetic factors:** There are many genes wherein mutation causes female infertility. Also, there are additional conditions involving female infertility which are believed to be genetic but where no single gene has been found to be responsible. An unknown number of genetic mutations cause a state of sub fertility, which in addition to other factors such as environmental ones may manifest as infertility (Sultan, Biason-Lauber, & Philibert, 2009).

**Polycystic ovary syndrome:** Polycystic ovary syndrome (PCOS) is one of the most common female endocrine disorders. PCOS is a complex, heterogeneous disorder of uncertain etiology, but there is strong evidence that it can to a large degree be classified as a genetic disease (Diamanti-Kandarakis, Kandarakis, & Legro, 2006; Fauser et al., 2011). PCOS produces symptoms in approximately 5% to 10% of women of reproductive age leading to sub fertility (12–45 years old). Some common symptoms of PCOS include:

Menstrual disorders: PCOS mostly produces oligomenorrhea (few menstrual periods) or amenorrhea (no menstrual periods), but other types of menstrual disorders may also occur (Teede, Deeks, & Moran, 2010). Infertility generally results directly from chronic unovulation (lack of ovulation) (Teede et al., 2010). Hyperandrogenism: It may produce hyper menorrhea (very frequent menstrual periods) or other symptoms (Teede et al., 2010).

Where PCOS is associated with overweight or obesity, successful weight loss is the most effective method of restoring normal ovulation/menstruation, but many women find it very difficult to achieve and sustain significant weight loss.

**Unovulation:** An unovulatory cycle is a menstrual cycle during which the ovaries do not release an oocyte. Therefore, ovulation does not take place. However, a woman who does not ovulate at each menstrual cycle is not necessarily going through menopause. Chronic unovulation is a common cause of infertility.
**Poor Ovarian Reserve:** Is a condition of low fertility characterized by 1) low numbers of remaining oocytes in the ovaries or 2) possibly impaired preantral oocyte development.

**Premature menopause:** Is the loss of function of the ovaries before the age 40 years.

**Menopause:** Menopause is an event that typically (but not always) occurs in women in midlife, during their late 40s or early 50s, and it signals the end of the fertile phase of a woman's life. Menopause is more accurately defined as the permanent cessation of the primary functions of the ovaries: the ripening and release of ova and the release of hormones that cause both the creation of the uterine lining and the subsequent shedding of the uterine lining (a.k.a. the menses or the period).

**Gonadal dysgenesis (Turner syndrome):** Turner syndrome or Ulrich-Turner syndrome (also known as "Gonadal dysgenesis) encompasses several conditions in human females, of which monosomy X (Bieling & Antony, 2003). It is a chromosomal abnormality in which all or part of one of the sex chromosomes is absent. Normal females have two X chromosomes, but in Turner syndrome, one of those sex chromosomes is missing or has other abnormalities. In some cases, the chromosome is missing in some cells but not others, a condition referred to as mosaicism or "Turner mosaicism". Girls with Turner syndrome typically experience gonadal dysfunction (non-working ovaries), which results in amenorrhea (absence of menstrual cycle) and sterility. (Bieling & Antony, 2003).

**Ovarian cancer:** Ovarian cancer is a cancerous growth arising from the ovary. Symptoms are frequently very subtle early on and may include: bloating, pelvic pain, difficulty in eating and frequent urination, and are easily confused with other illnesses (Johannes, 2010). Most (more than 90%) ovarian cancers are classified as "epithelial" and are believed to arise from the surface (epithelium) of the ovary. However, some evidence suggests that the fallopian tube could also be the source of some ovarian cancers. Since the ovaries and tubes are closely related to each other, it is thought that these fallopian cancer cells can mimic ovarian cancer leading to infertility (Piek, 2004).
**Endometriosis**: Endometriosis can lead to anatomical distortions and adhesions (the fibrous bands that form between tissues and organs following recovery from an injury) (Tomassetti et al., 2006). However, the link between infertility and endometriosis remains enigmatic when the extent of endometriosis is limited (Speroff & Fritz, 2005). It has been suggested that endometriotic lesions release factors which are detrimental to gametes or embryos, or, alternatively, endometriosis may more likely to develop in women who fail to conceive for other reasons and thus be a secondary phenomenon; for this reason it is preferable to view endometriosis-associated infertility in such cases (Speroff & Fritz, 2005).

**Pelvic inflammatory disease (PID)**: is a term used to describe any infection in the lower female reproductive tract that spreads to the upper female reproductive tract. The lower female genital tract consists of the vagina and the cervix. The upper female genital tract consists of the body of the uterus, the fallopian or uterine tubes, and the ovaries (Guven, Dilek, Pata, Dilek, & Ciragil, 2007).

**Fallopian tube obstruction**: is a major cause of female infertility. Blocked fallopian tubes are unable to let the ovum and the sperm converge, thus making fertilization impossible. Fallopian Tubes are also known as oviducts and uterine tubes. About 20% of female infertility can be attributed to tubal causes (García-Ulloa & Arrieta, 2005).

**Uterine malformation**: is a type of female genital malformation resulting from an abnormal development of the Müllerian duct(s) during embryogenesis. Symptoms range from amenorrhea, infertility, recurrent pregnancy loss, and pain, to normal functioning depending on the nature of the defect.(Raga et al., 1997). The prevalence of uterine malformation is estimated to be 6.7% in the general population, slightly higher (7.3%) in the infertility population, and significantly higher in a population of women with a history of recurrent miscarriages (16%) (Saravelos, Cocksedge, & Li, 2008).

**Uterine fibroid**: is a leiomyoma (benign non-cancerous) tumor from smooth muscle tissue that originates from the smooth muscle layer (myometrium) of the uterus. Fibroids are often multiple and if the uterus contains too many leiomyomata to count, it is referred to as diffuse uterine leiomyomatosis. The malignant version of a fibroid is extremely uncommon and termed a leiomyosarcoma. Fibroids are the most common benign tumors in females and typically found during the middle and later
reproductive years. While most fibroids are asymptomatic, they can grow and cause heavy and painful menstruation, painful sexual intercourse, and urinary frequency and urgency. Some fibroids may interfere with pregnancy although this appears to be very rare (Neiger, Sonek, Croom & Ventolini 2006).

**Male Infertility:**

Male infertility refers to the inability of a male to achieve a pregnancy in a fertile female. In humans it accounts for 40-50% of infertility (Brugh, Matschke, & Lipshultz, 2003). Male infertility is commonly due to deficiencies in the semen, and semen quality is used as a surrogate measure of male fecundity (Cooper et al., 2010). Factors relating to male infertility include (Rowe & Comhaire, 2000):

**Tobacco smoking:** Male smokers also have approximately 30% higher rate of infertility. There is increasing evidence that the harmful products of tobacco smoking kill sperm cells (Agarwal, Prabakaran, & Said, 2005).

**Testicular factors:** Testicular factors refer to conditions where the testes produce semen of low quantity and/or poor quality despite adequate hormonal support and include:

**Age:** Evidence shows that increased male age is associated with a decline in semen volume, sperm motility, and sperm morphology (Sarrel & DeCherney, 1985). In studies that controlled for female age, comparisons between men under 30 and men over 50 found relative decreases in pregnancy rates between 23% and 38% (Sarrel & DeCherney, 1985).

Sperm count declines with age, as shown below leading to male infertility:

- In males 20–39 years old, 90% of the seminiferous tubules contain mature sperm.
- In males 40–69 years old, 50% of the seminiferous tubules contain mature sperm.
- In males 80 years old and older, 10% of the seminiferous tubules contain mature sperm (Schmidt, Tjørnhj-Thomsen, Boivin, & Nyboe Andersen, 2005).

**Klinefelter syndrome:** Klinefelter syndrome is another cause which has already been described in the previous chapter.
**Varicocele:** varicocele or varicose seal is an abnormal enlargement of the pampiniform venous plexus in the scrotum. This plexus of veins drains the testicles. Defective valves, or compression of the vein by a nearby structure, can cause dilatation of the testicular veins near the testes, leading to the formation of a varicocele. It is reported that varicocele was present in about 35% of men with primary infertility and 81% of men with secondary infertility. This difference in the incidence of varicocele was highly significant. (Shu, 2003).

**Testicular cancer:** is cancer that develops in the testicles. Man's risk of testicular cancer is roughly 1 in 250 (0.4%). It is the most common cancer in males aged 20–39 years, and is rarely seen before the age of 15 years (Levitas et al., 2006). Radiation therapy to a testis decreases its function, but infertility can efficiently be avoided by avoiding radiation to both testes (Gutfeld, Wygoda, Shavit, & Grenader, 2007).

**Medical Treatment**

Medical treatment of infertility generally involves the use of fertility medication, surgery, or a combination, which enhance fertility. For women, fertility medication is used to stimulate follicle development of the ovary.

Agents that enhance ovarian activity can be classified as either Gonadotropin releasing hormone, Estrogen antagonists or Gonadotropins (Bisht & Sharma, 2010). There are currently very few fertility medication options available for men. A study in Egypt assessed the efficacy of a combination of clomiphene citrate and vitamin E in improving sperm count and sperm motility in male infertility (Ghanem, Shaeer, & El-Segini, 2010).

If the sperm are of good quality and the woman's reproductive structures are good (patent fallopian tubes, no adhesions or scarring), physicians may start by prescribing a course of ovarian stimulating medication. The physician may also suggest using a conception cap cervical cap, which the patient uses at home by placing the sperm inside the cap and putting the conception device on the cervix, or intrauterine insemination (IUI), in which the doctor introduces sperm into the uterus during ovulation, via a catheter. In these methods, fertilization occurs inside the body.
If conservative medical treatments fail to achieve a full term pregnancy, the physician may suggest the patient undergo in vitro fertilization (IVF). IVF and related techniques, Intra cytoplasmic sperm injection (ICSI), Zygote intra fallopian transfer (ZIFT) and Gamete intra fallopian transfer (GIFT) are called assisted reproductive technology (ART) techniques.

_Intra cytoplasmic sperm injection (ICSI)_ is an _in vitro_ fertilization procedure in which a single sperm is injected directly into an egg.

_Zygote intra fallopian transfer (ZIFT)_ is an infertility treatment where a blockage in the fallopian tubes prevents the normal binding of sperm to the egg. Egg cells are removed from a woman's ovaries, and in vitro fertilized. The resulting zygote is placed into the fallopian tube by the use of laparoscopy.

_Gamete intra fallopian transfer (GIFT)_ is a tool of assisted reproductive technology against infertility. Eggs are removed from a woman's ovaries, and placed in one of the Fallopian tubes, along with the man's sperm, which allows fertilization to take place inside the woman's uterus (Khalatbari, Ghorbanshirodi, Akhshabi, Hamzehpour, & Esmaeilpour, 2011).

With the advances in IVF the GIFT procedure is used less as pregnancy rates in IVF tend to be equal or better and do not require laparoscopy when the egg is put back (Rabizadeh, Nuri, & Taeibzadeh, 2002).

Assisted Reproductive Technology ART techniques generally start with stimulating the ovaries to increase egg production. After stimulation, the physician surgically extracts one or more eggs from the ovary, and unites them with sperm in a laboratory setting, with the intent of producing one or more embryos. Fertilization takes place outside the body, and the fertilized egg is reinserted into the woman's reproductive tract, in a procedure called embryo transfer.

Other medical techniques are e.g. tuboplasty, assisted hatching, and Preimplantation genetic diagnosis.

_In vitro fertilization (IVF):_ IVF is a major treatment for infertility when other methods of assisted reproductive technology have failed. The process involves monitoring a woman's ovulatory process, removing ovum or ova (egg or eggs) from the
woman's ovaries and letting sperm fertilize them in a fluid medium in a laboratory. When a woman's natural cycle is monitored to collect a naturally selected ovum (egg) for fertilization, it is known as natural cycle IVF. The fertilized egg (zygote) is then transferred to the patient's uterus with the intention of establishing a successful pregnancy. The first successful birth of a "test tube baby", Louise Brown, occurred in 1978 (Silver, 2000).

**Intra cytoplasmic sperm injection (ICSI):** Is an in vitro fertilization procedure in which a single sperm is injected directly into an egg. This procedure is most commonly used to overcome male infertility problems, although it may also be used where eggs cannot easily be penetrated by sperm (French, Sabanegh Jr, Goldfarb, & Desai, 2010).

**Gamete intra fallopian transfer (GIFT):** In GIFT eggs are removed from a woman's ovaries, and placed in one of the Fallopian tubes, along with the man's sperm and allows fertilization to take place inside the woman's uterus (Asch, Ellsworth, Balmaceda & Wong, 1984). With the advances in IVF the GIFT procedure is used less as pregnancy rates in IVF tend to be equal or better and do not require laparoscopy when the egg is put back (Toner, 2002).

**Infertility and related psychological factors**

One of the largest studies, which was in the form of a review article, studied emotional adjustment of infertile women during the last 25 years (Verhaak et al., 2007). They selected 27 out of 706 studies which assessed emotional adjustment of infertile women towards fruitless IVF therapy. Results showed that the difference in emotional adjustment is mild at the onset of study, while unsuccessful treatment intensifies negative emotions like anxiety and depression, which persist after consecutive unsuccessful cycles. Overall, most women fail to satisfactorily adapt to IVF therapy. Nevertheless, a significant number of subjects show clinically emotional problems. Once IVF therapy results in pregnancy and negative emotional reactions begin to fade, the fact that stress caused by treatment is significantly related to fear of treatment failure becomes more evident (Hammarberg, Astburg & Baker, 2007; Verhaak et al., 2007).
Varhak et al., (2007) further studied the effect of IVF therapy and its associated factors in a longitudinal study on 148 infertile patients and emotional adjustment prior to treatment and six months after treatment. Measured factors included anxiety, depression, personal characteristics, confrontation, marital relationship and social support. The results showed that anxiety and depression rates among women, resulted in increase of anxiety and depression after unsuccessful and decreased, after successful treatment. However, these rates did not vary after successful or unsuccessful treatment among males. There was no particular improvement among females after six months of treatment failure. Follow-up showed that 20% of women had signs of anxiety and/or depression.

Schmidt, Holstein, Christensen, and Boivin (2005) monitored 166 women starting one month before their IVF cycles, and the results showed no significant correlation between psychological stress and IVF outcome. The study made suggestion to infertility clinics that it might be possible to reduce the stress experienced by IVF patients during the treatment procedure. While psychological stress experienced during a cycle might not influence an IVF outcome; it is possible that the experience of IVF can result in stress that leads to depression. The financial consequences IVF can influence anxiety and become overwhelming. However, for many couples, the experience of infertility itself can also cause extreme stress and depression.

The lack of consensus in psychosocial studies examining the effect of emotional distress is likely to be owing to incongruence in study designs. For example, 60% of spontaneous conceptions are lost within two weeks of fertilization (Macklon, Geraedts, & Fauser, 2002) but psychosocial studies assesses women at different stages of pregnancy (for example, at two, six, or 12 weeks of pregnancy, or at delivery) and often considered all patient together with different causes of treatment failure (for example, lack of oocytes or failure of implantation).

A study conducted by Lund, Sejbaek, Christensen and Schmidt (2009) shows that 14.8% of the infertile women with unsuccessful treatment developed severe depressive symptoms at 1-year follow-up. This is comparable with a Dutch longitudinal cohort study reporting that 20% of the infertile women after a final unsuccessful treatment cycle scored above the threshold for depression measured by the Beck Depression Inventory (Verhaak, Smeenk, Van Minnen, Kremer, &
Kraaimaat, 2005). However, prevalence in this Dutch study was, however, not assessed before starting the fertility treatment. In total, 5.7% of the men in Lund, et al., (2009) study developed severe depressive symptoms during follow-up. The prevalence of depression among men during fertility treatment was 5.1% in an ongoing longitudinal cohort study from Sweden (Volgsten, Svanberg, Ekselius, Lundkvist, & Poromaa, 2008). In contrast to a previous meta-analysis (Lorant et al., 2003) reporting evidence for social inequality in depression, Lund, et al., (2009) identified no association between social class and the incidence of severe depressive symptoms in this cohort of infertile men and women.

Infertility has been shown to be equally distributed over the social classes in a representative population-based study from Denmark (Schmidt, Münster, & Helm, 1995). However, even in a country with free access to reimbursed fertility treatment, there was social inequality in medical help-seeking, with women with lesser education seeking treatment to a lower extent (Schmidt et al., 1995). People from the higher social class experience a serious loss of control over their life, which influences their mental well-being negatively. It is reasonable to believe that the most vulnerable infertile people from lower social classes either do not seek fertility treatment or participate in a longitudinal cohort study with repeated self-reported measurements (Lund et al., 2009).

The prevalence of psychiatric morbidity, specially depression in infertile patients have been studied, for example (Thiering, Beaurepaire, Jones, Saunders & Tennant, 1993) found that, there was mild to moderate depression in 28.3% of infertile women, moderate to severe depression in 7.2% and 1.2% had severe depression based on BDI. Oddens, Den Tonkelaar and Nieuwenhuyse (1999) reported that 24.9% of the infertile women had depressive disorders. There was depression disorder in 33% of infertile women (Lok et al., 2002). The overall percentage of depression disorder in infertile women ranges between 24 and 36 %. Depression increases with duration of infertility (Domar & Seibel, 1990), and there was a trend of increasing psychological stress with lengthening of infertility time. Kee, Jung and Lee (2000) study indicated that level of depression among patients undergoing infertility treatment varies according to the duration of infertility treatment. The study indicates that longer the treatment duration lesser will be the symptoms than those receiving treatment for the first time.
Other studies showed that psychological distress in infertile women increase with time (Berg & Wilson, 1991) and depression peaks between the second and third year of infertility and does not return to normal range until after 6 years of infertility (Domar, Broome, Zuttermeister, Seibel, & Friedman, 1992).

In a study by Khademi et al., (2005) showed a positive relationship between infertility duration and depression scores. The study suggest that if the woman is hopeful about the results of medical intervention and receiving support from the physicians and relatives for a higher pregnancy rate in the future and also if social and family stresses be absent and a deep understanding of infertility be present, mental stress and depression during the first year of infertility would be much lower. A long time period of infertility and repeated referring to the physicians, the infertility would gradually change to a chronic problem. Thus confronting this problem, the infertile women would experience monthly cycles of hope and hopelessness (Dhaliwal, Gupta, Gopalan, & Kulhara, 2004), their stress and depression severity would decrease but would never disappear. In recent years, special attention has been paid to the psychological health of infertile couples. Grief reactions are common among infertile couples, however, this normal grief reactions may prolong into pathological grief leading to major depression (Covington & Burns, 2006).

Depressed patients exhibit low mood, loss of interest or pleasure in daily activities, feelings of guilt or low self-worth, disturbed sleep or appetite, low energy, and poor concentration. Prevalence of depression is 5 to 12% for men and 10 to 25% in women (Sadock & Sadock, 2010). Depression may affect infertility treatment and it may also influence the intensity and longevity of relationship of the affected couple (Ashkani, Akbari, & Heydari, 2006). Lapane et al., (1995), have reported that depression could also play a role in the pathogenesis of infertility. Domar et al., (1992) reported that among infertile women 37% had depressive symptoms on the Beck Depression Inventory (BDI), which was twice as common as in the control group.

Nelson, Shindel, Naughton, Ohebshalom and Mulhall (2008) used Center for Epidemiological Studies Depression Scale (CES-D) for depression and found that 19% of infertile women had moderate and 13% had severe depression. Drosdzol et al., (2009) found that 35.4% infertile women scored above the cut-off score for severe symptoms of depression, compared with 19.47% of fertile women.
Gurhan, Akyuz, Atici and Kisa (2009) estimated association of depression and anxiety scores with oocyte and sperm numbers and pregnancy rates during in vitro fertilization (IVF) treatment. 80 Turkish couples were administered the Spielberger State and Trait Anxiety and Beck Depression Inventories. A significant correlation ($r = -.25$) was obtained between Depression and women's oocyte pickup data and number of oocytes. The study showed that low oocyte numbers were associated with higher depression. Also no significant relation was found for sperm counts with anxiety and depression scores on the day of oocyte and sperm collection, but sperm motility was weakly and inversely correlated with depression scores. Women with high state anxiety score on the oocyte pickup day had significant lower pregnancy rates, as did those with higher Depression. Study suggested that counseling of couples by health professionals on fertility-related issues to be implemented in IVF units (Gurhan, Akyuz, Atici, & Kisa, 2009).

Karlidere et al., (2008) studied whether the emotional distress of infertile Turkish women is related to social support and influences the outcome of their IVF and/or ICSI treatment. Study included 104 primary infertile Turkish women before the date of their embryo transfer. Comparisons were made between the women who became pregnant naturally. Results showed that Compared to the pregnant women, the non-pregnant women had a greater number of emotional symptoms despite similar levels of social support. Also, the increased severity of depressive symptoms and higher levels of anxiety were predictive of low pregnancy rates (Karlidere et al., 2008).

Infertile subjects view that their sexual relationship has become like a duty and compulsory act rather than a joyful task. The sexual relationship therefore, inevitably becomes "sexual intercourse due to needs". The inability to reproduce arouses a feeling of sexual failure.

Lee, Sun and Chao (2001) in order to determine the effect of diagnosis of infertility on sexual and marital satisfaction and feelings of failure and depression, studied 117 Taiwanese couples in whom infertility was present in both sexes (female factor infertility in 43 couples, and male factor infertility in 53 couples and both male and female factors in 21 couples). Results showed that amongst couples with both male and female infertility factors, women had less sexual and marital satisfaction as compared to their husbands. Also, women with female factor infertility had lower self
esteem and they had feelings of sin and shame as compared to women with male factor infertility.

**DEPRESSION**

Depression is typically characterized by low mood, low self-esteem, and loss of interest or pleasure in normally enjoyable activities. DSM-TV-TR criteria for Depression is given below:

A. Five (or more) of the following symptoms have been present during the same 2-week period and represent a change from previous functioning; at least one of the symptoms is either (1) depressed mood or (2) loss of interest or pleasure.

1- Depressed mood most of the day, nearly every day, as indicated by either subjective report (e.g., feels sad or empty) or observation made by others (e.g., appears tearful). Note: In children and adolescents, can be irritable mood.

2- Markedly diminished interest or pleasure in all, or almost all, activities most of the day, nearly every day (as indicated by either subjective account or observation made by others).

3- Significant weight loss when not dieting or weight gain (e.g., a change of more than 5% of body weight in a month), or decrease or increase in appetite nearly every day. Note: In children, consider failure to make expected weight gains.

4- Insomnia or hyper somnia nearly every day.

5- Psychomotor agitation or retardation nearly every day (observable by others, not merely subjective feeling of restlessness or being slowed down).

6- Fatigue or loss of energy nearly every day.

7- Feeling of worthlessness or excessive or inappropriate guilt (which may be delusional) nearly every day (not merely self-reproach or guilt about being sick).

8- Diminished ability to think or concentrate, or indecisiveness, nearly every day (either by subjective account or as observe by other).

9- Recurrent thoughts of death (not just fear of dying), recurrent suicide ideation without specific plan, or a suicide attempt or a specific plan for committing suicide (First, Frances, & Pincus, 2004).
The diagnosis of depressive disorder is based on the patient’s self-reported experiences, behavior reported by relatives or friends, and a mental status examination. Physicians generally request tests for physical conditions that may cause similar symptoms. If depressive disorder is not detected in the early stages it may result in a slow recovery and affect or worsen the person’s physical health. Standardized screening tools such as Major Depression Inventory can be used to detect major depressive disorder (Bech, Rasmussen, Olsen, Noerholm, & Abildgaard, 2001).

A person having a depressive episode usually exhibits a very low mood, which pervades all aspects of life, and an inability to experience pleasure in activities that were formerly enjoyed. Depressed people may be preoccupied with, or ruminate over, thoughts and feelings of worthlessness, inappropriate guilt or regret, helplessness, hopelessness, and self-hatred. In severe cases, depressed people may have symptoms of psychosis. These symptoms include delusions, less commonly, hallucinations, usually unpleasant (APA, 2000). Other symptoms of depression include poor concentration and memory (especially in those with melancholic or psychotic features), withdrawal from social situations and activities, reduced sex drive, and thoughts of death or suicide (Delgado & Schillerstrom, 2009).

Insomnia is common among the depressed. In the typical pattern, a person wakes very early and cannot get back to sleep, but insomnia can also include difficulty falling asleep. Insomnia affects at least 80% of depressed people. Hypersomnia, or oversleeping, can also happen, affecting 15% of depressed people (APA, 2000).

A depressed person may report multiple physical symptoms such as fatigue, headaches, or digestive problems; physical complaints are the most common presenting, according to the World Health Organization's criteria for depression (Patel, Abas, Broadhead, Todd, & Reeler, 2001). Appetite often decreases, with resulting weight loss, although increased appetite and weight gain occasionally occur (APA, 2000).

The bio-psychosocial model proposes that biological, psychological, and social factors all play a role in causing depression. The diathesis–stress model specifies that depression results when a preexisting vulnerability, or diathesis, is activated by stressful life events. The preexisting vulnerability can be either genetic (Caspi et al.,
implying an interaction between nature and nurture, or schematic, resulting from views of the world learned in childhood.

These interactive models have gained empirical support. For example, researchers in New Zealand took a prospective approach to studying depression, by documenting over time how depression emerged among an initially normal cohort of people. The researchers concluded that variation among the serotonin transporter (5-HTT) gene affects the chances that people who have dealt with very stressful life events will go on to experience depression. To be specific, depression may follow such events, but seems more likely to appear in people with one or two short alleles of the 5-HTT gene (Caspi et al., 2003) In addition, a Swedish study estimated the heritability of depression—the degree to which individual differences in occurrence are associated with genetic differences—to be around 40% for women and 30% for men (Kendler, Gatz, Gardner, & Pedersen, 2006) and evolutionary psychologists have proposed that the genetic basis for depression lies deep in the history of naturally selected adaptations. A substance-induced mood disorder resembling major depression has been causally linked to long-term drug use or drug abuse, or to withdrawal from certain sedative and hypnotic drugs (Schuckit et al., 1997).

Various aspects of personality and its development appear to be integral to the occurrence and persistence of depression (Andrews & Henderson, 2000), with negative emotionality as a common precursor (Morris, Bylsma, & Rottenberg, 2009). Although depressive episodes are strongly correlated with adverse events, a person's characteristic style of coping may be correlated with his or her resilience (Sadock, Kaplan, & Sadock, 2007). In addition, low self-esteem and self-defeating or distorted thinking are related to depression. Depression is less likely to occur, as well as quicker to remit, among those who are religious (Dein, 2006).

Beck (1976) following the earlier work of Kelly and Ellis (1960), developed what is now known as a cognitive model of depression in the early 1960s. He proposed that three concepts underlie depression: a triad of negative thoughts composed of cognitive errors about oneself, one's world, and one's future; recurrent patterns of depressive thinking, or schemas; and distorted information processing. From these principles, he developed the structured technique of cognitive behavioral therapy (CBT). According to Seligman (1975) depression in humans is similar
to learned helplessness in laboratory animals, which remain in unpleasant situations when they are able to escape, but do not because they initially learned they had no control.

Attachment theory, which was developed by Bowlby, predicts a relationship between depressive disorder in adulthood and the quality of the earlier bond between the infant and the adult caregiver. In particular, it is thought that "the experiences of early loss, separation and rejection by the parent or caregiver may all lead to insecure internal working, internal cognitive representations of the self as unlovable and of attachment figures as unloving or untrustworthy would be consistent with parts of Beck's cognitive triad" (Ma, 2006).

Depressed individuals often blame themselves for negative events and, as shown in a 1993 study of hospitalized adolescents with self-reported depression, those who blame themselves for negative occurrences may not take credit for positive outcomes. This tendency is characteristic of a depressive attribution or pessimistic explanatory style (Barlow, 2005).

The understanding of depression has also received contributions from the psychoanalytic and humanistic branches of psychology. From the classical psychoanalytic perspective depression, or melancholia, may be related to interpersonal loss (Carhart-Harris, Mayberg, Malizia, & Nutt, 2008) and early life experiences (Radden, 2003) Existential therapists have connected depression to the lack of both meaning in the present and a vision of the future.

Poverty and social isolation are associated with increased risk of mental health problems. In general Child abuse (physical, emotional, sexual, or neglect) is also associated with increased risk of developing depressive disorders later in life (Heim, Newport, Mletzko, Miller, & Nemeroff, 2008). In adulthood, stressful life events are strongly associated with the onset of major depressive episodes (Kessler, 1997) In this context, life events connected to social rejection appear to be particularly related to depression (Kendler, Hettema, Butera, Gardner & Prescott, 2003). Evidence that a first episode of depression is more likely to be immediately preceded by stressful life events than are recurrent ones is consistent with the hypothesis that people may become increasingly sensitized to life stress over successive recurrences of depression (Monroe, Slavich, Torres, & Gotlib, 2007).
The relationship between stressful life events and social support has been a matter of some debate; the lack of social support may increase the likelihood that life stress will lead to depression, or the absence of social support may constitute a form of strain that leads to depression directly (Vilhjalmsson, 1993).

**Management of the Depression**

The three most common treatments for depression are psychotherapy, medication, and electroconvulsive therapy. Psychotherapy is the treatment of choice for people while electroconvulsive therapy is used only as a last resort. Care is usually given on an outpatient basis, whereas treatment in an inpatient unit is considered if there is a significant risk to self or others. Only psychotherapeutic methods of managing depression are discussed in present study.

**Psychotherapy**

Psychotherapy can be delivered, to individuals, groups, or families by mental health professionals, including psychotherapists, psychiatrists, psychologists, clinical social workers, counselors, and suitably trained psychiatric nurses. With more complex and chronic forms of depression, a combination of medication and psychotherapy may be used (Thase, 1999).

Cognitive behavioral therapy (CBT/REBT) currently has the most research evidence for the treatment of depression and CBT/REBT and interpersonal psychotherapy (IPT) is preferred therapies for depression. Successful psychotherapy appears to reduce the recurrence of depression even after it has been terminated or replaced by occasional booster sessions.

The most-studied form of psychotherapy for depression is CBT, which teaches clients to challenge self-defeating, but enduring ways of thinking (cognitions) and change counter-productive behaviors. Research beginning in the mid-1990s suggested that CBT could perform as well or better than antidepressants in patients with moderate to severe depression (Roth & Fonagy, 2005). CBT may be effective in depressed adolescents (Butler, Chapman, Forman, & Beck, 2006) although its effects on severe episodes are not definitively known (Harrington, Whittaker, Shoebridge & Campbell, 1998). Combining fluoxetine with CBT appeared to bring no additional benefit (Goodyer et al., 2007; Goodyer, Research, Programme, & Assessment, 2008) or, at
the most, only marginal benefit (Domino et al., 2008). Several variables predict success for cognitive behavioral therapy higher levels of rational thoughts, less hopelessness, fewer negative thoughts, and fewer cognitive distortions. CBT is particularly beneficial in preventing relapse. Several variants of cognitive behavior therapy have been used in depressed patients, the most notable being rational emotive behavior therapy and more recently mindfulness-based cognitive therapy (Coelho, Canter & Ernst, 2007).

Prevalence

Depression is a major cause of morbidity worldwide. Lifetime prevalence varies widely, from 3% to 17%. In most countries the number of people who would suffer from depression during their lives falls within an 8–12% range (Andrade et al., 2003). Probability of having a depressive episode within a year-long period is 3–5% for males and 8–10% for females (Kessler et al., 2005). Population studies have consistently shown depression to be about twice as common in women as in men, although it is unclear why this is so, and whether factors unaccounted for are contributing to this (Kuehner, 2003). The relative increase in occurrence is related to pubertal development rather than chronological age and appears to be associated with psychosocial more than hormonal factors (Kuehner, 2003). People are most likely to suffer their first depressive episode between the ages of 30 and 40, and there is a second, smaller peak of incidence between ages 50 and 60 (Eaton et al., 1997).

Depression and infertility

Studies have found that the incidence of depression in infertile couples receiving infertility treatment are significantly higher than in fertile controls, with prevalence estimates of major depression in the range of 15%–54%. Anxiety has also shown to be significantly higher in infertile couples when compared to the general population, with 8%–28% of infertile couples reporting clinically significant anxiety (Chen, Chang, Tsai, & Juang, 2004).

Infertility is a psychological stressor and one of the most significant lifetime crises for infertile women (Newton, Sherrard, & Glavac, 1999). The stress of infertility may stretch the limits of both coping and supporting resources of the individuals (Boivin, Scanlan, & Walker, 1999). Moreover, diagnostic procedures and the
treatment of infertility may also influence both the physical and sexual health of the infertile women (Mahlstedt, 1985). As emotionally stressful situations, both the infertility itself and the treatments for it may cause depression and anxiety (Hammarberg et al., 2007). On the other hand, anxiety and depressive symptoms may either be the cause or the consequence of infertility (Greil, 1997).

Infertility is a stressful experience and has a high impact on couples’ psychological status. The problems of infertile couples are complicated and they are influenced by different factors such as sexual differences and the cause and length of infertility (Ramezanzadeh et al., 2004). Recent study observed that infertile women who reported greater spousal concern had higher levels of anxiety, depression and emotional distress (Gourounti, Anagnostopoulos, & Vaslamatzis, 2010).

Golzari et al., (2001) studied 30 infertile women in order to determine the prevalence of psychosexual problems and depression in infertile couples. Result showed that 96.7% of the infertile couples suffered from various degrees of depression. Further, sexual function was significantly lower in these subjects as compared to normal women (Noorbala et al., 2007). In addition to studies that assess negative feelings (anxiety, depression) and communication and sexual dysfunction among infertile subjects, some studies deal with the effect of infertility on the personality of infertile subjects.

Matsubayashi et al., (2001) reported that depression is more common among infertile women as compared to fertile or pregnant women. Studies conducted by Newton et al., (1999) and Wischmann (2005) on couples showed that the prevalence of depression is higher among infertile women than infertile men besides causing loss of self confidence.

Noorbala et al., (2007) used Beck's questionnaire to study the prevalence of depression and the effect of psychiatric intervention on the rate of depression of 638 infertile couples (319 couples). Findings showed that 48% of women and 23.8% of men suffer from various degrees of depression. Among the 48% of women, 30% suffered from mild, 12.5% from moderate, and 5.3% from severe depression and among the 23.8% of males, 16.6% suffered from mild, 4.7% from moderate and 2.5% from severe depression.
A long duration and period of infertility and consultation with physicians are stressful factors in infertile individuals; added to this, is anxiety about the effectiveness of medical intervention, would gradually change to a chronic problem among infertile couples to reach one of the most important goals of marriage - to be reproductive. While confronting this problem, the infertile couples would experience monthly cycles of hope and hopelessness (Dhaliwal et al., 2004) posing a high rate of stress that would increase the depression rate. Finally after years, they would gradually adjust with infertility using moderating mechanisms such as adoption; or they may continue their lives without any child and consequently, their stress, anxiety and depression severity would continue and never disappears.

**IRRATIONAL BELIEFS**

The nature of rational and irrational beliefs has been described and discussed by Ellis and (1997) and Beck (1976). They listed many dysfunctional beliefs that people often have that make them disturbed and ineffective, such as overgeneralization, catastrophizing / awfulizing, personalizing, and jumping to conclusions, etc… .Ellis and Dryden (1997) hold that virtually all these irrational beliefs consciously or implicitly include one or more absolutistic musts. Thus, when people use awfulizing, personalize, and tell themselves “He frowned at me, and that means he doesn’t like me and that means I’m no good,” they imply (1) He must not frown at me! (2) His frowning proves that he doesn’t like me, as he must like me, that I’m no good, as I must not be! (Brugh et al., 2003) I must never be frowned upon and put down by anyone and must be perfectly approved all the time! REBT looks for people’s automatic negative thoughts and shows them how to dispute them. But it also routinely looks for the absolutistic shoulds, oughts, and musts that lie behind them, finds these musts, shows them to patients, and teaches people how to dispute and change them into preferences (David, Lynn, & Ellis, 2009).

REBT shows people that they consciously and unconsciously choose to disturb themselves by escalating their preferences into demands and cravings, and that they can train themselves not to do so and thereby create healthy feelings and emotions.

There is a broad consensus in the REBT literature (Ellis, 1994) that Irrational Beliefs (IBs) and Rational Beliefs (RBs) refer to evaluative cognitions, and therefore serve an evaluative function. Abelson and Rosenberg (1958) use the terms “hot” and “cold”
cognitions to make the distinction between appraising (Menezes, Van Oorschot, & Vanstone) and knowing (cold). Cold cognitions (Lazarus & Smith, 1988) refer to the way people develop representations of relevant circumstances (i.e., activating events), whereas hot cognitions refer to the way people process and evaluate cold cognitions (David & McMahon, 2001; David, Schnur, & Belloiu, 2002). Cold cognitions are often analyzed in terms of surface cognitions that are easy to access consciously, and hot cognitions that are consciously accessible yet more difficult to access. Surface cognitions, often called automatic thoughts, refer to descriptions and inferences (e.g., expectancies, attributions), whereas hot cognitions refer to core beliefs (i.e., schemas) and other meaning-based representations (Eysenck & Keane, 2000). Hot cognitions, on the other hand, also called appraisals or evaluative cognitions, refer to how cold cognitions are processed in terms of their relevance for personal wellbeing (Ellis, 1994).

**The Relationship between Rational and Irrational Beliefs**

Early research conceptualized rational beliefs as low levels of irrational beliefs. However, recent data suggest that rational and irrational beliefs are not bipolar constructs (e.g., a low level of irrational beliefs does not necessarily signify high levels of rational beliefs), but are rather orthogonal to one another. (David & Szentagotai, 2006b) described the relationship between rational and irrational beliefs as very complex (Bernard, 1998; David, 2003). Faced with a specific event, people can have simultaneously high irrational beliefs, low irrational beliefs, or no irrational beliefs. Similarly and simultaneously, they can have high rational beliefs, low rational beliefs, or no rational beliefs regarding the same event (David et al., 2002).

**Irrational Beliefs and General Emotional Disturbance**

It follows from Ellis’s model of psychopathology, that endorsement of IBs should be related to increased levels of emotional disturbance and, conversely, reductions in IBs should be associated with clinical improvement. In both clinical and nonclinical samples, research has indeed supported this relationship (David et al., 2009). Endorsement of IBs has been positively associated with overall psychopathology (Smith, Haynes, Lazarus, & Pope, 1993), depression (Solomon, Arnow, Gotlib, & Wind, 2003), anxiety (Lorcher, 2003), nonassertive behavior (Lange, Jakubowski, & McGovern, 1976), and Type A coronary-prone behavior (Woods, 1987).
Lipsky et al., (1980) used a sample of community outpatient clients who presented with many of the classic neurotic symptoms such as anxiety, depression, guilt, and marital and family problems to assess REBT’s effectiveness. Clients were randomly assigned to one of the five groups: RET only (at the time of the study REBT was called rational emotive therapy), RET and rational role reversal, RET and rational emotive imagery, alternative treatment (relaxation and supportive counseling), and a no control group. They were assessed on irrational ideation, emotional adjustment, depression, anxiety, and neuroticism at pre and post-test.

Results were consistent, and supported the comparative efficacy of the three RET treatments. Participants receiving RET and rational role reversal, and RET plus rational-emotive imagery showed significantly fewer symptoms of self reported depression, anxiety, and neuroticism as compared to participants in the two control groups (one group received     (Lipsky et al., 1980). Interestingly, participants in the RET plus rational role reversal group improved significantly more than participants in the RET only group, although participants in the RET only group evidenced significant reductions in symptoms of depression, anxiety, and neuroticism, as compared to participants in either control group. A possible explanation for this finding is that in order to be effective at rational role reversal, in which the patient conducts REBT with the therapist, one must demonstrate a thorough understanding of the principles of REBT (Lipsky et al., 1980).

The goal of REBT is to promote more rational thinking. Implicit in REBT is the assumption that reductions in irrational thinking mediate the positive effects of REBT. Whereas the Lipsky et al., (1980) study offers support for the assertion that thinking more rationally can improve psychological functioning, it cannot answer the question of whether or not this improvement is attributable to increases in rational thinking (Smith, 1983).

Using multiple regression analysis, Smith (1983) found significant correlations between difference of scores in the IB measure and measures of depression, anxiety, and neuroticism, thus supporting the hypothesized association between decreases in IBs and concurrent decreases in emotional disturbance. However, correlations between measures of anxiety, depression, and neuroticism were significant for both control groups as well. In attempting to explain these findings, Smith (1983)
hypothesized that the positive associations between measures of irrational beliefs and neurotic symptoms in both the treatment and control groups could represent true changes in thinking or, conversely, could be an artifact of the instrument used to assess irrational beliefs (Kassinove, Crisci, & Tiegerman, 1977).

Muran et al., (1989) examined further the fundamental premise of REBT that irrational thinking results in emotional disturbance. These researchers hypothesized that individuals self-referring for psychological treatment would evidence significantly higher levels of irrational thinking compared to a sample of college students, and that there would be a positive association between IBs and depression, anxiety, anger, guilt, and general emotional distress. Nonclinical group showed significantly higher level of tolerance for frustration as compared to the clinical group. There were no other significant differences between the two groups on any of the other IB’s (i.e., awfulizing, self- and other-directed shoulds, and ratings of self-worth). Because anxiety and depression are among the most common clinical problems for which treatment is sought (Muran et al., 1989).

When depression was examined, higher levels of irrational thinking emerged in the clinical group. This group evidenced significantly higher levels of self-directed shoulds, lower frustration tolerance, and higher total irrationality than the nonclinical group. Results showed that for both groups total irrationality was significantly related to trait anger and guilt; awfulizing, self-directed shoulds, and low frustration tolerance were associated with guilt; and low frustration tolerance was significantly related to trait anger. Results of the above studies provide support for the REBT prediction that higher levels of IBs are associated with various forms of emotional disturbance (David et al., 2009).

Irrational Beliefs and Depression

Ellis has addressed the role of IBs in depression. Specifically, Ellis (1987) has cited Demandingness as the central IB in depressive disorders. According to him, individuals who hold demands rather than preferences (e.g., “my friends must always treat me with respect”), are at higher risk for depression. If, on the other hand, the same individual merely said to herself, “It would be nice if my friends always treated me with respect, but I’ll live if they don’t,” then it is likely that negative events will
result in the functional emotions of disappointment and sadness rather than depression.

Research on the association between depression and IBs has generally found a positive relationship (Prudhomme & Barron, 1992), although the findings in several studies (Hirschfeld et al., 1989; Rosenbaum, Lewinsohn, & Gotlib, 1996a) have been equivocal.

Using Jones’s Irrational Beliefs Test (IBT;1968), Nelson (1977) found that unrealistically high self-expectations, low frustration tolerance, anxious over concern, and helplessness were significantly correlated with self-reported depression in college students as measured by the Beck Depression Inventory (Beck, 1979). Shorkey and Whiteman, (1977) examined the pattern of IBs associated with clinical depression in three groups of participants: depressed patients, psychiatric patients, and a normal control group (a measure of anxiety was also included because of its common association with depression). Results were similar to Nelson’s (1977) findings. Discriminate analysis was used to elucidate the cluster of irrational beliefs underlying depression. Results showed that demand for approval, frustration reactivity (analogous to low frustration tolerance), anxious over concern, and helplessness significantly discriminated among the groups.

Above findings are informative with respect to the types of distorted cognitions that may underlie depression, the results have been questioned on methodological grounds. Specifically, the studies discussed above used measures of IBs that have been shown to have questionable discriminate validity. The IBT have been shown to be associated with measures of overall negative effect in addition to IBs, thus calling into question exactly what construct is being measured (David et al., 2009).

Further, a common measure of depression used in these studies is the BDI. Some researchers suggest that high BDI scores should be regarded as indicative of dysphoria, not clinical depression (McDermut, Haaga, & Bilek, 1997). If this is indeed the case, then drawing inferences regarding the relationship between IBs and depression based on studies using the BDI as the sole measure of depression may be misleading.
With these issues in mind, (McDermut et al., 1997) and Solomon et al., (2003) in a series of studies, sought to improve on earlier investigations by using multiple measures of IBs and a measure of IBs (Malouff & Schutte, 1986) that has shown good discriminate validity (McDermut et al., 1997). Also, the additional step of controlling for negative affect was taken by administering the Positive and Negative Affect Schedule Trait Version (Watson, Clark, & Tellegen, 1988).

McDermut et al., (1997) examined both attributions of events and IBs in three groups of community residents and college students: individuals diagnosed with major depression, a group with dysphoria, and a non depressed group. One of the questions examined was the extent to which depression was related to endorsement of IBs. Additionally, exploratory analysis was conducted to examine differences in the endorsement of IBs between both the depressed and the dysphoric group, and the non depressed and dysphoric group. With respect to overall IBs (as measured by the Beliefs Score (BS) total score) results showed that the depressed group had a significantly higher score than the non depressed group. Additional partial correlation analysis showed that the Beliefs Score (BS) was not significantly associated with overall negative effect, and that after controlling for negative effect, depression level remained a significant predictor of BS scores. This shows more conclusively that the effect was not attributable to association between the BS and general negative emotionality. By using a measure of IBs that has demonstrated good discriminate validity, controlling for overall negative effect, and employing a dysphoric comparison group in addition to a non-depressed group, the McDermut et al., (1997) study makes important methodological improvements over earlier research.

Bernard (1981) has questioned whether self-report measures are sensitive enough to detect individuals’ thoughts. It has been proposed that IBs operate at a preconscious level. If such is the case, then access to these thoughts may be possible only through indirect methods, such as asking individuals to articulate their thoughts and then analyzing these thoughts for irrational content.

Psychometric criticism of traditional measures of IBs is that their content is too general. Having individuals choose from a preselected list of thoughts may not accurately represent the types of specific, idiosyncratic thoughts held by individuals with emotional disturbances. Further, McDermut et al., (1997) used a group of
currently depressed individuals which makes inferring causality between depression and irrational thinking difficult. One cannot determine if irrational thinking leads to depression, as the REBT model would predict, or if being depressed leads to irrational thinking, which runs counter to the REBT model.

Studies by Solomon et al., (1998; 2003) sought to address these issues. In the first study (Solomon, 1998), used the BS and the articulated thoughts in simulated situations (ATSS) paradigm (Davison, Robins, & Johnson, 1983) to assess IBs in recovered-depressed (RD) and never-depressed participants (ND). This design allows for an evaluation of the extent to which endorsement of IBs is a risk factor for depression or a correlate of depression (i.e., IBs change as depression level changes). If IBs are a risk factor, then it follows that the RD group should evidence higher levels of irrational thinking. Conversely, if IBs are a correlate, then they should not differ significantly between the two groups because both groups were currently not depressed. In the ATSS paradigm, participants are presented with an audiotape of a situation and are asked to articulate their thoughts in reaction to the scenario. Incidentally, in a study investigating the construct validity of the ATSS procedure (Davison, Feldman, & Osborn, 1984), it was shown that participants in the stressful situation evidenced higher levels of IBs as compared to those in the neutral situation, and participants higher on measures of IBs were more anxious than participants who scored lower on measures of IBs (in the ATSS paradigm, situations can be tailored to the specific construct being examined, for example, social criticism, anger, or anxiety).

Solomon et al., (1998) sought to extend research by Rosenbaum et al., (1996b) who used the RD-ND design and found no differences in IBs as measured by a self-report questionnaire. Solomon et al., (1998) point out however, that if IBs represent a cognitive vulnerability for depression (i.e., a latent variable), then these researchers may not have been able to uncover differences in IBs because both groups were, at the time of the study, not depressed. If this is indeed the case, then IBs may be accessible in non depressed individuals only through priming. To address this issue, these researchers examined whether or not IBs can be primed and, if so, what type of priming would be effective in eliciting these beliefs: a negative mood state, negative events, or specific events that represent obstacles to goal attainment and include themes identified by participants as personal vulnerabilities.
Solomon et al., (1998) found the hypothesis that the RD group would have higher levels of IBs relative to the ND group was not supported. Baseline BS levels of IBs were not significantly different. Regarding the question of which priming, if any, would be effective in accessing latent IBs, the results provide some support for the negative mood prime hypothesis. In the RD group, negative mood was more strongly correlated with IBs. With respect to the negative event prime, there were no significant differences in IBs between groups. Finally, differences between groups did not reach statistical significance.

Taken together, these results suggest that IBs fluctuate with depression level, a conclusion that is not consistent with the REBT model of depression.

Ellis (1987) has identified demandingness as the core IB most closely associated with depression. Accordingly, most widely used measures of IBs, such as the BS, include items assessing demandingness. These items tend to be general and absolute however, and the extent to which they represent the specific types of demanding thoughts held by depressed individuals is questionable (Solomon et al., 2003).

As a way to more accurately assess the types of specific idiosyncratic beliefs thought to be most representative of REBT clients, Solomon et al., (2003) developed a more individualized measure, the Specific Demands on Self scale (SDS), which contains items addressing demandingness “in regards to one’s self-nominated worst personal shortcomings”. The scale contains 15 self-evaluative domains that include physical abilities, physical appearance, emotions, achievement, and personality. For each of the 15 items participants indicate whether there is anything about the domain that they would prefer to change. They hypothesized that the mixed findings in studies of IBs and depression may be due to the lack of sensitivity of traditional measures of IBs that use preselected items. To this end, they tested this hypothesis by comparing responses on the BS (preselected, closed-ended measure) to Specific Demands on Self scale (SDS, open-ended) responses. The David et al., (2009) hypothesized that group differences in IBs would only be associated with the Specific Demands on Self scale (SDS). Results showed that neither group differed significantly on BS scores.

As hypothesized, there was a significant difference between groups on the SDS. The RD group identified significantly greater self-demands than the ND group. In terms of Cohen’s (1988) criteria for effect size, the difference between groups was large.
Furthermore, simultaneous regression analysis using group membership as the criterion indicated that the SDS was associated with unique variance, while the BS was not. Finally, results showed that 70% of the RD group evidenced at least one strongly held demand as compared to only 20% of the ND group, and that the RD group was nine times more likely than the ND group to endorse a strong demand. These findings are important with respect to investigations of IBs and depression. They suggest that using a more specific, individualized measure of IBs, rather than a closed-ended, preselected measure, may be required to uncover IBs in individuals at risk for depression (David, Lynn & Ellis, 2010).

For centuries, philosophers and scientists have recognized the relationship between psychological factors and physical health. Both cognitive (e.g., response expectancies) and emotional (e.g., depression, anxiety) variables have been shown to contribute to physical sensations, symptoms, and suffering (Kirsch, 1990; Trief, Grant, & Fredrickson, 2000). However, a psychological variable that has been too frequently neglected as a predictor of health outcomes is irrational beliefs, which are the central to rational-emotive behavior therapy (Ellis, 1994).

Currently, irrational beliefs are defined as a combination of psychological process and thought content. Irrational beliefs are believed to consist of four categories of cognitive processes: (1) demandingness; (2) awfulizing/catastrophizing; (3) frustration intolerance; and (4) global evaluation/self-downing (GE/SD). Each category covers various content areas (e.g., achievement, affiliation, comfort) (Walen, DiGiuseppe, & Dryden, 1992). The counterparts to irrational beliefs are rational beliefs, which cover the same content areas, but involve different cognitive processes; that is, (1) preferences rather than demandingness; (2) the appropriate evaluation of the negative aspects of a situation rather than awfulizing; (3) statements of frustration tolerance rather than frustration intolerance; and (4) evaluation of specific actions and acceptance of fallibility (non GE/SD) rather than global evaluation of human worth and self-downing (David et al., 2009).

REBT holds that it is not the activating events we experience that cause our suffering, but rather our beliefs about those events. Two individuals can experience the same activating event, and yet respond completely differently due to the type of beliefs they hold. This basic tenet justifies the application of REBT theory to understanding health
outcomes, where the activating event (e.g., being diagnosed with an illness) may be impossible to control, but one’s reaction to it is not. For example, consider two individuals that have been diagnosed with cancer, and are scheduled to receive external beam radiation treatment. Person A might irrationally think in response to this event, ‘‘This is AWFUL! This treatment will ruin my life! I can’t stand it,’’ whereas Person B might rationally think, ‘‘I wish I didn’t have to deal with this treatment, but it is only a part of my life. It will not dominate 100% of my life. And even though I don’t like having to go through this, I will be able to stand it. ‘Based on their varying beliefs, these two individuals (Persons A and B) might experience very different emotional, behavioral, and physical responses to cancer and its treatment. Person A, who holds irrational beliefs, may well experience dysfunctional negative emotions (e.g., rage, depression), engage in unhelpful health-related behaviors (e.g., refuse or delay treatment), and suffer from various stress-related physical complaints (e.g., nausea, fatigue, headaches). On the other hand, as a result of holding more rational beliefs, Person B might fare considerably better than Person A emotionally (e.g., annoyance, mild sadness), behaviorally (e.g., maintain treatment compliance), and physically (e.g., reduced physical complaints) (David et al., 2010).

Although many clinicians may regard the links between beliefs (rational and irrational) and a wide variety of health-related outcomes as obvious, scientifically sound research is needed to support this clinical intuition. Unfortunately, there is a dearth of empirical clinical data in this area. Research in this area can be divided into two categories: (1) studies that directly examine the relationship between beliefs and health outcomes, and (2) studies that examine the effects of REBT on health outcomes. In the present research an attempt is made to study the effect REBT on depression and irrational beliefs among infertile women.

Irrational Beliefs and Health Outcomes

A limited number of studies examine the direct effects of irrational beliefs on health outcomes. Papageorgiou et al., (2006) discuss the role of depression in the development of coronary vascular disease. They theorized that depressed mood can lead to inflammation of tissue, which in turn may lead to coronary vascular disease. David et al., (2010) tested the association of irrational beliefs with plasma inflammatory markers, hypothesizing that higher levels of irrational beliefs predict
higher levels of plasma inflammatory markers. In a sample of 853 healthy individuals, David et al., (2010) after controlling for age, sex, body mass, physical activity, and depressed mood, found that irrational belief scores were positively correlated with plasma inflammation markers.

In a sample of 203 adolescents (129 with asthma and 74 without), Silverglade et al., (1994) reported that irrational beliefs were significantly related to severity of disease. Participants who scored significantly higher on a measure of irrational thoughts (i.e., the importance of approval and the need to control emotions) experienced severe asthma than patients who scored lower on the irrational thoughts measure. Consistent with the idea that irrational beliefs are important predictors of health outcomes, McNaughton et al., (1995) demonstrated that irrational beliefs were related to depression and poor health in Alzheimer’s disease caregivers. Specifically, the researchers found that decreased level of irrational beliefs was related to improved subjective health in 89 caregivers over a period of six months.

Sullivan et al., (2001) have focused on the effects of a specific type of irrational health belief, commonly known as catastrophizing. Catastrophizing has most often been examined in the context of pain. Pain catastrophizing has been conceptualized as a negative mental set that can be activated in anticipation of and during painful experiences. In REBT terminology, catastrophizing is most similar to awfulizing about discomfort (e.g., This pain is AWFUL!). Research has indicated that catastrophizing is associated with patients’ experiences of pain. For example, patients undergoing knee surgery who tend to catastrophize before surgery are at greater risk for postsurgical pain (Pavlin, Sullivan, Freund, & Roesen, 2005). Additionally, greater catastrophizing predicts greater pain in patients with rheumatic disease (Edwards, Bingham, Bathon & Haythornthwaite, 2006). More broadly, review articles support the important role of catastrophizing in determining pain outcomes (Tang & Crane, 2006; Zaza & Baine, 2002).

The Relationship between Irrational Beliefs and Health Behaviors Irrational beliefs are not only associated with physical symptoms like pain, but also with health behaviors. For example, eating disordered populations show a greater tendency toward catastrophizing, low frustration tolerance, and negative self-rating when compared to control patients (Moller, 2001).
Phillips et al., (1997) demonstrated that persons with bulimia tend to have levels of irrational beliefs on par with depressed patients, and greater than those of healthy controls. Consistent with these data, the literature also suggests that increased levels of irrational beliefs are linked to inappropriate eating attitudes in nonclinical samples of young women (Tomotake, Okura, Taniguchi, & Ishimoto, 2002). Further supporting the generalizability of the connection between irrational beliefs and health behaviors, Christensen and colleagues (Christensen, Moran & Wiebe, 1999) demonstrated that higher levels of irrational beliefs were predictive of self-reported diabetic, as well as objective levels of hemoglobin HbA1. Irrational beliefs have also been linked to alcohol problems, such that higher levels of irrational beliefs predict higher levels of alcohol problems in college students (Camatta & Nagoshi, 1995).

**Irrational Belief and Infertility**

Study by Wishman et al., (2001) showed that psychological effect of infertility leading to decrease in marital satisfaction of infertile couples. Confirming reduction of marital satisfaction in infertile women, some studies have found irrational beliefs play an important role in marital dissatisfaction (Mazaheri Keyghobadi., Imani, Feshang, & Yato, 2001).

Katiraei et al., (2010) studied irrational beliefs between fertile and infertile women. Using Jones’ irrational beliefs scale, the investigation showed that there was significant difference between fertile and infertile women on the subtests of Jones irrational belief scale namely: Demand for Approval, High self Expectation, Blame proneness, Frustration Reactive, Emotional Irresponsibility, Anxious over concern, Problems avoiding and no difference was observed in other subtests which includes: Dependency, Hopelessness, and Perfectionism. The study showed that infertile women use more irrational beliefs than fertile women

In summary, the empirical evidence supporting links between irrational beliefs, health outcomes and behaviors is growing. It is suggested that more research is needed in this area to both refine our conceptual understanding of the effects of irrational beliefs on health outcomes and the underlying mechanisms responsible for these effects (David et al., 2010).
Different studies have shown the beneficial effects of psychiatric and psychological treatments not only in adapting to unsuccessful treatments but also in reducing stress and bringing about successful pregnancy. The rehabilitation of one’s life after unsuccessful treatment for infertility is a cognitive model in which the infertile subject is assisted in trying their best for having children or in accepting the condition of being childless (Ramezanzadeh, 2009). Ramazanzadeh et al., (2009) study shows that knowledge before treatment for distress and acceptance of the probability of being left childless are factors which determine the emotional response which occurs in response to infertility treatment failure. Infertility specialists can help improve the process of acceptance of such situation by discussing the problems of infertility with couples so that they can handle the condition in a better way such as the opportunities that exist in case of treatment failure. Clinicians must also help couples in becoming emotionally ready for facing unsuccessful treatment in case it occurs. Psycho-cognitive teachings such as opening the situation for infertile couples can probably help them in overcoming and controlling the natural emotional distress brought about by treatment failure (Bunting & Boivin, 2007).

Other researchers have also pointed to the importance of psycho-cognitive intervention in preparing for pregnancy. The results of studies conducted by Damer et al., (2000) Noorbala et al., (2007) and Newton et al., (1999) show the effect of psychological intervention and psychotherapy on psychiatric disorders and the rate of success of pregnancy among infertile couples, study revealed that the intervention group had lower anxiety and depression and higher pregnancy rate and good marital satisfaction rates. Other studies show that psycho cognitive therapy (behavioral, cognition and psychotherapy) during the process of diagnosis and treatment, especially prior to IVF therapy and pregnancy testing, can result in higher rates of pregnancy and the use of psychological treatment can increase the chance of pregnancy even after six months follow-up (Boivin, Griffiths & Venetis, 2011).

**Summary of the above findings**

Infertility is the failure to achieve pregnancy after a year of frequent, unprotected intercourse. It is prevalent in approximately 10% to 20% of couples. Infertility is divided into primary and secondary infertility. Several centers have reported different
causes for infertility. It has been reported that 40% of infertilities were related to men, 
40% to women and 20% to both sexes.

In a review of the literature, it was found that infertility-related stress increased 
depression, irrational beliefs, defense mechanism, marital conflicts, decreased sexual 
satisfaction, sexual functioning, life quality, self-efficacy, intimacy and health.

In this part the inter relationships among outcome variables like depression, irrational 
beliefs and infertility has been reviewed. The previous studies have shown positive 
relationship between depression, irrational beliefs and infertility.

Several studies showed that depression increases with duration of infertility and there 
was a trend of increasing psychological stress with lengthening of infertility time. 
Based on depression scales, infertile patients depending on the duration of treatment 
patient showed different level of depression symptoms. Who were in infertility 
treatment to long time showed less symptoms than those who are in their first stage of 
their problem.

Further, depression may affect infertility treatment, follow-up and hope for the future; 
it may also influence the intensity and longevity of relationship of the affected couple.

The results of a systemic review about woman's emotional reactions to IVF indicated 
that unsuccessful treatment raised the women's level of negative emotion, which 
continued after consecutive unsuccessful cycles and when IVF resulted in pregnancy, 
the negative emotions disappeared.

Many studies have reported that the effectiveness of infertility treatment depends on 
both the success rate of the treatment facility and the emotional well-being of the 
women seeking treatment, infertility-related stress may decrease the chances of 
conception but the role of irrational beliefs and depression relative to the outcome of 
in fertility treatment is controversial. While some studies report that increased 
depression levels may result in a lower pregnancy rate.

Studies showed that infertile women use more irrational beliefs than fertile women. 
Different studies have shown the beneficial effects of psychological treatments not 
only in adapting to unsuccessful treatments but also in reducing stress and bringing 
about successful pregnancy. Studies suggested applying cognitive behavior
intervention in the infertility centers to reduce the psychological pressures on women facing infertility to help them to enhance fertility chances.

**RATIONAL EMOTIVE BEHAVIOR THERAPY (REBT):**

The essential premise of rational emotive behavioral therapy (REBT) is that people cause themselves distress and dysfunction by their habitual irrational beliefs, and that these maladaptive thinking patterns can be changed, with resultant improvement in emotional states and functioning. Therapy involves training patients in rational self-analysis to help them become aware of their thought patterns, followed by teaching them how to see their reactions in more constructive (i.e., rational) terms. They then have daily relearning exercises during which they practice their new thinking patterns—termed rational emotive imagery—several times a day (Rosner, 2011). The theory of REBT is based on the following series of psychological premises (Patterson, 1966).

1. Human beings are both rational and irrational. When humans act rationally they are more effective and happier than when they act irrationally.
2. Human psychological/emotional disturbance is due to human irrationality. Thoughts and emotions are inextricably linked; thoughts entail emotions, so that irrational thinking is accompanied by irrational (i.e. maladaptive, inappropriate, unrealistic) emotions.
3. Irrational thinking has its origins in early life, particularly in our early experiences with our parents and with our society’s culture.
4. Human thinking is symbolic, usually verbal, in nature. Our thoughts are our self-talk, the things we say to ourselves. Because thinking and emotion are linked, what we tell ourselves in our internal self-talk elicits emotions. When we engage in irrational thinking, what we are telling ourselves will elicit irrational (i.e. maladaptive, inappropriate, unrealistic) emotions. When we engage in rational thinking, our self-talk will elicit rational (i.e. adaptive, appropriate, realistic) emotions. Human psychological/emotional disturbance is the result of human irrational thinking. Persistent psychological/emotional disturbance, i.e. neurosis or other mental disorders, result from persistent irrational thinking. To overcome emotional disorders, it is not enough to understand the origins of our irrational
thoughts; the irrational thoughts must be extinguished and replaced by rational thoughts.

5. Human psychological/emotional disturbance is not due to external events and circumstances, it is due to the irrational thinking that accompanies those events and circumstances. Our irrational thinking distorts our perception and interpretation of external events. It is what we tell ourselves about external events (not the events themselves) that cause our psychological/ emotional disturbance. Our irrational thoughts elicit our irrational emotions.

6. One can attack, challenge, and refute our irrational thinking (perceptions and interpretations) of external events. By replacing our irrational thoughts about external events with rational thoughts, we can replace our irrational (i.e. maladaptive, inappropriate, unrealistic) feelings with new rational (i.e. adaptive, appropriate, realistic) feelings. Through REBT, a therapist can teach a client to realize that the client’s irrational thinking (perceptions and interpretations) of external events cause the client’s psychological/ emotional disturbance. Through REBT, a client can learn how to attack, challenge, refute his irrational thinking (perceptions and interpretations) of external events and replace them with new rational thinking. Through the on-going practice and application of REBT, a client can reduce his irrationality and improve his effectiveness and happiness.

According to the ‘‘ABCDE’’ model (David & Szentagotai, 2006; Ellis, 1994) often people experience undesirable activating events (A), about which they have rational and irrational beliefs/cognitions (B). These beliefs lead to emotional, behavioral, and cognitive consequences (C). Rational beliefs (RBs) lead to adaptive and healthy (i.e., functional) consequences, whereas irrational beliefs (IBs) lead to maladaptive and unhealthy (i.e., dysfunctional) consequences. Once generated, these consequences (C) can become activating events (A) themselves, producing secondary (Meta) consequences (e.g., meta-emotions: depression about being depressed) through secondary (meta-cognitions) RBs and IBs. Clients who engage in REBT are encouraged to actively dispute (D) (i.e., restructure) their IBs and to assimilate more efficient (E) RBs, to facilitate healthy, functional, and adaptive emotional, cognitive, and behavioral responses. The ABC(DE) model was been recently expanded by including the concept of unconscious information processing (David, 2003) More
precisely, sometimes cognitions are not consciously accessible, insofar as they are represented in the implicit rather than the explicit memory system (David, 2003).

REBT overlaps with the cognitive-behavioral therapies (CBTs) of Aaron Beck (1976), Meichenbaum (1994), Barlow (1996), and other therapists. But, as Ellis (2004) has noted REBT not only shows clients how they think, feel, and behave irrationally, and how to become more preferential and less absolutistic, but it also actively and steadily keeps teaching them three main “rational” philosophies:

1. People can choose to have unconditional self-acceptance (USA) in spite of their failings at important tasks and their being rejected by significant people. Why? Because they simply and strongly can refuse to damn themselves for their doings.

2. People can choose to have unconditional other-acceptance (UOA) in spite of the frequent “bad” behavior of others. Just as they refuse to rate their selves for their effective and ineffective thoughts, feelings and acts, they can do the same for others. If they do so, they have Compassion for others by accepting them, but not their sins. They often hate what people do, but not the persons who do what is hateful.

3. People can choose to have unconditional life-acceptance (Takefman, Brender, Boivin, & Tulandi, 1990) in spite of the frequent unfortunate life conditions. They can accept their life when it is replete with adversities and still decide to be as happy as they can be in spite of these adversities. They can choose to focus on whatever is joyous and fortunate in the many things available in life, to change the changeable things, and observe and dislike the unchangeable things they cannot change, and have wisdom to know the difference. Life may never be as happy as they would like it to be, but they can still lead a reasonably good existence (David et al., 2009).

REBT Concepts

In the proposed model of personality, A refers to the trigger or event such as having an argument with a significant other. B serves as the client’s belief system about the event. For instance, the person who had an argument might believe that the rest of his day has been ruined because of the argument he had earlier on. On the other hand, C represents the consequence which can either be adaptive or maladaptive depending on whether the A or event is perceived rationally or irrationally and the emotions arising
as a result (Corey, 2012). If the event is perceived rationally, then adaptive or constructive behavior is portrayed e.g. relaxation, meditation or effective coping strategies, and the person moves on with the rest of the day (Willson & Branch, 2006). However, if irrational thoughts (such as people should or must not argue with me) is attached to such events then problematic behavior is evident in the individual; this is where psychological, behavioral and emotional problems start emerging from (Corey, 2012). Willson et al., (2006) lists a few examples of the consequences that can arise from these irrational beliefs which range from drinking to depression amongst many other disturbances which can be observed in day today life.

Irrationality seems plausible in some cases, it does not account for all psychological, behavioral and emotional problems, and hence, the theory should have either acknowledged this limitation or implemented the theory to account for other causal factors. As noted by Bennet (2006) there are various causes of psychological, behavioral and emotional problems which can be accurately accounted for by the Biopsychosocial model. For example, if a family has a history of depression, future generations are likely to inherit this biological disposition. However, whether an individual from this background develops depression will also be determined based on psychological factors such as consistently having irrational thoughts and, whether they have a good social support network and effective coping skills.

Another perspective ignored is the role played by General Medical Conditions and as demonstrated, hypothyroidism, stroke and Multiple Sclerosis also cause depression; and all disorders also have their corresponding General Medical Conditions DSM-IV-TR (2000). This violates the APA (2002)code which encourages psychologists to work using information that has been illustrated to be effective, as it ignores and limits itself to evidence in support of REBT and fails to consider others factors.

**REBT Goals**

Since REBT theorists believe that problems for individuals are caused by the beliefs they hold (Corey, 2012), it is no wonder that their therapeutic goal is to help clients develop a more positive outlook and the maintenance of positive cognitions by restructuring the irrational thoughts and beliefs they hold (Corey, 2012). Another method used to combat these irrational goals is the tracking of cognitions so that the person may know when they start thinking irrationally and to take immediate action
before these thoughts lead to maladaptive behavior, by schema restructuring (Corey, 2012).

REBT also goes a step further by helping clients decide how to use their newly acquired knowledge in the future as opposed to becoming dependent and going to therapy every time things start going wrong in their lives (Corey, 2009); which is in line with the APA (2002) notion of fostering autonomy in the client. Another strength of REBT is that it is deemed to be the most effective form of Psychotherapy when combined with medication, in quite a number of clinical disorders and especially when it comes to treating depression (Bennett, 2006).

Since REBT therapists believe that restructuring of thoughts dramatically changes the persons behavior and feelings, during therapy, the practitioner takes on the role of a teacher focusing on generating insight in order to see how their irrational thoughts and negative self talk have contributed to the problems they are currently experiencing, better known as psycho education (Corey, 2009). Reconstructing negative to positive emotions can have a congruent positive effect on both cognition and behavior, which reinforce a person’s attitude (Cottam, Dietz-Uhler, Mastors, & Preston, 2009). In a study by Staw et al., (1994) discovered that positive emotions had a positive influence on work.

According to REBT, we have the ability to be both rational and irrational though, we are inclined to thinking irrationally (Corey, 2012). For this reason REBT therapists aim to change this self talk which they believe will also change subsequent behavior and the emotions or feelings associated by both cognitions and behavior (Mkangi, 2010).

According to the rational-emotive behavior theory (REBT) of mental health and disturbance, emotional problems and self defeating behaviors are learned maladaptive responses resulting from faulty thinking patterns. For many years, Ellis (1994) has cogently argued that diverse manifestations of psychopathology are the outcome of holding irrational beliefs. When assessing people’s psychological problems, REBT therapists and theorists rely on the ABC model, a framework that has strong commonalities with other cognitive-behavior approaches.
The main components of this model are: Activating events (A), which refers to events that the person is potentially able to discern and attend to (Dryden & Branch, 2008). Activating events can be: (1) objective situations; (2) present thoughts, feelings, and behaviors related to objective situations and past or future thoughts and memories that are in some way related to the present situation (David & Szentagotai, 2006). Internal events, such as the experience of pain, can also comprise situations that provoke distress (Dryden & Branch, 2008).

The dimension of the A is important in REBT, because it differs from other forms of cognitive-behavior therapy (CBT), is that inferences (cognitions that exist along a true-false continuum) are included as activating events. Dryden (2003) has renamed A as adversity, representing the inference that can be drawn about the activating event. Activating events trigger the person’s Beliefs (B), which, according to REBT, are fully and explicitly evaluative. One of the central tenets of REBT is that beliefs that mediate the Consequences (C) that the person experiences, which can be emotional, cognitive-behavioral, and physiological in nature. Whereas rational beliefs lead to functional consequences, irrational beliefs lead to dysfunctional ones (David & Szentagotai, 2006).

Although in his earlier works Ellis describes 11 types of irrational beliefs (Ellis, 1962) later developments suggest that they fall into 4 main categories: (1) demandingness (DEM), (2) awfulizing (AWF), low frustration tolerance (LFT), and (4) global evaluation/self or other-downing (GE/SD). These four types of irrational beliefs cover various content areas (e.g. performance, comfort, affiliation) and can refer to ourselves, others, or life in general (David, David, Ghinea, Macavei, & Eva, 2005). The alternative rational beliefs are: (1) preferences, (2) antiawfulizing, (3) high frustration tolerance, and (4) unconditional self/other acceptance. REBT also specifies the relationships among these beliefs (Ellis, 1994), namely that both rational and irrational beliefs consist of a primary and secondary belief. Whereas the former expresses the demanding or preferential nature of the belief, the latter conveys a personally meaningful context or theme (W. Dryden & Branch, 2008; MacInnes, 2004). An example would be: I must get the highest grades in my class (primary belief—DEM), and I cannot stand it if I don’t (secondary belief—LFT).
The Behavioral Consequences of Demandingness in Ellis’s words, demands are “commands on the universe to be the way you want it to be” (DiGiuseppe, 1996). As rigid assertions of desires, demands are beliefs characterized by a dogmatic insistence that a certain condition must or must not exist. Such absolutistic requirements are commonly expressed in the form of ‘‘must,’’ ‘‘ought,’’ absolute ‘‘shoulds,’’ ‘‘have to,’’ and so forth. Demands concern oneself, others, and life conditions. The rational alternatives of demands are full preferences, which are flexible assertions of what the person wants, coupled with the acceptance of the fact that we cannot insist absolutely that we get what we want; hence, the demanding element is negated (David et al., 2009). Demandingness is viewed as the core (or root) irrational belief from which the other irrational beliefs stem (Ellis, 1994). However, this assumption is clinically derived, and has not yet received sufficient and definite empirical support (David et al., 2005; DiGiuseppe, 1996). In response to the lack of empirical investigation into the primacy of demandingness, Ellis (2003 a) often offers what is fundamental common sense: How can a derivative exist (Such as awfulizing, LFT, or self-downing) in the absence of a demand? It is unlikely that these derivatives (e.g., awfulizing) would stem from a full preference. For example, if people strongly prefer to be approved of by others but recognize that they cannot insist on or guarantee approval, then being disapproved of cannot be evaluated as a truly awful experience. 

What has been established, however, is the role of demandingness in generating a range of unhealthy negative (dysfunctional) emotions (David et al., 2005; David et al., 2002). According to Ellis (2003 a), there are three main types of demands that create problems for people: (1) demands that they should perform well, (2) demands that others must treat them nicely, and (Brugh et al.) demands that living conditions must be free of hassles and that life should be fair. Our can use this distinction in extracting the behavioral consequences of demandingness.

Demands on the behavior of the self (e.g. ‘‘I must achieve,’’ ‘‘I must be competent,’’ ‘‘I must act perfectly’’) have been associated with self-defeating behaviors such as comfort eating, medication use, the tendency to engage in routine or repetitive behaviors (N. Harrington, 2005), and reduced attempts to inhibit aggression (Bernard, 1998). Also, behavioral demands are predictive of interpersonal behavioral difficulties such as relational problems, and social avoidance and isolation (Watson, Sherbak, & Morris, 1998).
A significant amount of research has documented the link between a demand of self-oriented perfectionism and maladaptive behaviors such as disordered eating (Pearson & Gleaves, 2006; Sherry, Hewitt, Besser, McGee, & Flett, 2004); alcohol abuse (Hewitt & Flett, 1991); problems in interpersonal interactions (Haring, Hewitt, & Flett, 2003); suicide (Blatt, 1995); diminished task performance (Frost & Marten, 1990); and reduced willingness to discuss and share personal results on various tasks with others (Frost et al., 1995).

Harrington (2005) conducted a study with non psychotic psychiatric patients to study demands for personal comfort (e.g., beliefs that life should be free of hassles and inconvenience) and entitlement/fairness (e.g., beliefs that life should be fair, and that one should enjoy immediate gratification), and their relation to maladaptive behaviors. Harrington (2005) determined that individuals holding comfort and/or entitlement beliefs were prone to self-defeating behaviors, including self-harming, behavioral avoidance, comfort eating, the use of medication, overspending, and procrastination. Procrastination has been previously linked to irrationality in general and demandiningness in particular in both clinical and nonclinical populations (Beswick, Rothblum, & Mann, 1988; Bridges & Roig, 1997). Demands for comfort, fairness, and approval are also related to the expression and control of anger. As these demands increase, anger control diminishes, while relationship problems (Addis & Bernard, 2002) and behavioral expression of anger-aggression increases (Bernard, 1998).

REBT distinguishes between couple dissatisfaction, which consists of moderately intense negative emotions and rational beliefs, in one or both partners, and couple disturbance, which consists of highly intense negative emotions and irrational beliefs experienced by one or both partners (Addis & Bernard, 2002). According to REBT, relationship disturbances stem from unrealistic expectations characterized by irrational demands for approval and performance, which partners tend to express in terms of each other and the marital relationship itself (Ellis, 2003b).

Clinical observations suggest that failing to meet these irrational demands (by self or by the partner) leads to awfulizing, underestimating the ability to cope with problems (low frustration tolerance), and to blaming the self or the other person (Ellis,
Thus, the REBT hypothesis that demandingness is at the heart of psychological disturbance has a broad and solid foundation (David et al., 2009).

**The Behavioral Consequences of Awfulizing/Catastrophizing**

Awfulizing beliefs refer to the extreme dichotomous evaluation of a negative event as worse than it absolutely should be. Awfulizing beliefs exaggerate the consequences of past, present, or future events, conceptualizing people or events as terrible, horrible, or the worst thing that could happen (MacInnes, 2004). A person who holds an awfulizing belief is unable to allow for the fact that there are worse possible present or future outcomes (Dryden, 2003).

According to the REBT theory, awfulizing derives from demandingness: when people do not get what they believe they are entitled to have children, they conclude that ``it is awful'’ (R. DiGiuseppe, 1996; W. Dryden & Branch, 2008). Anti-awfulizing beliefs are the rational counterparts of awfulizing. They refer to the evaluation that when people’s full preferences are not met, they conclude that the circumstances may be ‘‘bad’’ but not awful. This approach allows for the fact that worse outcomes are possible (W. Dryden & Branch, 2008) and relies on a continuum of badness, rather than a dichotomous judgment of either awful or not bad at all.

Whereas the relationship between awfulizing and dysfunctional emotions has received extensive attention in the REBT literature (David et al., 2002) significantly less research has focused on the impact of awfulizing on overt behavior. The rational-emotive behavior theory of emotions has traditionally tied awfulizing to the experience of anxiety (David, 2003), although clinical anecdotes suggest that awfulizing can pervade most if not all emotional problems, including unhealthy anger, depression, shame, guilt, and hurt (Dryden & Branch, 2008). Ellis distinguishes between two major forms of anxiety: ego and discomfort anxiety (Ellis, 2003c) both of which have to do with awfulizing. Discomfort anxiety results when people feel that: (1) their comfort is threatened, (2) they must get what they want, and that it is awful or catastrophic when they do not get what they demand. In contrast, ego anxiety appears when people feel that: (1) their self or personal worth is threatened, (2) they must perform well and/or be approved by others, and that is awful or catastrophic when they fail to perform well and/or are not approved by others. In Ellis’s opinion, these two constructs help explain several phenomena related to emotional disturbance.
(Ellis, 2003c) including a range of self-defeating behaviors (e.g., avoidance). However, Ellis’s assumptions are based primarily on clinical observations, rather than empirical data. Awfulizing also influences the experience and control of anger (Hazaleus & Deffenbacher, 1985; Zwemer & Deffenbacher, 1984). High levels of awfulizing are related to both unhealthy anger suppression and to aggressive anger expression (Martin & Dahlen, 2004).

The Behavioral Consequences of Low Frustration Tolerance

Low Frustration Tolerance (LFT) beliefs assert the fact that one cannot tolerate or bear an event or set of circumstances, thereby making a situation appear to be intolerable (David et al., 2009). As in the case of awfulizing, many REBT theorists hold that low frustration tolerance stem from demands—when people do not get what they believe they must get, they conclude that the situation is intolerable and they cannot stand it (Dryden & Branch, 2008). On the other hand, high frustration tolerance beliefs assert that events may be difficult to tolerate, but they are not intolerable. According to REBT, low frustration tolerance discourages people from contending with unpleasant circumstances, and short-circuits their ability to confront obstacles to goal-attainment. Alternatively, high frustration tolerance promotes active efforts to confront or eliminate obstacles to happiness and achievement (Dryden & Branch, 2008). Martin and Dahlen’s (2004) study of college students determined that low frustration tolerance is related to trait anger the aggressive expression of anger and inversely related to the tendency to control the outward expression of anger. Harrington (2005) links low frustration tolerance beliefs to a variety of mal adaptive coping mechanisms such as behavioral avoidance, procrastination, comfort eating, overspending, the use of medication, and self-harm.

The Behavioral Consequences of Global Evaluation/Self-Downing

People exhibit a natural tendency to make global evaluations (i.e., over-generalize) about themselves, others, and the world. This tendency is probably a result of the cognitive system’s innate ability to generalize rapidly from specific occurrences to facilitate learning or ensure safety, for example. More specifically, people tend to draw global, stable, and more or less definite conclusions based on low-frequency behaviors.
or events. From a logical point of view, this process can yield erroneous inferences, so no firm and general conclusions can be drawn based on inductive reasoning (David, 2006b).

Self-downing refers to making global negative evaluations about oneself (The fact that I failed in the exam proves that I am a failure). The person evaluates a specific trait, behavior, or action according to standards of desirability or worth and then applies the evaluation to himself or herself (MacInnes, 2004). When such negative overgeneralizations are applied to others or the world, it is called other-downing and world-downing, respectively. The rational correspondent of self-, other-, and world-downing is unconditional self-, other-, and world-acceptance. With regard to unconditional self acceptance, a person understands that although people do bad or stupid things, they cannot be globally rated as bad or stupid, and that people’s fallibility and foibles (including the self) must be accepted. REBT teaches that people are valuable in themselves, even though their behaviors may not always be laudable; however, unconditional self-acceptance does not mean that individuals do not strive to change or improve their behavior when it is called for (maladaptive behaviors) (David et al., 2009).

Ellis and other REBT theorists (Dryden, 2003) suggest that self-downing also results from demandingness. When people do not get what they believe they must get, and they attribute this failure to themselves, they will tend to engage in global self-condemnation, rather than disapprove of a specific behavior. To date, researchers have failed to secure support for this contention. Factor analytical studies have found that self-downing beliefs and demands, awfulizing, and LFT load onto different factors (DiGiuseppe, Leaf, Exner & Robin, 1988), contrary to REBT theory. That is, acceptance beliefs are somehow independent of other irrational beliefs. One possibility is that conditional acceptance beliefs are especially easy to access. David et al., (2009) found that clients who depress themselves are quick to identify that they are worthless or a failure, but less able to readily establish what demand they fail to achieve.

Self-downing is one of the irrational beliefs that exhibits the highest correlations with emotional disturbance and negative affect (DiGiuseppe, 1996; DiGiuseppe et al., 1988). Unconditional self-acceptance is positively correlated with happiness and life satisfaction, and negatively correlated with dysfunctional emotions such as depression.
and anxiety (Chamberlain & Haaga, 2001a). In fact, the hypothesis that unconditional self-acceptance is associated with emotional well-being has been one of the core assumptions of REBT for decades.

Early theories of feelings focused mainly on the role of physiological factors such as arousal (Cannon, 1927; Ekman, 1992). Although early theories offered important insights into the mechanisms (e.g., physiological) involved in generating emotions, they did not cover the gamut of these mechanisms. More recent theories, however, have included cognition as a major component of affect (Smith & Lazarus, 1993). Indeed, the relation between emotion and cognition is one of the central themes of modern psychological science. Because rational and irrational beliefs are a particular type of cognition, research relating rational and irrational beliefs to feelings can be considered part of the cognitive approach to emotions (David et al., 2009).

Several lines of research can be identified that fall within the cognitive approach. The first line of research (Schachter & Singer, 1962) explores the role of representational cognitions (how we represent the environment in our mind)—namely cold cognitions such as schemata, attributions and automatic thoughts—in human feelings. The second line of research (Smith & Lazarus, 1993) explores the role of appraisal in human feelings. Cognitions associated with appraisal are not representational, but evaluate the personal significance of transactions in the environment and/or representational cognitions. The third line of research (LeDoux, 2000) focuses on the role of unconscious information processing on human feelings.

David et al., (2003) have proposed that it is possible to integrate these diverse research streams in terms of the distinction between ‘‘hot’’ and ‘‘cold’’ cognitions. Abelson and Rosenberg (1958) use the terms hot and cold cognitions to distinguish between appraising (Menezes et al.) and knowing (cold). Cold cognitions refer to the way people develop representations (be they conscious and/or unconscious) of relevant circumstances (i.e., activating events), whereas hot cognitions refer to the way people process and evaluate (consciously and/or unconsciously) cold cognitions in terms of their relevance to personal well-being (David & McMahon, 2001; David et al., 2002).

Consequently, during a specific activating event, there seem to be four different possibilities for how cold and hot cognitions regarding the activating event can be
related (David, 2003): (1) distorted representation of the event/negatively appraised, (2) non-distorted representation/ negatively appraised, (3) distorted representation/non negatively appraised, and (4) non-distorted representation/non-negatively appraised. Although earlier research has suggested that cold cognitions are strongly related to emotions (Schachter & Singer, 1962), it is now generally accepted that as long as cold cognitions remain unevaluated, they are insufficient to produce emotions (Smith et al., 1993).

According to Lazarus (1991) appraisal theory of emotions, although cold cognitions contribute to appraisal, only appraisal itself results directly in emotions. Accordingly, the effect of cold cognitions (conceptualized as distal causes) on emotions seems to be influenced by hot cognitions (conceptualized as proximal causes). More precisely, the way we represent—by cold cognitions—activating events in our mind depends on the interaction between activating events and our rational and irrational beliefs. Cold cognitions may generate various operant behaviors, and then both cold cognitions and operant behaviors may be further appraised in a rational/ irrational manner, generating feelings and psycho-physiological responses (David et al., 2009).

Ellis’s cognitive theory of emotion (i.e., REBT theory of feelings) that centers on the role of rational and irrational beliefs in human feelings falls within the appraisal paradigm in attempting to integrate cold cognitions with the cognitive unconscious. The REBT efforts at such integration will be elaborated in the following section (David et al., 2009).

**REBT Theory of Feelings**

According to REBT, people experience undesirable events (A) about which they have rational or irrational beliefs. Irrational beliefs are defined as evaluative beliefs that are not empirically supported, non pragmatic, and/or illogical. Rational beliefs, on the other hand, are empirically supported, pragmatic, and/or logical. Rational beliefs promote functional (healthy/appropriate/adaptive/rational) feelings, whereas irrational beliefs promote dysfunctional (unhealthy/ inappropriate/ maladaptive/irrational) feelings (David, 2003).
Ellis originally suggested the distinction between functional and dysfunctional feelings and their intensity (Harper & Ellis, 1961). Dysfunctional negative feelings (e.g., anger, depressed mood, anxiety, guilt) are more intense and related to irrational beliefs, whereas functional negative feelings (e.g., annoyance, sadness, concern, remorse) are generally less intense and related to rational beliefs (David et al., 2009).

David et al., (2002) found that high levels of irrational beliefs generate dysfunctional feelings (e.g., depressed mood, anxiety), whereas low levels of irrational beliefs (interpreted as rational beliefs) generate functional feelings (e.g., sadness, concern).

Relationship between rationality of beliefs and emotionality has been mainly studied in relation to verbal reports of feelings (David et al., 2009).

According to REBT, rational beliefs should be accompanied by biological indicators of health, whereas irrational beliefs should be accompanied by unhealthy biological indicators of maladaptive or disease-related physiological responding. Indeed, Papageorgiou et al.,(2006) found that irrational beliefs were positively associated with C-reactive protein, interleukin-6, tumor necrosis factor-alpha, and white blood cells; these results remained significant after controlling for age, sex, years of school, body mass index, physical activity status, depression level, and food items. The results suggest that irrational beliefs are associated with indicators of increased inflammation, among apparently healthy people. Therefore, future studies should focus on the psycho physiological concomitants of beliefs, using a variety of measures of rational and irrational beliefs, and biological indicators of health and disease.

In summary, existing data on the effects of REBT on health outcomes are consistent with the hypothesized link between irrational beliefs and health outcomes. However, insufficient empirical data exist to draw definitive conclusions concerning the role of irrational beliefs in REBT effectiveness. There is growing support for the influence of irrational beliefs on health outcomes, and for positive effects of REBT on health outcomes. However, none of the studies we reviewed have conducted a comprehensive formal analysis including an REBT treatment, assessments of irrational beliefs, and evaluations of health outcomes within the same study.
Considering the literature reviewed, and REBT theory, there appear to be at least three possible pathways through which irrational beliefs might affect health outcomes. First, irrational beliefs may influence health outcomes directly. Second, irrational beliefs may influence health outcomes indirectly through their effect on psychological distress. Third, irrational beliefs may influence health outcomes indirectly through their effect on response expectancies (David et al., 2010).

David et al., (2010) elaborate on each of these possibilities in turn, using the outcome of pain as an illustrative example. First, irrational beliefs, such as catastrophizing, may directly contribute to increased experiences of pain. In other words, a thought, like ‘‘the pain will be horrible,’’ could lead to more intense pain experiences. This pathway does not assume further psychological mediation, and suggests that reducing irrational beliefs should directly improve health outcomes.

Second, the relationship between irrational beliefs and pain may be mediated by psychological distress. In other words, increased irrational beliefs result in increased distress, which in turn results in increased pain. For example, the thought, ‘‘the pain will be horrible,’’ leads to anxiety, and anxiety increases pain. This notion is supported by studies which have found that emotional factors, particularly anxiety, depression, and hostility are related to both irrational thoughts and health outcomes (i.e., the severity of asthma) (Silverglade et al., 1994). However, other literature suggests that emotional distress may not account for all the effects of irrational beliefs on health (Papageorgiou et al., 2006). This meditational pathway suggests that reducing either irrational beliefs or psychological distress should improve health outcomes.

Third, the relationship between irrational beliefs and pain may be mediated by response expectancies. Response expectancies are defined as expectations for non-volitional outcomes. For example, an expectation that one will experience pain is response expectancy; expectations that one can lift one’s arm or that it will rain today are not. Response expectancies are viewed as automatic and self-reinforcing (Kirsch, 1990). There is now strong empirical evidence supporting the association of response expectancies with a wide variety of health outcomes in experimental and clinical samples (Roscoe et al., 2006). This pathway would suggest that increased irrational thoughts result in increased expectancies for pain, which in turn result in increased pain. For example, the thought, ‘‘the pain will be horrible,’’ leads to an expectancy of
more intense pain, and this expectancy leads to increased experienced pain. This meditational pathway suggests that reducing either irrational beliefs or response expectancies should improve health outcomes.

Each of these pathways can potentially be tested through correlation or experimental designs. For example, a correlation design would examine relations between irrational beliefs, psychological distress and response expectancies. Using such a design, David et al., (2010) research has supported the hypothesis that irrational beliefs in part may operate through response expectancies.

David et al., (2010) investigated the contribution of response expectancies and irrational beliefs (both general and exam-specific) to exam-related distress in college students using a prospective design. In a sample of 105 undergraduates, their findings revealed that both response expectancies and general irrational beliefs separately predicted exam related distress. Observed effects of general irrational beliefs were perfectly mediated by response expectancies, and observed effects of exam-specific irrational beliefs were partially mediated by response expectancies. Though the study was not focused on health outcomes, these data support the view that response expectancies may mediate the effects of irrational beliefs. In a study of 120 undergraduates, response expectancies partially mediated the effects of catastrophizing on experimentally induced pain (immersing one’s arm in ice water) (Sullivan et al., 2001).

David et al., (2009) have demonstrated, emerging evidence suggests that irrational beliefs may play a role in directly influencing health outcomes, as well as perhaps in directly affecting those outcomes through mediators such as psychological distress or response expectancies. David et al.,(2009) opined that although the literature on irrational beliefs and physical health is not as developed as one might like it to be, the situation is not AWFUL; there is enough evidence to encourage and support further investigation in this area. REBT “is perhaps the one of the therapeutic system that directly tackles our confrontation with reality” (Rothschild, 1993). REBT arms us in our struggle with this aspect of reality by providing us with two weapons: a willingness to accept reality, combined with an unwillingness to accept our irrational interpretations of that reality. In other words, “it is far better to focus on how to have inner control rather than decry the reality that events occur without our permission”.

71
**Evaluation of REBT**

REBT has not been extensively evaluated in controlled studies. Nonetheless there is a body of knowledge supporting its efficacy and effectiveness, including cost-effectiveness. Rosner (2011) in a meta-analytic study concluded that the efficacy of REBT appeared to be comparable to both cognitive behavior therapy (CBT) and systematic desensitization. Study reported that standard deviation of results as quite large, suggesting considerable variability among individuals in treatment response, raising an interesting question about what kind of person does best with this kind of treatment. Recently Sava et al., (2009), compared cognitive therapy, REBT and fluoxetine for major depressive disorder in a randomized clinical trial. They found significant improvement and comparable results for all three treatments at 6 months follow-up. They addressed the issue of cost-effectiveness dividing the total cost by the number of depression-free days and quality-adjusted life years. The two psychotherapies were found to be more cost effective than pharmacotherapy.

REBT was not used in isolation, but implemented along with a variety of other interventions involving relapse prevention, problem-solving, assertiveness, relaxation and other techniques. The approach of REBT differs from other forms of therapy in that its goal is a new philosophical outlook, rather than just a different mode of interpreting life events (Rosner, 2011). The main questions raised have to do with the validity of the assumptions underlying REBT; it is important to keep in mind that not all of these have not been tested and validated. There is some evidence that irrational beliefs are related to psychological disturbance and maladaptive behaviors. Chang & Bridewell (1998) found a significant association between irrational beliefs and pessimism in college students. Zeigler & Leslie (2003) found empirical support for the ABC model underlying REBT by using a questionnaire to study college students. They found correlations between high scores on irrational thinking, awfulizing, and low frustration tolerance and the students’ reports of experiencing daily hassles (a marker for stress). It is not very clear whether people who have only rational beliefs are more effective and happier than people who have both rational and irrational beliefs. Similarly, it simply is not true that all human emotional/psychological illness is unrelated to actual external events: physically traumatic brain injury, exposure to neuro-toxins, metabolic diseases, cerebro-vascular accidents, and brain tumors are all
actual external events that have severe impact on emotional/psychological functioning (Rosner, 2011).

*The role of irrational beliefs in the rational emotive behavior theory of depression:*

REBT is presently one of the most widely practiced forms of cognitive behavioral psychotherapy (Ellis & Dryden, 1997). A large number of psychotherapy outcome studies support the efficacy and effectiveness of this form of therapy with a wide range of clinical disorders (R. A. DiGiuseppe, Miller, & Trexler, 1977; Haaga & Davison, 1993; Kendall et al., 1995). REBT practice is based on a model of change that has also undergone more and more extensive empirical investigation (Macavei, 2005). According to this model, psychopathology is a result of people endorsing irrational beliefs that sabotage their goals and purposes. It is considered that at the basis of all human disturbances lies the tendency of making devout, absolutistic evaluations of perceived events that come in the form of dogmatic “musts” or “shoulds” (Ellis & Dryden, 1997). The major derivatives of these “musts” are awfulizing, low frustration tolerance and self-downing. Awfulizing occurs when an event is rated as being more than 100% bad. Low frustration tolerance means the person believes that no happiness is possible if the unwanted event actually takes place. Self-downing refers to the tendency of labeling oneself, other people or life as being “worthless” or “bad” if failure occurs (Ellis & Dryden, 1997).

Accordingly, to Kendall et al., (1995) depression stems from a combination of irrational beliefs, demandingness and self-downing in particular. In other words, the person believes that he/she must be competent, achieving etc. at all times otherwise he/she is worthless as a human being. To change their dysfunctional depression people have to stay with their preferences for success, approval, justice, and comfort, and avoid turning these preferences into absolutistic demands. This way, even though their wishes are not fulfilled, people will only experience functional sadness (Ellis & Dryden, 1997).

Early studies testing the effectiveness of the REBT model of depression have shown a reduction in both irrational beliefs and other treatment outcomes that could support the REBT theory of change (Lipsky et al., 1980). However evidence supporting the REBT theory of depression is limited in a number of ways. Firstly, early irrational beliefs measures lacked discriminate validity; many items of these instruments
referred to emotions rather than cognitions, therefore correlations with other measures of negative affect were to be expected (Smith, 1989). Secondly, studies did not include ordinary sadness group, which made it impossible to determine what was specific for major depression in terms of irrational beliefs (Solomon, 1998). Thirdly, the lack of a recovered depressed group made it difficult to determine whether irrational beliefs were a causal factor or a non-causal correlate of depression (Solomon, 1998). Fourthly, irrational beliefs measures provided a global score of irrationality, which limited the conclusions about the impact of different types of IBs on depressive symptoms (Macavei, 2005). Some of these limitations were addressed in a number of studies, which led to conclusions supporting the hypothesis that clinically depressed people and depression-prone individuals significantly exceed controls in irrational beliefs (McDermut et al., 1997; Solomon et al., 2003). There is less evidence supporting the causal role of IBs in the case of depressive symptoms (Solomon et al., 2003).

Macavei (2005) compared a clinically depressed group (people with a diagnosis of Major Depression), a Dysphoric group (people with elevated depressive symptoms but no diagnosis of Major Depression) and a Control group (people with no diagnosis of Major Depression or depressive symptoms) on irrational beliefs. Fifty-one persons, aged 15 to 62 participated in the study, nineteen participants, (6 females and 13 males) formed the Control group. They had no diagnosable mental disorder and scored 9 or lower on the Beck Depression Inventory. Seventeen participants, (12 females and 5 males) formed the Clinically depressed group with score 16 or higher on the Beck Depression Inventory and Fifteen participants, (12 females and 3 males), formed the Dysphoric group. Researcher used the Attitudes and Beliefs Scale 2 (DiGiuseppe et al., 1988) and Beck Depression Inventory (Beck, 1979). Results show that the Dysphoric group significantly differs from Controls regarding most of the irrational beliefs and the Major Depression group also significantly differs from Controls regarding most IBs also the Major Depression group significantly differs from the Dysphoric group regarding most IBs. This findings bring evidence for the idea that irrational beliefs accompany depressive symptoms, whether they are of clinical or subclinical intensity and provide a new argument in support of the main assumption of the REBT theory of depression; clinical depression is accompanied by irrationality. Also, irrational beliefs seem to be associated with depressive symptoms,
even when they are of subclinical intensity, being more elevated in case of clinical depression, in comparison to subclinical depression.

**PSYCHOLOGICAL INTERVENTION AND INFERTILITY**

There are two approaches to manage infertility related psychological problems namely medical and psychological. In this section studies on psychological intervention for managing infertility is presented with special focus on Cognitive Behavior Therapy/ Rational Emotive Behavior Therapy (CBT/REBT).

*Cognitive-Behavioral intervention:*

Rational Emotive Behavior Therapy (REBT) is the first form of cognitive behavior therapy (CBT) and was advocated by Albert Ellis in 1955. According to the REBT model, people experience undesirable activating events, about which they have rational beliefs (RBs) and irrational beliefs (IBs). These beliefs then lead to emotional, behavioral, and cognitive consequences. Rational beliefs lead to functional consequences, while irrational beliefs lead to dysfunctional consequences. Infertile women who engage in REBT are encouraged to actively dispute their IBs and to assimilate more efficient, adaptive and rational beliefs, with a positive impact on their emotional, cognitive, and behavioral responses. Thus, REBT is a psychological theory and a treatment consisting of a combination of three different types of techniques (cognitive, behavioral, and emotive) can use to help infertile women to feel better physically and emotionally, and to engage in healthier behaviors.

Tuschen-Caffier, Florin, Krause and Pook (1999) evaluated the impact of a 6-month CBT/REBT for infertile couples. The study included seventeen idiopathic infertile couples were included in the therapy program. The aim of the intervention was to improve chances of conception, sexual functioning and satisfaction. Further, the study aimed at reducing helplessness and to improve communication skills. Pre-post result indicated that the therapy group showed improvement in sperm concentration, reduction in thoughts of helplessness and a decrease in marital distress. By the end of therapy participants practiced timed intercourse more reliably and reported unchanged sexual pleasure and satisfaction during the non fertile period of the menstrual cycle. At the 6-month follow-up, problem-focused thoughts had decreased. The live birth rate was higher in the therapy group than in control samples. Preliminary data suggest that CBT/REBT may be an effective approach for the treatment of infertility.
Faramarzi et al., (2008) compared the effectiveness of CBT with medicine (fluoxetine) to manage depression and anxiety in infertile women. Participants were classified into three groups: CBT group, anti-depressant group, and control group. Twenty-nine participants in the CBT group have received 10 sessions of relaxation training and cognitive restructuring to manage negative automatic thoughts and dysfunctional attitudes. Thirty participants in the anti-depressant (Fluoxetine 20 mg) group received 20 mg fluoxetine daily for 90 days. Thirty control subjects did not receive any intervention. Results indicated improvement as follows: Anti-depressant group 50%, CBT group 79.3%, and control group 10%. The decrease in the CBT group was significantly more than anti-depressant group. Study suggests that CBT was not only a reliable alternative to pharmacotherapy but also was superior to fluoxetine in reducing depression and anxiety of infertile women. Fluoxetine was superior to no therapy in the treatment of depression but not anxiety.

Domar et al., (2000) studied the efficacy of CBT/REBT and standard support interventions on pregnancy rates in women experiencing infertility of less than 2 years’ duration. Sample was one hundred eighty-four women who had been trying to get pregnant for 1 to 2 years. Participants were randomized into a 10-session CBT/REBT group, a standard support group, or a routine care control group. They were followed for 1 year. Results showed that group psychological interventions appear to lead to increased pregnancy rates in infertile women.

Ramezanzadeh, Noorbala, Abedinia, Forooshani, and Naghizadeh (2011) studied the effect of CBT/REBT on depression of infertile couples. The sample consists of 30 infertile couples who are placed randomly into experimental and the control group. Both groups were assessed using by Beck Depression Inventory (BDI). The time lapse between pre-test and post-test was 6 weeks. The experimental group was exposed to CBT/REBT in six sessions. The study indicates that CBT/REBT is effective in decreasing the depression of infertile couples in the experimental group than the control group (p<0.0001) and its effect is considerably higher on women than men (p=0.009). Results suggest to adopt CBT/REBT along with biological therapies for better outcome of infertility treatment.

Berga et al., (2003) study assessed whether CBT targeted to problematic attitudes common among infertile women with functional hypothalamic amenorrhea would
restore ovarian function. Sixteen infertile women participated who had functional hypothalamic amenorrhea; with normal body weight; and did not report any psychiatric problem. Subjects were randomized to CBT or observation for 20 weeks. Results showed that of eight infertile women treated with CBT, six resumed ovulation, one had partial recovery of ovarian function without evidence of ovulation, and one did not return of ovarian function. Of those randomized to observation, one resumed ovulation, one had partial return of ovarian function, and six did not recover. Thus, CBT resulted in a higher rate of ovarian activity (87.5%) than did observation group (25.0%) among infertile women with functional hypothalamic amenorrhea. CBT designed to minimize problematic attitudes linked to hypothalamic all stasis was more likely to result in resumption of ovarian activity than observation.

Nilforooshan, Ahmadi, Abedi and Ahmadi (2006) evaluated the effect of cognitive-behavior intervention on the pregnancy rate of infertile couples. Out of 638 infertile patients evaluated, 140 couples (280 patients) with depression (from mild to severe) in at least one of the spouses were selected. All couples provided informed consent and were randomly numbered from 1 to 140. Those with even numbers were assigned to the CBT/REBT before infertility treatment (experimental group), and those with odd numbers were not assigned to the psychological intervention (control group). Patients in the experimental group received individualized 6-8 sessions of CBT/REBT before beginning infertility treatment along with Fluoxetine (antidepressant) at 20-60 mg per day during the CBT/REBT period. The control group did not receive any intervention. Three questionnaires, the Beck Depression Inventory (BDI), the Stress Scale (Holmes-Rahe), and a socio-demographic questionnaire, were administered to all patients before and after treatment. The clinical pregnancy rate was compared between the two groups based on sonographic detection of gestational sac 6 weeks after the last menstrual period. Results showed that Pregnancy occurred in 33 (47.1%) couples in the experimental group and in only 5 (7.1%) couples in the control group. There was a significant difference in pregnancy rate between the treatment and control groups (P < 0.001). The results (logistic regression analysis) showed that pregnancy in the experimental group was 14 times higher than the control group.

A higher cardiovascular vulnerability to stress is associated with a lower pregnancy rate during in vitro fertilization and embryo transfer (IVF–ET) program. Facchinetti, Tarabusi and Volpe (2004) assessed whether CBT program attenuates autonomic and
neuro-endocrine response to a stressful task in infertile women waiting for IVF–ET. Samples consist of Forty-five couples with 3.1 years mean duration of infertility. Two-thirds of them already failed an IVF–ET attempt. Once included in the waiting list women were administered the Stroop color-word (CW). Systolic BP, heart rate (HR) and plasma cortisol were serially measured. Subjects showing a positive heart rate reactions were selected to receive CBT (12 group sessions over 16 weeks) while the others just waited, for the same period of time (observation group). After 17–19 weeks subjects were assessed with to the Stroop CW. The heart rate response to Stroop CW was significantly reduced by CBT while it remained unchanged in the observation group. Similarly, systolic BP response was reduced after CBT whereas an increase occurred in the observation group. After CBT, a significant decrease in the reaction of plasma cortisol to Stroop CW took place whereas no changes were observed in the other subjects. Findings indicate that CBT is useful for decreasing the level of distress in infertile women undergoing IVF–ET treatment.

Sinha (2002) studied efficacy of cognitive behavior intervention program as an alternative to medical treatment in alleviating depression and anxiety symptoms in women with infertility and improving their subject well-being. Ten women diagnosed with infertility were taken and allotted sequentially to the experimental (N=5) and control (N=5) groups and administrated the clinical history preformed, Hospital Anxiety and Depression Scale (HADS), infertility reaction scale (IRS) and the subject well-being inventory (SWBI). The infertile women in the experimental group received both the medical care and cognitive behavior intervention, whereas control group received only medical care. The analysis of results showed that there had been significance decrease in the score of both HADS and IRS in the experimental group. This indicated that the cognitive behavior intervention along with regular medical treatment had been effective in alleviating the anxiety and depression symptoms in women with infertility.

**Psycho-education Programs**

Psycho-education was originally conceived as a composite of numerous therapeutic elements within a complex family therapy intervention. Infertile women and their relatives were, by means of preliminary briefing concerning the infertility, supposed to develop a fundamental understanding of the therapy and further be convinced to
commit to more long-term involvement. Since the mid 1980s, psycho-education in German-speaking countries has evolved into an independent therapeutic program with a focus on the didactically skillful communication of key information within the framework of a cognitive-behavioral approach. Through this, patients and their relatives should be empowered to understand and accept the illness and cope with it in a successful manner. Achievement of this basic-level competency is considered to constitute an “obligatory-exercise” program upon which additional “voluntary-exercise” programs such as individual behavioral therapy, self-assertiveness training, problem-solving training, communication training, and further family therapy interventions can be built. Psycho-education looks to combine the factor of empowerment of the affected with scientifically founded treatment expertise in as efficient a manner as possible.

Schmidt, Thomsen, Boivin, and Nyboe Andersen (2005) evaluated a patient education program focused on improving communication and stress management skills among couples undergoing fertility treatment. Sample consisted of 74 couple, they were divided to experimental (N=37) and control (N=37) groups. Experimental group completed the intervention. The effectiveness regarding communication and infertility-related stress was assessed by questionnaires immediately before (time T1) and after the intervention (time T2). Seeking of information and professional support was assessed at a 12-month follow-up (time T3). The intervention resulted in important perceived improvement in the participants’ competence to actively manage changes in marital communication and in communication in different social arenas and recommend fertility clinics to develop and evaluate different interventions for those fertility couples who ask for more psychosocial support.

Preparatory Information

Menning (1977) reported that one of the most helpful aids to couple undergoing an infertility medical investigation was supplying information about various diagnostic procedure. She found that this allowed couples to become experts in their area of special concern which gave them a greater sense of control and reduce stress, anxiety and depression.

Wallace (1984) evaluated the benefits of information for 80 females undergoing laparoscopy, as part of their infertility work-up. Infertile women were divided into
three groups, the experimental group received routine hospital care plus a maximally information booklet, one control group received only routine care and second control group received routine care plus a minimal information placebo booklet. The results showed that the experimental group had lower fear score in the morning of surgery, lower worry score before and after surgery and at one week follow up. The results support the value of receiving high information regardless of individual copying style.

Takefman, Brender, Boivin, and Tulandi (1990) examined the sexual and emotional adjustment of couples undergoing medical investigation and compared the effectiveness of two type of preparatory information designed to reduce particular stress, depression and anxiety associated with investigation. The sample consisted of 39 primary infertile couples who were undergoing an infertility evaluation for first time. Each couple was randomly assigned to one of three informational groups:

1. First experimental group viewed a video tape with high information that described procedural and emotional aspect of the medical investigation

2. Second experimental group viewed a video tape with high information that described procedural and emotional aspect of the medical investigation and in addition received a pamphlet that describe the sexual strains to infertility

3. A control group with low information, viewed a video tape detailing only the procedural aspect of the medical investigation

During the medical intervention, couples were contacted on a monthly basis to evaluate their reactions to each diagnostic test. The result revealed that during the medical investigation the control group improved in feeling and knowledge about infertility and reported an improved ability to cope with infertility. The experimental groups that received the high information and viewed a video tape that described both the procedural and emotional aspect of the medical investigation done showed significantly decrease in infertility specific negative feeling and increase in infertility knowledge. Perhaps the additional information created a sense of overload in couples just beginning the diagnostic work up. Furthermore, in second experimental group, specific training in coping strategy to manage the psychological strain illustrated in the videotape would have product more beneficial effects.
Evidence of positive effects of education, especially when combined with other investigation were provide by Newton, Sherrard, and Houle (1994). Highly anxious infertile women preparing for oocyte retrieval were assigned randomly to relaxation training plus education regarding the retrieval procedure, the accompanying sensory experience and coping mechanism. Those who received relaxation training and information regarding pain surrounding the retrieval procedure did better than did women who received relaxation training alone. These results suggest that information to enhance infertile women understanding of particular medical procedure may yield benefits.

The major implications from this body research are that preparatory information will likely to benefit infertile women undergoing medical testing in some way. However, the degree of beneficial effects may vary depending upon the content of the information, responding infertile women variables such as coping style and the medical circumstances.

Infertility education materials have become a small industry that includes videotape, audiotapes and self-help bodies addressing both the medical and psychological aspects of infertilities pamphlets from pharmaceutical companies, material support organization such as resolve and booklets from professional organizations.

*Mind-body connection to infertility: Relaxation*

Infertility causes psychological and emotional tension in the couples and cause severe stress on infertile women. Relaxation technique is one of the methods that reduces the stress and can balance the human's emotions. The specific approach that has been investigated with regard to infertility is relaxation training.

Valiani, Abediyan, Ahmadi, Pahlavanzadeh, and Hassanzadeh (2010) determined the effect of relaxation on the infertile women's stress score. Sample was 76 infertile women aged between 18-35 years old under IVF and/or ICSI treatment in. Infertile women were randomly divided into intervention (N=36) and control groups (N=36) using simple random sampling. At the beginning, the stress scores were assessed in both groups using Newton's infertility stress questionnaire. Relaxation technique (12 Sessions) was implemented on the intervention group. Embryo was transferred to the uterus (after 2 weeks) and before conducting the pregnancy test. Independent sample
t-test indicated a significant difference in stress scores between the two groups after the intervention (p < 0.05). Result suggested Relaxation technique can reduce the stress score in infertile women as a complementary and alternative medicine method.

Domar et al., (1990) study indicated that the 54 infertile women who completed cognitive behavioral treatment program along with relaxation response showed statistically significant decreases in anxiety, depression, and fatigue as well as increases in vigor. In addition, 34% of these women became pregnant within 6 months of completing the cognitive behavioral treatment. These findings established a need for stress reduction in the long-term treatment of infertility.

O'Moore, O'Moore, Harrison, Murphy, and Carruthers (1983) offered autogenic training composed of exercises in body awareness, passive concentration and physical relaxation to 11 infertile couples over 8 weeks and an additional two months for self-directed practice. Assessed at the end of two months practice, a significant reduction in state anxiety was documented for women and men, although trait anxiety evidence no significant change. Plasma prolactin also declined significantly for women participants.

**Emotional disclosure technique**

The beneficial effects of written emotional disclosure (personal) have been mainly examined in relation to past or current stressful/traumatic experiences. The anticipation of a medical event has rarely been studied within this paradigm. Panagopoulou, Montgomery, and Tarlatzis (2009) examined whether written emotional disclosure would reduce emotional distress and increase pregnancy rates in women who are undergoing in-vitro fertilization treatment (N = 148). They were randomized to an emotional-writing condition, a fact-writing condition and a control condition. Outcome variables included fertility-related distress, general distress and a positive indication of pregnancy. Psychological and medical information about women who refused to participate were also collected, and this represented a fourth group for analysis (N = 66). Results indicated no significant difference between groups in terms of emotional distress. However, a significant difference was observed with regard to pregnancy results, with the non-participants group reporting the higher percentage of pregnancies.
The female menstrual cycle is a complicated interaction of hormonal messages that are under the control of the Hypothalamic-Pituitary-Ovarian axis. Dysfunction in this axis can lead to unovulation and infertility. Stress has the potential to produce such dysfunction. Bablis, Pollard, and Monti (2006) reviewed the normal menstrual cycle, and examined how the stress-reducing technique like Neuro Emotional Technique (NET) successfully helped the fertility of a number infertile women by resolving unovulation/menstrual irregularity. Results showed that unovulating infertile women started to ovulate following a series of Neuro Emotional Technique (NET) treatments. The success attributed to the NET intervention and the resumption of ovulation indicated the need for further research to determine causal relationship.

McQueeney, Stanton, and Sigmon (1997) studied the efficacy of emotion-focused and problem-focused group therapies for women with fertility problems. In this study, 29 infertile women, who were attempting conception for almost 4 years, were given to six sessions of training in problem- or emotion-focused coping or to a no-treatment control condition. Problem-focused training aimed at increasing assertive and effective communication skill with medical and other significant members. The emotion focused intervention involved encouraging emotional express surrounding fertility concern, promoting pleasurable activities and relaxation and reducing negative affect associated with dysfunctional cognitions surrounding infertility. Women were assigned randomly to treatment conditions, the control group who composed of women who volunteered for treatment but could not attend owing to group scheduling constraints. Both problem and emotion focused coping group evidenced significantly reduced distress at treatment termination relative to controls. At one month follow up, only the emotion-focused group evidenced significantly better psychological adjustment than controls (i.e. lower depression symptoms and greater infertility specific well-being). At 18 months of treatment, a significance between group differences emerged on parental status. Eight of ten problem focused infertile women participants had become mother (four biological, four adoptive) versus two of eight emotion-focused members and three of eight controls. These results suggest that coping skills training is beneficial in decreasing distress and increasing well-being in women with fertility problem. However random assignment to the control group was not conducted, suggesting need for replication. Emotion focused training appeared to yield more enduring psychological gains; however this
finding may be dependent on the nature of the sample. On average women had been attempting conception for almost 4 years. Perhaps problems focused intervention is more effective for those who are just beginning the diagnostic and treatment process; whereas emotion focused treatment is relatively beneficial for those confronting the chronic stress of infertility. The most parsimonious explanation of the apparent effectiveness of problem focused intervention in promoting parenthood at 18 months is that such training bolsters effective communication and persistent attempts directed toward becoming a parent.

**Psychological Counseling**

Counseling has been strongly recommended to help infertile couple. Terzioglu (2001) determined the specific problems experienced by couples participating in assisted reproductive techniques (ART) and to assess couples’ psychological counseling needs. Study also determined the effects of the psychological counseling on the success rate of ART, couples’ were assessed on anxiety, depression and life satisfaction levels. Thirty couples for the experimental group and 30 couples for the control group were selected. Couples in the experimental group took part in the psychological counseling and were informed and supported throughout the different stage of the ART. A guide developed for the couples and education material developed for the counseling were used during the study. Post assessment results of the study showed that couples in the experimental group had lower anxiety and depression scores than the couples in the control group. Life satisfaction scores and pregnancy rates were higher for couples in the experimental group than for the couples in the control group. Statistical evaluation showed that the difference between the experimental group and the control group was significant (p < 0.05).

Bresnick and Taymor (1979) evaluated the effect of six sessions of counseling on emotional symptoms. Sixty-two couples received infertility counseling along with the infertility investigation and treatment. At the end of the study a questionnaire was sent to all patients in order to evaluate the incidence of psychological symptoms associated with their infertility and their response to counseling. The study confirmed the presence of a high incidence of emotional symptoms in the self-selected patients. It showed that male partners are also affected, but less so. Study has demonstrated that infertility counseling serves to enhance the quality of life in many patients who
have become the victims of their infertility crises. It was also noticed that out of the 212 couples offered counseling, less than 30% accept the referral. The authors offer no explanation of the poor response though there is a possibility that many couples adjust rapidly and therefore not feel any need have professional help. It is also possible that counseling itself may be threatening for some. However the lack of a control group makes it difficult to evaluate the effectiveness of the counseling offered by Bresnick and Taymor (1979).

Wischmann, Stammer, Scherg, Gerhard, and Verres (2001) attempted to design a psychological intervention framework for couples therapy. They provided counseling to 377 couples and 35 couples accept the offer of a subsequent 10 hour course of couple therapy. The general objective was to reduce stress to facilities a more rational approach to decision about medical treatment and to improve general prospects of success by enhancing the quality of the information available to the infertile couples. The authors found that about 20% couples actually needed a more intensive form of counseling. The standard offering of 2 counseling sessions was adequate for most of the couples with an unfulfilled desire to have a child. Authors mentioned that That the therapeutic intervention for the infertile women obviously needs systematic and careful consideration and a number of questions such as effectiveness of therapeutic modality, duration of treatment, role of medical treatment need to be addressed.

**Meta analytical studies of psychological intervention in infertility**

De Liz and Strauss (2005) conducted Meta-analytical study in order to evaluate the efficacy of group, individual and couple therapies on:

(i) The reduction of negative emotional symptoms

(ii) The possible promotion of pregnancy

The study examined and compared the efficacy of psychotherapy for infertile women in the reduction of anxiety and depression and possible promotion of pregnancy. Only 22 of 66 studies were deemed suitable for meta-analysis. Emery et al., (2001) and Tuschen-Caffier, Florin, Krause, and Pook (1999) study maintains that psychological factors are most likely to be found in idiopathic infertility, or in an ‘unknown’ genesis. Other studies described their sample as having multiple infertility origins (Domar, Friedman, & Zuttermeister, 1999). Infertile women were classified as
suffering from either primary infertility and/or secondary infertility in the following studies: primary infertility (Emery et al., 2001; Galletly, Clark, Tomlinson, & Blaney, 1996a; Takefman, Brender, Boivin, & Tulandi, 1990; Tuschen-Caffier et al., 1999) and both primary and secondary infertility (Connelly et al., 1993; Domar et al., 1999; McNaughton-Cassill et al., 2000; Stewart et al., 1992). The average duration of a marital relationship was 8 years (Emery et al., 2001). Domar et al., (1999) report that 132 women participants have a mean of 17.1 (SD= 2.0) years of education completed, indicating a higher level of career qualification.

Interventions were towards counseling for infertile women and couples using either cognitive behavioral, focal, resource or psychoanalytic methods (Emery et al., 2001; Sarrel & DeCherney, 1985). Tuschen-Caffier et al., (1999) offered supportive sexual therapy. Christie and Morgan (2000) conducted psychoanalytic group therapy. Clark et al., (Clark et al., 1995; 1998) carried out two studies using cognitive behavioral group psychotherapy on similar sample. Galletly et al., (1996b) and Domar et al., (1999) also used comprehensive group psychotherapy programs to infertile individual. Meta analysis by De Liz & Strauss (2005) suggests that psychotherapy (group, individual and couple) reduces anxiety and depression for infertile women and possibly enhances conception success.

In another meta analytical study by Hämmerli (2009) examined, psychological interventions which included counseling, cognitive-behavioral therapy, educational interventions, relaxation, psychodynamic/-analytic interventions to improve mental health and pregnancy rate among primary infertile women. A total of 21 controlled studies were included in the meta-analysis. Of the total number of studies, 10 of the studies reported on infertile women receiving ART (IVF/intra cytoplasmic sperm injection: ICSI) for infertility, whereas 8 of the studies investigated infertile women not receiving IVF/ICSI (i.e. receiving other medical treatments like intrauterine sperm insemination). Finally, three of the studies reported on infertile women who received mixed treatments.

The following psychosocial outcomes were reported (number of studies mentioned in brackets): depression (12), anxiety (12), mental distress (8), interpersonal functioning (5) and infertility stress (5). Pregnancy rates were reported in 14 of the studies. Most of the studies measured outcomes between 4 weeks and 6 months after the
psychological intervention. The intervention strategies employed included counseling (Emery et al., 2003; Emery et al., 2006; McNaughton-Cassill, Bostwick, Arthur, Robinson, & Neal, 2002; Wischmann et al., 2001; Zhen, Xie, & Xu, 2005), cognitive behavioral therapies (Domar et al., 2000; Tarabusi, Volpe, & Facchinetti, 2004) psycho-education (Chan, Ng, Chan, & Chan, 2006; Lee, 2003; Shu, 2003), mind/body orientated relaxation (Levitas et al., 2006; Rezabek, Vichova, Pavelkova, & Zivny, 2003), psychodynamic/-analytic (Sarrel & DeCherney, 1985) and mixed interventions (Schmidt, Tjørnhøj-Thomsen, Boivin, & Nyboe Andersen, 2005).

The results of meta-analysis of psychological interventions for infertile women indicated some evidence for the efficacy of psychological interventions in achieving pregnancy and indicate that psychological interventions (psychological interventions include counseling, cognitive-behavioral therapy, psycho-educational interventions, relaxation, psychodynamic/-analytic Interventions) may be effective in increasing couples’ pregnancy rate. Also Psychological interventions represent an alternate treatment option, in particular, for primary infertile women who are not receiving medical treatment (Hämmerli, Znoj, & Barth, 2009).

Boivin (2003) determined whether psychosocial interventions improves well-being and pregnancy rates, and identified the kinds of interventions that were most effective. Of the 380 studies 345 were excluded from the review for various reasons. 290 studies mentioned psychosocial intervention(s) but did not include any evaluation; 47 studies described a case study which could not be generalized; 5 studies evaluated non-specific patient-centered care delivered as part of routine care and 3 studies results could not be interpreted due to the lack of statistical or other methodological details.

The final sample consisted of 35 studies, of which only 25 were included for meta analysis. Which studies represents 6.6% of the potential pool of 380 studies. The studies were grouped according to the type of intervention and evaluated.

1) 15 studies mentioned counseling interventions

2) 6 studies were focused on educational Interventions, which mainly incorporated one or two educational activities including coping training, stress
reduction, sex therapy and receiving preparatory information about medical tests or treatments

3) 4 studies were comprehensive educational programs, it was educational but assessed the effectiveness of more comprehensive and structured educational psychosocial interventions. For example, the Behavioral Medicine Program for Infertility (BMPI, also known as the mind/body program)(Domar, Seibel, & Benson, 1990) is a 10-week group program that includes, cognitive-restructuring, methods for emotional expression, relaxation training, nutrition and exercise. Similarly, the intervention designed by Clark and colleagues (Clark et al., 1995; Clark, Thornley, Tomlinson, Galletley, & Norman, 1998) for obese unovulatory women includes not only education about nutrition and medical topics but also group support and stress management techniques.

Analysis of these studies showed that CBT/REBT and counseling interventions were more effective in reducing negative affect than in changing interpersonal functioning (e.g., marital and social functioning). Pregnancy rates were unlikely to be affected by cognitive behavior interventions. It was also found that group interventions which had emphasized education and skills training (e.g., relaxation training) were significantly more effective in producing positive change than counseling interventions which emphasized emotional expression and support and/or discussion about thoughts and feelings related to infertility. Men and women were found to benefit equally from CBT/REBT and counseling interventions.

The usefulness of psychological support for infertile women has been highlighted in the literature over the past number of years. There is a clear empirical evidence for high levels of depressive symptoms, anxiety, distress, irrational beliefs among infertile women undergoing assisted reproductive treatment (ART). Studies suggest that infertile women are in need of and require increased psychological support. Various studies indicate the efficacy of psychological interventions for infertile women with respect to their mental health and, in part, pregnancy rates. Therefore, in future research, additional studies of high-quality design are needed to achieve more definitive answers on the efficacy and indication of psychological interventions for infertile women.
Summary

Approximately 10-15% of couples in childbearing age experience infertility. Infertility is a stressful event that can give rise to psychological difficulties. Infertility is a severely distressing experience for many couples. Depression is considered as one of the main psychological disorders associated with infertility and it may significantly affect the life of infertile individuals, their treatment, and follow-up.

In the review of literature, it was found that infertility-related stress increased depression, irrational beliefs, defense mechanism, marital conflicts, decreased sexual satisfaction, sexual functioning, life quality, self-efficacy, intimacy and health. Fertility treatments are both a physical and emotional burden on women and their partners. Psychological factors such as depression, anxiety, and stress-induced changes in heart rate are predictive of a decreased probability of achieving a viable pregnancy. In fact, infertility is a complex crisis of life that is a psychological threat and an emotional pressure.

Interrelationships among outcome variables like depression, irrational beliefs and infertility has been reviewed. The previous studies have shown positive relationship between depression, irrational beliefs and infertility. Further, studies showed CBT/REBT was effective in decreasing depression among infertile women.

Although, many studies have examined the efficacy of cognitive behavior therapy on depression among infertile women, but no studies have yet examined the impact of group cognitive behavioral therapy (REBT) on irrational beliefs among infertile women. The aim of this study was to develop and assess the efficacy of group REBT on depression and irrational beliefs among infertile women.