"We must first prepare, as a foundation for the whole, a complete and accurate natural and experimental history. We must not imagine or invent, but discover the acts and properties of Nature."

Sir Francis Bacon, 1620

CHAPTER II

REVIEW OF LITERATURE

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Enuresis, or urinary incontinence beyond an age when a child should be developmentally capable of continence, is one of the most common developmental problems. It can be a source of embarrassment for the child and a source of frustration for parents.

Enuresis is not a disease, rather it is a symptom that may have multiple etiologic factors (Abraham, 1980). The major factors classified are: psychological, sociocultural, physiological and heredity. The psychogenesis of enuresis has been recognized by many psychologists and physicians who noticed the coincidence of onset with emotional conflict or difficulties and of cessation with the solution of child's conflict. It has been observed that toilet trained children sometimes begin to wet when a new baby arrives in the family; the enuresis is a part manifestation of a general regression to an infantile mode of behaviour. There is a correlation between enuresis and psychological disturbance that increases with age. Children living with socially disadvantaged situations and expressing
psychological stress are enuretic at greater frequencies than those who are not. Nutritional status, physical health etc. all are found to be responsible for enuresis (De Sousa, 1974). Chao et al., (1997) perceived the causes of nocturnal enuresis as maturational delay (50%), deep sleep (50%), familial (43.3%), behavioural problems (43.3%), and excessive fluid intake (26.7%).

Family and Social factors play a significant role in enuretic behaviour. De Sousa (1974) studied the causes of behaviour problems in children. He concluded that mother’s anxiety during prenatal period, nutritional status, physical health, attitudes and behaviour during early upbringing of the child, faulty parental attitudes, overprotection and rejection, joint family, and cultural factors are mainly responsible for enuresis. Richman (1977) also studied behavioural problems in pre-school children in relation to family and social factors. He concluded that parental illness, marital disharmony and poor parenting skills adversely affect the child’s
behaviour. High rates of depression among mothers of pre-school children exhibiting behavioural problems like enuresis have been reported. Just the same way Moilanen and Jarvelin (1987) studied personality and family characteristics of enuretic children. Results indicated that non-enuretic subjects lived more frequently with their original families and with both biological parents, while parental divorce or separation was more common among enuretic subjects. Bed-wetting subjects showed more unstable and careless personality characteristics, while the day wetting subjects showed the lowest self-confidence. It is concluded that psychiatric factors play an important role in enuretic behaviour. Rushton (1993) also confirmed in his study that family factors play an important role in enuresis. He stated that the parents who blame or punish the child need to be educated and reassured about enuresis. Rona, Li and Chinn (1997) have also emphasized environmental factors in the etiology of enuresis.
Socio-economic status (SES) or Socio-cultural factors are also responsible for lack of confidence and feeling of insecurity which are found to be included in the etiology of enuresis. SES of an individual has substantial effect on one's reactions to frustration (Coons, 1957; Stoltz & Smith, 1959; Gupta, 1974; Malaviya, 1977; Sarkar & Biswas, 1989). However, very few research data are available to demonstrate the role of SES in the etiology of enuresis. Jarvelin et al., (1988) and Norgaurd et al. (1997) found in their studies that enuresis is more common among lower socio-economic groups. On the contrary, in one study by Agarwal & Mishra (1997), it was found that SES (socio-economic status) does not affect the enuretic behaviour. Children from any SES can have this behavioural problem. However, due to nonavailability of sufficient research data on the issue this factor needs further research evidence for conclusive results.

Adams, Hillman and Gaydos (1994) studied impact of socio-cultural and biological risk factors. Their findings
suggest that social risk conditions place a pre-schooler at a greater risk for behavioural difficulties (including enuresis), whether these poor social conditions occur with full term, healthy infants or with children at biological risk. Jarvelin et al., (1988) and Norgaard et al. (1997) found in their studies that enuresis is more common in large overcrowded families and in children living in institutions.

Epidemiological studies have, however, shown a correlation between psychological disturbance and enuresis, which is more pronounced in older children (Rutter, 1989). Fergusson et al. (1990) in their study specifically evaluated risk factors for developing enuresis. It was found that delayed attainment of initial nocturnal continence and exposure to four or more stressful life events in a years were significantly related to the development of enuresis. Warzak and Friman (1994) also support the view that children with nocturnal enuresis have a wide range of negative experiences that can affect self-esteem and development. The same has been
confirmed by a study conducted by Kalo and Bella in 1996. Jarvelin et al., (1988) and Norgaard et al., (1997) have also emphasised that enuresis is more common among those who have many traumatic life experiences and changes. Thus, the contribution of psychological components in the development or persistence of enuresis has been supported by recent research studies.

It has been observed that not all children belonging to same parents/family and same environment have this behavioural problem. This suggests that certain individual personality characteristics may also trigger enuresis in children. Some attempts have been made to study the personality of enuretic children. Bissell (1892) divided enuretics into those who are overactive, excitable, oversensitive and mostly precocious and those who are underactive, drowsy, listless, and retarded. In a pilot study by the researchers (Mishra & Agarwala, 1996), marked differences in the personality characteristics of enuretic and non-enuretic children have been found. It has
been concluded that personality characteristics like anxieties, conflicts, aggression, feeling of insecurity, need for love and protection, pessimism, contaminated thought process and uncontrolled drive are much more among enuretic children in comparison to their non-enuretic counterparts.

Intelligence is also an important factor to be considered in the etiology of enuretic behaviour of a child. Some studies have demonstrated the role of intelligence in causing enuresis. Ackerson and Highlander (1928) who analyzed 3,000 cases statistically found that 23% enuretic children had a slightly lower average I.Q. than their non-enuretic counterparts. As measured by the age at which the dry habit was established by 206 formerly enuretic children, there was no significant correlation with I.Q., underweight, conduct, and personality problems, or "discord between parents". Agarwala and Mishra (1997) found that intelligence does not affect the enuretic behaviour. Children of any level of intelligence can have
this behaviour. Thus, it is still controversial whether intelligence has a role in causing enuresis or not. No definite conclusions are available in this regard. An effort is made in the present study to analyse the role of intelligence in enuretic behaviour.

In addition to psychological, sociocultural, and individual personality factors there are a series of researches which demonstrate that heredity factor is also one of the most important factors in causing enuresis. Simonds and Parraga (1982) studied prevalence and relationship to each other and to positive family histories of enuretic children. Results support the suspected genetic basis for nocturnal enuresis; however, emotional and environmental factors may be prominent in some cases. Moilanen and Jarvelin (1987) also support this heredity factor in the etiology of enuresis. Abe et al., (1993) also examined 93 pairs of same sex twins at the age of 3 years and their mothers were interviewed to assess behaviours. 61 pairs were followed up. Results
show that the monozygotic twins were more concordant than the dizygotic twins with respect to reaction to sudden noises and absence of stranger anxiety in the first year of life, and inability to sleep alone. There was a significant difference in concordance for abundant salivary drooling in infancy, motion sickness, constipation, perspiration, and bed-wetting at 3 years, and night terrors at 3 years or at follow up.

Hjalmas (1997) stated that nocturnal enuresis in children is not a psychogenic disorder. It is caused by hereditary delay in maturation of the somatic mechanism (reduction of nocturnal urine production and a normal arousal to a full bladder) which prevents the child from wetting the bed. Sellinger (1997), on the basis of his study also reported that heredity factor is responsible for enuresis.

However, no specific genetic pattern has ever been identified. DSM-IV notes that the concordance rate for the disorder is greater in monozygotic than in dizygotic twins,
and 75% of children with enuresis have a similarly affected first-degree biological relative. Chao et al., (1997) conducted a study on nocturnal enuresis in Singapore- parental perspective in an Asian Community. Nocturnal enuresis was familial in 56.7% of patients.

Enuretic behaviour also depends on the biological conditions of a child. The disorder is suspected to be related to a relative immaturity in the autonomic or vegetative nervous system (Broughton, 1968). However, few of these hold much credibility. In a few cases, persistent bladder infections or bladder abnormalities may be causal. Essen and Peckham (1976) have found in their study that children with enuresis have developmental delays twice as often as those without. This was found in a large longitudinal population study. Norgaard and Djurhuus (1993) also examined the pathophysiologic basis of enuresis in children and young adults. Physiosocial disturbances, sleep abnormalities, bladder reservoir dysfunction, and endocrinology, are examined as specific causes.
Watanabe et al., (1997) studied the physiological background of nocturnal enuresis, which is due to a mild arousal dysfunction. They conducted two studies, one in rats and one in children with nocturnal enuresis. The results of these investigations suggest that in nocturnal enuresis, the fundamental arousal function following bladder distension, due to an arousal centre like the locus coeruleus and its network, is normal. In contrast, the process of multiplying the transient connection from light sleep to complete awakening, which probably relies upon functions of the thalamus and the further upper centrums, was thought to be abnormal. Sellinger (1997) also observed the biological factors like small bladder capacity, and reduced nocturnal secretion of antidiuretic hormone which are responsible for enuresis.

The exact role of sleep and arousal remains elusive. Parents consistently report that nocturnal enuretic children are deep sleepers who are difficult to arouse compared with their siblings who do not have enuresis.
Although differences in the electroencephalographic sleep pattern have not been found and nocturnal wetting episodes have been shown to occur randomly throughout the sleep stages, recent evidence does point to some difficulty in arousal for these children (Wille, 1994). Neveus et al., (1998) also investigated connections between nocturnal enuresis and sleep factors such as the subjective depth of sleep and classical parasomnias. It was found that a high arousal threshold is one of the pathogenetic factors underlying nocturnal enuresis and the group of therapy-resistant enuretic children might not only sleep more deeply than their non-enuretic peers, but perhaps have 'better' sleep.

Some studies focused on the role of multifactors in enuresis. Abraham (1980) studied on nocturnal enuresis and concluded that nocturnal enuresis is a multifactorial phenomenon both with and across individuals. He found that this was a means of expressing aggression. Since, there are multifactors which are responsible for enuretic
behaviour and correlated to one another, it is difficult to
determine the degree to which each of these factors is
responsible for this behaviour. There are observations
that the nature of the behavioural disturbance in children
with enuresis is nonspecific and that no physiological
marker can be found that reliably differentiates
psychologically disturbed from non disturbed children with
enuresis (Mikkelsen & Rapport, 1980; Shaffer et al.,
1994). Rushton (1993) studied multifactors related to
enuresis and stated that the initial evaluation of a child
with enuresis should include urinary tract infection and
sleep histories, psychological history, and family history, a
physical examination; and a urine analysis and urine
culture. A complete voiding history should be obtained to
exclude the presence of a bladder abnormality or
dysfunction. Determining the reaction of both the child and
the family to the problem is an important part of the
evaluation. Parents who blame or punish the child need to
be educated and reassured about enuresis. Depending on
the results of the initial evaluation, the enuresis can be categorized as either uncomplicated or complicated. Warzak and Friman (1994) also support these multifactors as causitive factors of enuretic behaviour. Kalo and Bella (1996) made an effort to determine the prevalence of enuresis and the factors associated with it among primary school children. This is a cross-sectional population-based study and data were collected using a self-administered questionnaire. Six hundred and forty school children aged 6-16 years were selected randomly. Enuresis prevalence was 16.3% among boys and 13.8% among girls. The overall prevalence was 15%. Breast feeding, firstborn children, family integrity and stability were found to be protective. Stressful life events before the age of six years, deep sleep, acute family psychosocial problems, recurrent urinary tract infection, constipation and congenital defects were found to be strongly associated with enuresis. Enuresis was also found to be associated with family history of enuresis. An important finding is that of the 83 children who had
enuresis during sleep, 25 (30.1%) wet their beds during
day time sleep (day sleep wetting). The importance of
enuresis as a health problem has been affirmed.
Rona, Li and Chinn (1997) tried to assess whether
changes have occurred in the determinants of nocturnal
enuresis in Scotland and England in comparison to
previous studies. The study was based on 22 study areas
from a representative English sample, 14 areas from
representative Scottish sample, and 20 areas from an
English inner-city sample. A total of 14,674 subjects were
included in the analysis from 16,835 eligible children in
the age range of 5 to 11 years. For the main analysis, an
enuretic child was one who wet the bed at least once a
week. As expected, the frequency of enuresis was higher
in boys and decreased markedly with age in both sexes.
Bed-wetting was more frequent in: Afro caribbean
children compared to white children in the representative
samples; those whose mothers smoked at least 10
cigarettes at home compared with non-smokers; children
who had disturbed sleep compared with those who slept
well; those with mothers aged less than 20 years at the child’s birth compared with mothers in the age range 25 to 34; and in the second or third born in the family in comparison with the first born. Father's social class was associated with enuresis only in girls. Only 50% of parents consulted a doctor for enuresis in their child. The percentage was even lower in Afro-Carribean families (33%). Enuresis continues to be highly prevalent problem and has not decreased over the last 45 years. They confirm that environmental factors are still important in the etiology of enuresis. It is surprising that despite the availability of effective treatment only half of parents consult a doctor about the problem.

Considering the high prevalence rate of enuresis and role of multifactors in its etiology, it can be concluded that enuretic behaviour is a complicated phenomena which is of grave concern. Enuresis affects not only the patient but the entire family of the patient (enuretic child). Implications of enuretic behaviour have been reported by many psychologists. Even with a purely somatic etiology, enuretic condition may affect the mental well-
being of children and adolescents, e.g. lowering self-confidence and limiting opportunities to participate in activities with their peers (Moilanen et al., 1987). Warzak (1993) discussed the psychological implications of nocturnal enuresis (NE). Historical and contemporary view of NE are reviewed to illustrate the effect of NE on patient’s self-esteem, distress, accompanying fear of detection, and possible effect on patient’s families and others. Enuretic children from dysfunctional families may be at increased risk for emotional or even physical abuse. Butler (1994) has also enumerated the negative influences of enuresis on child’s self-confidence, general well-being, and routine activities with peers.

Hagglof et al., (1997) studied the self-esteem before and after treatment in children with nocturnal enuresis and urinary incontinence. A case control study was designed to study self-esteem in children with nocturnal enuresis and day time incontinence. The patients and the controls were recruited from the normal population in the town of Umea, Sweden. Medical and psychological examinations were performed before the
start of treatment. Follow-up investigations were carried out at 3 and 6 months after starting treatment. Self-esteem was measured using a Swedish self-answering questionnaire that was known to have good psychometric properties. Statistically significant impairment of self-esteem was observed between patients and control children before starting treatment ($P < 0.01$). After six months treatment, the patients had the same levels of self-esteem as the control group. Self-esteem was significantly better in patients that were totally dry at 6 months follow-up compared with the patients with persisting urinary problems ($P > 0.01$).

Pugner and Holmes (1997) also stated that bed-wetting is a common complaint, affecting approximately 10% of 7 year old children in the developed world and causing an economic drain on society. Not only is the cost of nocturnal enuresis borne by the families, but also by national health services and state health insurance. Although previous studies have examined the direct costs of nocturnal enuresis, the current paper also investigates the direct costs to some selected families,
such as the extra housework that is involved. The total cost of having an enuretic child was estimated on a case study basis in five countries with results being reported here for three countries (Sweden, U.K. and Germany). The study considered costs over a period of 3 months, with questionnaires on self-perceived self-esteem being included for the child. The critical factors influencing overall costs were the number of wet nights per week, necessitating washing and drying, and cost of the treatment itself. Overall, the study found that total cost of not treating enuresis in heavy bed wetters can be higher than with any of the treatment alternatives, which must be seen as an additional burden to families with a child suffering from lower self-esteem.

Riley (1997) focused upon evaluation and management of nocturnal enuresis. He stated that enuresis can be a source of family crisis, and can contribute to a lack of self-esteem in the affected child. It must be stressed to both parent and child that improvement is gradual and largely a function of maturation in cases where no organic problem is
identified. Schulpen (1997) studied the burden of nocturnal enuresis. Nocturnal enuresis is a well-known "low severity high prevalence" condition in pediatrics, with extensive psychosocial suffering. This suffering is not always realized by pediatricians and other professionals. The aim of this study is to show that enuresis not only has an impact on the child, but also frustrates the entire family. The literature shows that nocturnal enuresis causes distress and low self-esteem for the child. It also has major social and economic implications for the family, with an increasing intolerance as the child grows older. An analysis of nine studies on the impact of successful treatment on the psychological condition of enuretic children showed improved behaviour and personality scores. In five studies the improvement in mental health was significantly related to treatment success. Timely treatment will prevent psychosocial damage, favour a normal development of the child and bring practical belief to the family. Moffatt (1997) stated that nocturnal enuresis is a common developmental symptom which, in a nonsupportive environment, might have
negative effects on the growth of positive self-concept in children.

Vantijen, Messer and Namdar (1998) confirmed in their study that nocturnal enuresis is not only one of the most prevalent ailments in childhood, but as shown in their study, it also rates highly on the patient's psychological agenda. Suffering from NE (nocturnal enuresis) is a significant event in the life of an enuretic. Its impact could be compared with the severity of academic attainment and being teased frequently, which were ranked similarly among the controls to NE. The tensions accompanying NE have been shown to affect a person's self-esteem and to lead somatic complaints when prolonged.

Enuresis, which in majority of instances is an expression of emotional difficulties, often may in turn give rise to added conflicts. The above studies lead us to conclude that if the enuretic problem is not properly treated, it may affect the child as well as the entire family. The effects depend, of course, on the attitudes of the people who are important to the child. Punishment, scolding and shaming create or aggravate feelings of guilt
and inadequacy. Many enuretic children lie tensely awake for hours feeling to go to sleep. Embarrassment and lack of self-confidence have driven some children to seclusiveness. Failure of the “bladder” to respond to “remedial” measures often develops in the child a sense of hopelessness similar to that, which is known to arise in patients with chronic asthma or eczema. The notion of “weak bladder” or “weak kidney” is apt to convince the child that he/she is physically ill and suggests to him/her that he/she is different from others. Invitations to overnight visits with relatives or friends are declined, those fortunate non-enuretic children who go to summer camp are envied. The whole constellation is full of potentialities for insecurity, sensitiveness, apprehension and general unhappiness.

Thus, millions of children are affected by nocturnal enuresis (Sellinger, 1997). Moreover, the cost of enuresis is considerably high for the child, family, and society at large. Despite this fact enuresis continues to be poorly understood and is often poorly managed. Because enuresis is a symptom and not a disease, it is
difficult to discern a cause or an effective treatment. Although less than 5% of children with nocturnal enuresis have an organic basis for their wetting, the physical examination and history should carefully rule out any physical causes before planning a psychotherapeutic regimen for enuretic children. The cornerstone of therapy for all children with nocturnal enuresis should be behavioural management. Medical management should be initiated only after behavioural management has failed. No one therapy guarantees success, and multiple therapies may be attempted before dryness is obtained.

Research has shown some success of behaviour modification techniques in the treatment of enuresis. Appropriate toilet training with parental reinforcement has been attempted, especially in enuresis in which the disturbance was not preceded by a period of urinary continence. Record keeping is helpful in determining a baseline and following the child’s progress may itself be a reinforcer. A star chart may be particularly helpful. Other useful techniques are restricting fluids before bed and night lifting to toilet train the child. Doleys and Wells
(1975) recorded changes in functional bladder capacity and frequency of bed-wetting during retention control training with a 42 months old girl. Bladder capacity increased and remained above baseline levels. Bed-wetting decreased and did not occur during the last 8 weeks of a 14 weeks follow-up period.

In another study by Christmenson and Lisper (1982) on parent behaviours related to bed-wetting and toilet training as etiological factors in enuresis, 182 mothers of 4 year olds were interviewed about their children's bed-wetting and their own toilet training practices. It was found that parents of enuretic children had begun toilet training at earlier age; these children were also taken to bathroom more often during the day time than non-enuretic children. Bunyan (1986) also described behavioural treatments for enuresis in children and the role the social worker can play in treatment. Treatment methods recommended are: positive reinforcement of any improvement in bed-wetting, retention control training with stop-start exercises, alarm bell and pad conditioning, and overlearning exercises once continence has been achieved.
In a study by Bollard and Woodroffe (1977) two substantial modifications were made to the dry bed training procedure described by Azrin and Foxx (1974). The first modification was to have parents administer the intensive all night training program rather than an outside trainer. With 14 children treated in this manner, nocturnal enuresis was eliminated in all cases. The median time taken to the last night of bed-wetting was only 12 days. There were two relapses in a six months follow-up. The second modification involved administering the dry-bed procedure without the adjunct of an enuresis machine. This resulted in significantly reduced frequency of bed-wetting, although nocturnal enuresis was not completely stopped in any of the 10 children treated.

Williams, Doleys and Ciminero (1978) studied on nocturnal enuresis and a two years follow-up of enuretic children treated with dry bed training. In a 2 years follow-up of 12, 4-14 years old children who had been treated with dry-bed training, it was found that 5 of the 8
who had achieved continence averaged less than 1 bed-wetting during the follow-up period (subject was wet:1 ), of the other 3 subjects 2 subjects were wetting 4 times and 1, 6 times. In those who had terminated treatment prematurely, a mean of 14.5 wet nights in a month was reported.

Griffiths, Meldrum and McWilliam (1982) also successfully treated 11 children (aged 5 years 3 months to 9 years 6 months) with severe nocturnal enuresis by the dry-bed method. This method teaches children that they are the locus of control and incorporates social learning and self correction approaches, including cleanliness training, positive practice, night time awakening, retention control, and differential positive reinforcement for dryness. The group median for treatment was 4 weeks, dryness being defined as 2 successive weeks without bed-wetting. Training periods ranged from 2 to 20 weeks. Subsequently, 2 subjects relapsed, although organic and psychiatric factors, respectively, were probably responsible. At 9 month follow-up, 73% of subjects were
completely dry. The procedure made heavy demands on parents, clinician, especially in its initial phase.

Samaan (1972) reported a technique for the modification of nocturnal enuresis. Briefly, the child is woken several times each evening and guided to the toilet. Following urination, a reinforcer is given. Once the procedure is established the parents are asked to fade out wakening, the prompting and the reinforcer. Verbal reinforcement is given in the morning for dry nights. If the child fail to use the toilet as necessary during the night, the prompting is recommended. This approach was reported as successful with a child who had failed to respond to the conventional alarm bell treatment. However, the authors do not know how successful this approach might be when compared in large numbers with the other techniques. Chao et al., (1997) conducted a study on nocturnal enuresis. Remedial attempts included bed time fluids restriction and voiding (100%), incentive measures (43.3%), traditional practices (26.7%),
punishment (20%), drugs (16.7%), psychotherapy (100%) and bladder training (3.3%).

Miller (1993) has demonstrated the use of concomitant nonpharmacologic therapy in the treatment of nocturnal enuresis. Nonpharmacologic therapeutic approaches include motivational counselling, bladder stretching exercises, elimination diets, hypnotherapy, behavioural or conditioning therapy, acupuncture and naturopathic remedies. Mishne (1993) has given a case of 9 year old boy with nocturnal enuresis and demonstrated the efficacy of analytically oriented play therapy, commonly preferred by psychoanalysts, clinical psychologists, and clinical social workers. Vogel, Young and Primack (1996) reported a survey of treatment methods used by primary care physicians in Worcester, Massachusetts in the treatment of nocturnal enuresis. The results suggest a predominance in the use of psychobehavioural over pharmacologic treatment methods. Ninety one percent of physicians reported recommending the use of rewards to control enuresis. O'Donnell (1998) studied the evaluation of urinary
incontinence (UI) in institutionalized individuals and discussed the use of behavioural modification in this problem. It was concluded that few treatment options for UI (Urinary Incontinence) are feasible for use in institutionalized individuals. However, prompted voiding can reduce the severity of UI in most of these patients and "Will Therapy" helps to improve the quality of life.

Among the behavioural techniques, classical conditioning with the bell (or buzzer) and pad apparatus is generally the most effective treatment for enuresis. Dryness results in more than 50 percent of cases. The treatment is equally effective in children with and without concomitant mental disorder, and there is no evidence of symptom substitution. Difficulties may include child and family noncompliance, improper use of the apparatus, and relapse. Bell and pad method has been used most successfully by some psychologists for the treatment of enuresis. (Stubbe, 1985; Kooijman and Bosch, 1986; Gustafson, 1993; Vogel, Young and Primack, 1996; Rapport, 1997).
Drugs should rarely be used to treat enuresis and then only as a last resort in intractable cases causing serious socioemotional difficulties for the sufferer. Some drugs are effective and some psychologists support this through their studies. Hensen and Jorgensen (1997) studied the relationship between nocturnal urine production and the occurrence of both wet and dry nights in patients with nocturnal enuresis and estimated the effect on nocturnal urine production of treatment with the antidiuretic hormone desmopressin in a group of enuretics with none or only a partial reduction in the number of wet nights in response to desmopressin treatment. It was concluded that there was a clear reduction in the number of wet nights and in nocturnal urine production during desmopressin treatment, even though none became totally dry on desmopressin. There was a markedly higher nocturnal urine production on wet nights during both the baseline period and during desmopressin treatment. Another study done by Moffatt (1997) also supports the use of desmopressin in enuresis. In another study by Caione et al., (1997), multicentric trial with oxybutynin and
desmopressin was used in the modification of enuretic behaviour. The Italian Multicentric trial was undertaken in twelve pediatric and urological centres in order to assess the efficacy of two of the most popular drugs, desmopressin (DDAVP) and oxybutynin. Results show that the patients with nocturnal enuresis treated with DDAVP reported a significantly lower number of wet night during treatment than during the baseline period, with 79% showing a 'good' (6-7 dry nights/ week) or 'intermediate' response (4-5 dry nights/ week). Those treated with oxybutynin alone had a 54% success rate. The patients treated with both oxybutynin and DDAVP showed a better response, with a 71% rate of success. Thus, it was concluded that the efficacy of the two drugs is confirmed in patients carefully selected on the clinical basis of voiding disturbances. In patients with enuresis, the reduced urinary output and the lower bladder filling rate due to DDAVP can reduce uninhibited bladder contraction, thus enhancing the oxybutynin action.

Lackgren et al., (1998) also evaluated the role of long-term oral desmopressin (over a 7 year follow-up) in
enuretics, particularly in assessing the potential curative effect, and analysed the results for specific types of patients to obtain clues about possible mechanisms of cure. It was concluded that active treatment of nocturnal enuresis with oral desmopressin has a clinically significant effect on the cure rate, which is maintained after ceasing therapy. There also seemed to be a better response to treatment when it was prolonged. Furthermore, they concluded that this therapy is safe when administered in the long-term.

Chiozza et al., (1999) compared the efficacy and safety of different doses of DDAVP spray treatment (20 to 40 mcg/ day) in patients with nocturnal enuresis (defined as three or more wet nights per week). On the basis of results it was concluded that DDAVP (Desmopressin) spray therapy at a dose of 20 mcg/ day was effective in 70-75% of nocturnal enuretics. In non-responders it is suggested that the daily dose of DDAVP should be increased to 30 to 40 mcg.

Thus, the above cited literature leads us to conclude that both psychological as well as pharmacological
methods have been used with considerable success in the treatment of enuresis. But their relative efficacy has not yet been established. However, some attempts have been made in this direction. Wong and Luo (1992) used a behavioural therapy program, based on Skinner’s radical behaviourism along with Chlorimipramine (in a daily dosage of 7-20 mg varied according to age), to treat childhood enuresis with considerable success. Moffatt (1997), on the basis of his study stated that combined therapy with desmopressin and conditioning alarm might be helpful in enuresis for some of the more resistant cases but also needs additional study. Further, he stated that the management of nocturnal enuresis requires an investment of time but is quite rewarding, because families that have had success are very grateful. Moilanen et al. (1998) also demonstrated the efficacy of combined use of conditioning and medication.

Thus, to conclude, enuresis is a severe behavioural problem with high prevalence rate and high costs, having multiple causes and multiple available treatment methods. The problem needs attention by parents, social
workers and clinical psychologists. The degree to which each of the reported causes contributes in the causation and maintenance of enuretic behaviour needs to be analysed. Moreover, the relative efficacy of various treatment methods is also to be determined. Finally, there is a need of a multimodal package of behaviour modification techniques for the treatment of enuretic behaviour which can be easily applied by parents in home or family setting under the guidance of a clinical psychologist. Hospital setting is neither feasible nor recommended for the treatment of this common behavioural problem. With this consideration, a multimodal package of behaviour modification techniques is being designed in the present study to suit the requirements of parents of enuretic children. An effort is also being made to judge the relative efficacy of behaviour modification techniques, pharmacotherapy, and combined use of both these.