## **REHABILITATION OF PATIENTS WITH THE KLINEFELTER'S SYNDROME -REVIEW OF AVAILABLE LITERATURE**

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#### Summary

Persons with the Klinfelter's syndrome are members of the society and they perform different functions in the society. There are a lot of negative attitudes against them which negatively affects their social lives. Those wrongful opinions conduce to suspiciousness, feeling of oversensitiveness and lead to conflicts at work. In view of the behavior or external characteristics, those persons are very often treated with distrust; they are isolated from the society which makes the adaptation with the surroundings difficult for the persons concerned.

Boys with Klinefelter's syndorm present significant failures already in primary school when the need of abstract thinking arises. Speech and reading abilities are delayed; memory and logical thinking are disturbed, they have problems with physical activity. These types of problems demand treatment as soon as possible. It is essential to introduce individual education and rehabilitation which may improve the effectiveness of teaching, increasement of the general activity and motivation to take actions.

#### Introduction

As far as in the process of monogenesis the formed specimens most often have the same genome as the parents, the gamogenesis leads to formation of a new genome. For that reason it is one of the most import ant sources of the organisms' variability. The sexual reproduction can be defined as a process of offspring procreation, in which the new generation acquires genetic information obtained from both parents (Danowski 2002).

In the earliest phase of the embryonic life both male and female primordium of genitalia occurs. Their further differentiation is conditioned by the chromosome composition and hormone effect. The variability transmitted hereditarily is of crucial importance for evolution (Danowski 2002).

In the human genetics the most significant role is played by diseases passed down hereditarily because most of them constitute a substantial problem. As they cannot be permanently cured, it may be tried to decrease effects dangerous to life and health.

Klinefelter's syndrome was first described in 1942. The name of the syndrome comes from Harry Flitch Klinefelter, who described 9 cases of patients with gonadal dysgenesis, elevated level of gonadotropin in urine, microorchidism, eunuchoidism, azoospermia and gynecomastia. Afterwards it turned out that information about the cases of syndrome were reported earlier. In 1895 Richard Altmann (1852-1900) described a patient with symptoms of the syndrome. At first Klinefelter's syndrome was considered as an endocrine disorder of unclear etiology. The chromosomal origin of the syndrome was discovered by Patricia A. Jacobs and J. A. Strong from Western General Hospital in Edinburgh in 1959, described a 24-year-old man with symptoms of the Klinefelter's syndrome (Jacob and Strong 1959).

The actual frequency of occurrence can by defined only on the basis of population prenatal and postnatal diagnostic tests as it is estimated that only 25 to 33% of men are diagnosed. The population tests in Denmark based on the Cytogenetic Central Register including over 70 000 prenatal tests, found in years 1970-2000 the occurrence of the Klinefelter's syndrome with the frequency of 213 cases in 100 000 male fetuses, which, with the standardization of many mothers, corresponded to the frequency of 153 in 100 000 male fetuses. The results of the tests were corresponding to the results of cytogenetic neonates screening test (151 in 100 000) (Dutkiewicz at al. 2001, Szalecki 2006, Śmigiel and Stembalska 2007).

The causes of the occurrence of phenotypical features of the Klinefelter's syndrome are not entirely clear – indirectly they result from the chromosomal aberration with the presence of

additional X-chromosome which is connected with the previously mentioned testes failure, decreased testosterone production and delay in maturation of the epiphyseal cartilages. At present, it seems that the most significant factor is polymorphism of the androgen receptor gene located on the X -chromosome (Ferguson-Smith and Connor 2002, Korpysz and Szalecki 2006, Szalecki 2006).

## **Characteristics of the disease**

Klinefelter's syndrome is connected with many bodily-sexual disorders occurring in men. Clinically, those persons demonstrate a number of disorders referring to the androgenic testicular hypofunction. The reproductive organs in this syndrome are always small but hard. Ultrasonography shows that the size of testes is only a few millimeters, most often less than 5mm. Primary infertility and gradual disappearance of potency is observed. A number of symptoms dependent on the degree of androgenic testes activity dysfunction, concerning secondary and tertiary sexual characteristics (Krawczyński at al. 1998, Krawczyński 1998, Szalecki 2006, Śmigiel and Stembalska 2007).

Slightly less developed scrotum with discoloration, often sagging is characteristic, however the penis is developed properly. There are no pathological changes of the vas deferens area. In most cases bilateral gynecomastia occurs.

Usually the figure presents eunuchoid or gynoid features (i.e. upper and lower extremities have are of increased size in relation to height, while the intertrochanteric size is increased in relation to the interbrachial size). Increased development of the layer of fat in the hips are and tallness are observed. The scalp hair and pubic hair are of female-type distribution, the underarm hair is normal or sparse whereas the facial hair is sparse or absent. Changes are reported in the radiological picture of the cranium region, they include: flattening of both temporal areas, enlarged frontal sinuses, early fusion of the coronal sutures, small sella and lack of third molars in dentition (Fracki and Bablom 1999, Jakubowski et al. 1999, Kosowicz 1999, Szalecki 2006).

Already in the early infancy stage, a frequent feature is muscle hypotony of different intensification – from mild to severe.

According to many authors, together with the Klinefelter's syndorme there is a number of anomalies connected mostly with the skeletal system; for example cubitus varus, iliofemoral articulation degeneration, pigeon chest, clinodactyly, syndactyly, shortening of the fourth metacarpal bone, high palatal vault, radio-ulnar synostosis, micrognathia and hypertelorism (Szalecki 2006).

A specific osseous change in the Klinefelter's syndrome with the 48XXXY karyotype is the fusion of the proximal part of the radius with the ulna whereas in patients with the 47XYY karyotype, the pictures indicate greater length of the metacarpal bones over phalanges. Probable, these are secondary changes, caused by muscle hypotony.

A tendency towards cardiac anomalies, such as tetralogy of Fallot, Ebstein's anomaly and ventricular septal defect, is observed in men, who are diagnosed with Klinefelter's syndrome. Reduced bone mass up to 15% is reported in ¼ of the patients. Men with the syndrome have tendencies towards deep vein thrombosis, lower extremities varices, shank ulceration, diabetes, epilepsy, alcoholism, disorders of thyroid functioning, immunological dysfunctions of the autoagressive nature (celiac lupus erythematosus, rheumatoid arthritis), kidney diseases (Kokot, 1988).

Those anomalies do not occur often enough to classify them to the typical symptoms of the syndrome but their frequent occurrence in men with karyotype different than 47 XXY was observed.

Neuropsychological tests indicate decreased intelligence quotient. Noticeable failures become evident already in school when the need for abstract thinking arises. There is a delay in speech development, dyslexia, dysgraphia and dyscalculia.

Mental stupor and mental retardation often lead to suicidal attempts and depression, which grow more intense with age. Emotional disorders in Klinefelter's syndrome, are related to a little

degree of independence, being easily amenable to influence, little resistance to stress, neuroticism, infantilism and passive-aggressive personality. Apart from the obvious sterility in the psychosexual sphere, decreased libido and problems with sexual intercourses are observed. Men with the syndrome get frequently intensely involved in unstable relationships, which afterwards lead to emotional crisis; they try to avoid being rejected. The life time of people suffering from Klinefelter's syndrome is over 2 years shorter than the average population life time. It results from the susceptibility to infections, neurological disorders, cardiovascular, respiratory and urinary system diseases. Additionally, the frequency of occurrence of autoimmunological diseases of the thyroid and diabetes type 2, significantly increases in this group (Korpysz and Szalecki, 2006, Krzyżowski 1999, Rabijewska and Zgliczyński 2009).

# **Everyday life problems**

Features characteristic for the clinical picture form already in the puberty period or just after its completion. The people with this kind of syndrome have problems with personality disturbance of the borderline type. According to ICD-10 (International Statistical Classification of Diseases and Related Health Problems 10 Revision) diagnostic criteria persons suffering from those disorders are characterized by vague or disordered self-image, their own goals and inner preferences (including sexual preferences), tendency towards involving in unstable relationships, which often lead to emotional crises, strenuous trials to avoid being abandoned, repeated threats or selfdestruction behaviors as well as constant feeling of inner emptiness (Krzyżowski 1999, Mikołajczyk i Wawrzyniak 2009).

Most of patients cause raising difficulties and the need of individual education arises (Gardziejczyk et al. 2006).

Persons with the Klinfelter's syndrome are members of the society and they perform different functions in the society. There are a lot of negative attitudes against them which negatively affects their social lives. Those wrongful opinions conduce to suspiciousness, feeling of oversensitiveness and lead to conflicts at work. In view of the behavior or external characteristics, those people are very often treated with distrust; they are isolated from the society which makes the adaptation with the surroundings difficult for the persons concerned.

# **Individual education**

Boys with Klinefelter's syndorm present significant failures already in primary school when the need of abstract thinking arises. Speech and reading abilities are delayed; memory and logical thinking are disturbed. These types of problems require aid as soon as possible. It is essential to introduce individual education which may improve the effectiveness of teaching, increasement of the general activity and motivation to take actions (Sekułowicz 2006).

In such cases The Good Start Method can be employed. This method makes use of visual stimuli, such as graphic signs or pictures or auditory stimuli, such as a song or melody. Copying the graphic signs linked to musical rhythm gives conditions for stimulation of the motor activity. The exercises are introduced sequentially with gradual intensification of their complexity. Three components are distinguished: introductory, proper and concluding. The proper component of the classes are the motor, motor-auditory and motor-auditory-visual activities. The Good Start Method focuses on teaching writing and reading hence during the exercises of this method, attention is paid to a correct arrangement of the child's hands, to rhythm and tempo of the sung songs and the accuracy of articulation. It performs the corrective function by leveling the developmental deficits. Since the classes are carried out as play and in the atmosphere of complete acceptation there is an occasion to abreact the tensions. There is a need of constant stimulation concerning the child's performance by applying adequate dynamizing methods (Olszak 1996).

## **Mental problems**

It was proved that psychotherapy in Klinefelter's syndrome plays a very important role in the quest for orienting on strengthening the neurotic, threatened in the social environment 'Me', which helps with the self-acceptance, reduces feeling of anxiety and facilitates functioning within a family. In such case the only possibility to help is the self-acceptance oriented psychotherapy. The psychotherapy commences here from certain foundation, when the personal sexuality is accepted but causes problems in the relation with personal 'Me', members of the family, occupational and social environment. The psychotherapy, apart from group and individual therapy, should also educate the patient's family, so that the relations could improve and to adjust the family to the child's 'otherness', teach tolerance, appropriate attitude and understanding. Next difficulty is achieving the self-acceptance combined with the identification of own sexual role and type of sexual activity. It is also important to neutralize the ghetto mentality and minority psychology (Jaczewski and Radomski 1986, Kalicka-Kasperczak at al. 1994, Lew-Starowicz and Lew-Starowicz 1999).

#### Occupational rehabilitation

The final element of rehabilitation, which acts on many levels, is the occupational rehabilitation. It was proved that it is necessary in some cases of men suffering from this disease, since their sense of social rejection resulting from the external appearance or character traits, may evidently affect the occupational life. For that reason, it is important that the patients with Klinefelter's syndrome can make use of the psychologist's, careers officer's help and take part in professional trainings. Those persons undergo medical, psychological, social and professional examinations and the obtained results are the basis for the occupational forecast and are used to issue a certificate classifying to a selected direction of professional preparation. A person, who has been erased from the society in result of a certain dysfunction, has the right to come back. The community does not have the right to reject such person; frankly it should facilitate him/her joining in the everyday social life. In case of those men, the professional work adjusted to their disability is a factor which determines comfort of the personal or social life. A well-chosen work teaches acting in group, does not let the patients sickly consider the worries and problems; it extends the range of practical abilities, brings people together and improves the general mental and physical state. It advances self-realization, regaining the feeling of self-worth and finding oneself in certain social roles. The occupational environment may neutralize anxiety and favor self-acceptance through a tolerant attitude. The occupational environment and the type of performed job may activate suppressed, concealed interests (Lew-Starowicz and Lew-Starowicz 1999, Pankowska 2005).

## Treatment and rehabilitation

The first step which gives the opportunity to deal with the negative consequences of the Klinefelter's syndrome, initially undertaken by the doctors, is to balance the testosterone deficiency as well as the spermatogenesis induction carried out by administering chorionic gonadotropic hormone, testosterone preparations in order to obtain and maintain secondary male sexual characteristics, using intramuscular esters and oral and percutaneous medical preparations. All these actions aim at alleviating the negative consequences of the disease and the physical sphere and in many cases recover fertility, which may allow the proper functioning in the society.

Some clinical test which deal with this type of genetic diseases showed that the parsons with Klinefelter's syndrome often suffer from shank varices with ulceration of significant degree. Ulcerations of this type are most often the consequence of chronic venous insufficiency which occurs in these patients.

According to the bibliographical data the risk of shank ulceration increases substantially in patients with Klinefelter's syndrome. The frequency of occurrence of the shank ulceration in patient's with Klinefelter's syndrome is 6 to 13%. The risk increase of the shank varicosity and thromboembolic disease compared with the health population was also emphasized (Lijowski-Bochnia and Brzeski 2000, Campbell at al. 1981).

In persons with the Klinefelter's syndrome the pathogenesis and cause of the shank ulceration is not known. An increased platelets' aggregation was discovered in persons with the syndrome and this conclusion was confirmed by many authors. Another factor are the vascular anomalies. A frequent occurrence of multiple angiomas on the patients' skin as well as multiple subarachnoid hemorrhages were described. One of the therapies, which may be used in the shank ulceration is the compressotherapy - it accelerates wounds healing and the continuation of the pressing therapy may prevent neoplasm. The sequential and lymphatic massage may be also recommended soon after the edema subsides. A very important factor enhancing healing of the ulceration is a proper whole-extremity skin care, appropriate nutrition, life-style change, patient education, preventive treatment and pharmacological medicines (Campbell at al. 1981, Jaxa-Chamiec 2008, Kokot 1988, Lijowski-Bochnia and Brzeski 2000).

Physiotherapeutic treatments, such as ultrasound, magnetotherapy, laser therapy and electrotherapy are also advised.

The ultrasounds influence the increased speed of shank venous ulceration healing. They have a cleansing effect on the infected wounds or ulceration from the bacteria-containing purulent discharge, simultaneously they accelerate the tissue granulation process in the base of a wound. The most frequently applied method is the use of ultrasounds in the water bath of 34°C temperature and distance of 2 cm from the base of the defect. The extremity should be immerged in water 10 cm above the ulceration. In practice, the applied dose ranges from 0,5 to 1W/cm<sup>2</sup> The ultrasounds are applied for 5 minutes in little wounds of around 2 cm whereas together with the wound surface extension the time of treatment increases to 10 minutes. If the wound size exceeds 20 cm, it is divided into two surfaces and they are acted on separately. The treatment procedures should usually be performed every second day (Fornalczyk-Wachowska and Kuliński 2001,2008).

Another physiotherapeutic procedure applied in the healing process of the shank ulceration is the magnetic field of low frequency. Indication for this procedure are first of all chronic wounds. Alternating magnetic field of low frequency stimulates immunoreactivity and cell and humeral immunity of the whole organism (Fornalczyk-Wachowska and Kuliński 2001). Magnotherapy is performed everyday until the ulceration is cleansed and depending on the clinical stage, different parameters of the treatment procedure are being used. The range of the magnetic induction fluctuates between 2 to 20mT and the frequency from 5 to 75Hz (Khadir at al. 1999).

Positive results in the shank ulceration treatment are visible also after employing laser therapy. The effect of biostimulating low level laser therapy is represented by the blood circulation and tissue trophic improvement through the rehabilitation of cell nourishment and blood circulation mechanisms. It may be stated that the laser light accelerates the regeneration of the blood and lymphatic vessels, stimulates the hematopoietin function of the marrow and increases the hemoglobin content in blood cells. The blood coagulability decreases by reducing platelets' aggregation and increasing the concentration of the free heparin in blood. The laser therapy is employed as an additional element of treating the shanks ulceration, especially in cases with accompanying chronic eczema lesions. The treatment procedures should be performed everyday in the period of cleansing the ulceration, next, after amelioration of the local condition, every second day. The employed wavelength is 632,8nm and applied dose is 4J/cm<sup>2</sup> during every procedure. High effectiveness was also obtained while employing 830nm wavelength. A considerable blood flow is evident already in 30 minutes after the treatment (Błaszczak at al. 2007, Czernicki at al. 1994, Schindl at al. 1999).

In the peripheral circulation treatment, electrotherapy may also be used. The high voltage method uses short, subsequent spike, single-phase pulses of  $5 - 200\mu$ s duration and 1 - 125Hz frequency and high voltage, usually of 100-150V, at times reaching even 500V (Fornalczyk-Wachowska and Kukliński 2008). The therapy helps to increase the diffusive, osmotic processes, metabolism increases as well. The improvement of the nutritional function caused by the enhanced blood flow through the tissues is evident. The treatment procedure is performed by means of two traditional flat carbon rubber electrodes located in an appropriate distance from each other. The active electrode is placed directly on the ulceration or symmetrically on both sides of the wound. The treatment procedures are performed from few up to twenty weeks, everyday and the duration of each procedure is several dozen minutes. It seems that the most effective is alternating polarization with periodic changes of polarization. At later stages of the therapy, anode stimulation or treatment

with the change of cathode polarization lasting at first 20 minutes to anode polarization lasting 40 minutes in order to accelerate the tissue granulation and cleanse the lesion from the purulent discharge, are applied (Błaszczak at al. 2007).

Frequent occurrence of osteoporosis is diagnosed in the Klinefelter's syndrome. <sup>1</sup>/<sub>4</sub> of the patients is diagnosed with reduced bone mass up to 15%. The rehabilitation process in men with Klinefelter's syndrome, in whom the osteoporosis was discovered, needs to be supported by balance, breathing and loosening exercises and later exercises improving the deep stabilization. Such exercises help to compensate detrimental changes in the spine ligament system which develop as a consequence of advanced kyphosis and decreased body height. Extensor muscle of the spine reduce forward bending of the figure, which limits the overload on the vertebral bodies and simultaneously the risk of secondary injury to the osseous tissue and progression of the osteoporosis symptoms. A vital element of the exercises is a complete correction of the spine (Dega 1983, Mędraś and Jóźków 2000, Mika 2003, Misiorowski et al. 2008).

An important component, are exercises which improve maintaining balance. A crucial element is keeping complete safety while performing the exercises. A recommended form is for example alternate standing on toes and heels thanks to which the ability of fast body mass dislocation improves, which is crucial in case of falling threat. Various forms of sensomotor training with the use of cushions and other equipment which enrich the training (Mika 2003).

It is recommended to exercise large groups of muscles, such as abdominal muscles, back muscles, muscles of the pectoral and pelvic girdle as well as exercises performed in water environment which are a deloading factor (Jabłońska 2003, Kołodziej 1989).

Persons with Klinefelter's syndrome are often characterized by emotional disorders, which are connected with little degree of independence and resistance to stress, neuroticism and passive-aggressive personality. One of possibilities to alleviate those negative attitudes may be classic massage which allows calming oneself down.

The effect of the massage may be enhanced by supportive agents such as aroma oils, for example chamomile or bergamot oil which are useful in anxiety or depression state. They have got a calming and antidepressant effect, soothing the mind and nervous system.

A frequently observed feature in men with Klinefelter's syndrome is the muscle hypotony of different degree of intensification – from mild to severe. Some authors notify that the Klinefelter's syndrome is connected with many anomalies related mostly to the skeletal system, such as cubitus varus, pigeon chest or iliofemoral articulation degeneration. The preventive treatment, and at later stage, correction of the resultant changes, become crucial in order to prevent further advancement of the hypotony and other anomalies of the skeletal system. The benefits of total conditioning exercises are visible in the locomotor system, they have a developing effect which is extremely important during maturation. The strength and muscle mass also change favorably, which is often a problem for the persons with Klinefelter's syndrome; the endurance changes as well which helps to avoid overload and perform movement activities without greater effort. Strengthened bony frame protects against overload of the capsular-ligament apparatus and articulations, it also improves the stability of articulations which prevents the advancement of the iliofemoral articulation degeneration and cubitus varus which are frequently observed in those men. That type of exercises affects the osteoarticular system by shaping it and increasing its endurance. The training should not be monotonous. The exercises need to be modified, preferably every day, so that they give satisfaction and are a form of relaxation. As the name indicates, those exercises are a form of whole body rehabilitation, its all systems, among others also the cardiovascular system within the myocardium as well as the peripheral circulation (Zembaty and Kokosz 2002, 2003).

A crucial element of the training are resistance exercises which are oriented on forming the muscle strength. The general instructions concerning these exercises focus on the fact that the overload cannot exceed 50% of the maximal strength and the exercises should be performed with no isometric work. The weight of the overload should be modified in the moment when the exercising person performs 10 repetitions without feeling fatigue. The training should include 8-10

repetitions, two or three times during training sessions, from 2 to 3 times a week.

Breathing exercises are a form of rehabilitation which affects multidimensionally and effectively not only the respiratory system but also cardiovascular and nervous systems, improving the quality of functioning of the musculo-skeletal-ligamentous system. Patients with Klinefelter's syndrome are more frequently diagnosed with anomalies of the thorax, such as pigeon chest. It is characterized by the sternum deformity which forms a forward directed protrusion, resembling a prow, and a visible below the nipples evident concavity.

While characterizing the negative influence of the thorax deformity on the respiratory and cardiovascular system, the impairment of the respiratory muscles, decreased lungs capacity and limitation of thoracic movements need to be mentioned. In case of this defect, the breathing exercises play a very important role. Their aim is to teach breathing by the correct course, increase the lungs vital capacity, strengthen the respiratory muscles and increase the thoracic movements. The patient needs to be taught to concentrate during breathing, which allows to expand certain areas of lungs and to make the proper parts of the thorax convex. It is important that the patient emphasizes and lengthens the exhalation phase, whereas the inhalation should be deepened by means of the upper extremities bending or abduction movement (Kalka 1996).

Apart form breathing exercises, the rehabilitation program connected with the thoracic defects should also include total conditioning exercises, specific exercises of a forming character referring to a particular type of thoracic defect, stamina-oriented exercises, developing the efficiency of the internal organs and front crawl or butterfly style swimming.

Breathing resistance exercises affect the increase of the lungs expanding and mobilization of additional respiratory muscles. The resistance may be applied during inhalation as well as exhalation. Exercises activating the blood-vascular system increase the capacity and improve the functioning not only of the myocardium and the conduction system but also other systems of the organism (Kasperczyk 1981, 1994, 1996, Rosławski 2001).

## Music Therapy

Another type of therapy applied in the rehabilitation of persons with Klinefelter's syndrome is music therapy. Music exerts an extra-intellectual effect on human beings, it allows to put the positive and negative feelings in order, motivates to take actions, contributes to cooperation and easier contact establishing, reduces conflicts, activates, makes relieving the inner tension possible, increases concentration. This form of therapy is easy to apply as it can be carried out without extended explanations or clarifying rules. It may be conducted individually or in group (Janiszewski 1998, Natanson 1988).

A form of rehabilitation of patients with this rare disease are activities including dancing and gymnastics, they combine exercises which shape particular parts of the body and affect the general development. They are a specific kind of music therapy which helps to calm one down and to relieve the negative emotions. The purpose of these exercises is to enhance the general physical fitness, develop dancing skills and sensitize to music. The fun forms of the musical activities promote relaxation, decrease tension and allow to avoid a feeling of frustration (Dębicka 2004, Nowotny 2003).

#### Hippotherapy

Hippotherapy affects the mental as well as physical sphere of the patients. The neuromotor influence of hippotherapy, due to a constant dialog between the patient and a horse and its motion, is always connected with the psychological aspect – a contact with a living being. Simultaneously by the contact with the horse's body, the sensomotor sphere is activated – perceiving the warmth, smells, consciousness of own body, its location in space, planning movements. Hippotherapy allows the patients to feel what independence and boosted self-confidence are and at the same time it provides an opportunity to feel joy, satisfaction and success with which persons with Klinefelter's syndrome have a lot of problems. The horse's moves, its warmth and calmness help to control undesirable emotions and behaviors and to strengthen and support positive ones. That experience helps to stimulate inner mental and physical potential. It may be said that during the therapy, the

horse changes into a very precise movement stimulator. Thanks to the hippotherapy it is possible to stimulate the psychomotor development through an improvement in the visual-movement coordination, spatial imagination and cognition of own body outline. Increased capabilities to focus attention and maintain organized activity, speech development stimulation and vocabulary expansion, improvement of the defensive and balance reactions, posture correction due to proper functioning of the postural muscles are observed (Gąsiorowska i Paszkiewicz 2002). Dog therapy

Dog therapy is one of natural forms supporting rehabilitation and treatment of disabled persons through plays and exercises performed with appropriately trained dogs. Dog therapy contributes to restoring physical fitness as well as developing the emotional sphere. For that reason this therapy is addressed not only to disabled persons but to lonely ones too, which is a frequent problem for persons with Klinefelter's syndrome. Dog therapy influences socialization and sensitiveness among sick persons with this disease since contact with a dog suppresses signs of aggression, forces a child or adult person to behave differently. The uniqueness of the relation with a dog results from a feeling of increased self-worth of a human being. A dog unconditionally accepts a human being just as he/she is. It is not important for a dog how we look like or how we behave, on condition that the behavior is not directed against the animal. A dog treats everybody in the same way, it does not judge by the appearance. A crucial aspect of dog therapy is the fact that the sick people feel needed - taking care of a dog, giving commands, keeping a dog on the lead, they know that they are needed and at the same time they unconsciously improve their physical condition (Puszczewicz and Czwiertnia 2008).

## Organizations dedicated to Klinefeter's syndrome

One of the organizations which deals with rare genetic syndromes in Poland is the Association for Children with Genetic Disorders (Stowarzyszenie na Rzecz Dzieci z Zaburzeniami Genetycznymi). The most important aim of their activity is a comprehensive aid directed to children with rare genetic disorders, their parents, carers and specialists, help in the organization and management of versatile forms of treatment and education, rehabilitation and work with children with rare genetic disorders. The association organizes a data base concerning the rare genetic disorders. It cares for the popularization of the problem and integration of the community. The organization conducts trainings and conferences for parents and specialists. One of its tasks is also raising funds for the sick children. The cooperation involves authorities, institutions, non-governmental institutions and similar organizations in Europe and world. Additionally they look for contact with parents of children from among 400 rare chromosomal syndromes including the Klinefelter's syndrome. They capacitate contact between families, members of GEN association; they support them in searching for information concerning rare syndromes, diagnosis, treatment, rehabilitation and supporting individual development [www.gen.org.pl].

# Conclusion

The presented disorders and resulting from them patient's inner conflicts referring to identity, family relations, lack of acceptance with accompanying emotional chaos and disorders which are the consequences of this mutation, classify the patients with Klinefelter's syndrome to the described forms of therapy.

The conclusions which need to be drawn on the basis of the presented information support the idea that comprehensive rehabilitation procedures and health preventive treatment, may affect the life comfort of everybody, including those, whose psychosexual and physical sphere has in some sense been upset as a result of bodily disorders. This disease affects many aspects of life and for that reason the rehabilitation treatment also has to be carried out on many levels. Despite the lack of a specific remedy and not entirely known causes of the mutation, the attention needs to be focused on the rehabilitation treatment in order to prevent the consequences of diseases which more frequently occur in men with this mutation than in the rest of population, e.g. osteoporosis or ulceration of the lower extremities. The actions should be undertaken gradually and consequently in order to obtain the best, satisfactory for the patients, results, at the same time improving their life comfort. By virtue of their appearance, infertility and emotional problems, persons with Klinefelter's syndrome become withdrawn and go to extremes creating a vicious circle from which they cannot get out. It is important that in the course of gradual introduction of the specific therapies the patient gets the support of third parties: family, friends and the therapist himself. Apart from education of the people closest to the patients, the therapist himself should support the patients in their efforts, accept them as they are and motivate to further actions, assuring them of the benefits gained from the therapy.

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