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Personality traits and sex-role schema in adult patients with childhood-onset combined pituitary hormone deficiency not treated with growth hormone

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ABSTRACT

Background. Patients with combined pituitary hormone deficiency have quantitative and qualitative abnormalities of pituitary hormone production that may trigger psychological consequences. Several studies have evidenced symptoms of social disturbances in these patients.

Aim. The aim of this study was to evaluate personality traits and psychological sex-role schema influencing social adaptation in patients with childhood-onset combined pituitary hormone deficiency.

Material and Methods. Study involved a unique group of 28 adult patients with childhood-onset combined pituitary hormone deficiencies that were never treated with growth hormone. To psychological assessment the short Polish version of Bem's Sex Role Inventory and the Polish version of Minnesota Multiphasic Personality Inventory were used in the study.

Results. The analysis of scores on the Polish version of Minnesota Multiphasic Personality Inventory showed significantly elevated results in the scales for lying, hysteria, psychopathic deviation, hypochondria, and schizophrenia as well as decreased scores in hypomania indicating a number of symptoms of maladjustment in many different areas of life. The short Polish version of Bem's Sex Role Inventory scores indicated that most of combined pituitary hormone deficiency patients were sex-undifferentiated and no one was androgynous.

Conclusions. The sex-role schema and certain personality traits seem to predispose childhood-onset combined pituitary hormone deficiency patients not treated with growth hormone to problems with social adaptation and greater susceptibility to situational stressors. Neurotic reactions, tendency for social alienation, and lack of flexibility have all been observed in these patients. Therefore, combined pituitary hormone deficiency patients may more often need special support when it comes to coping with disease.

Keywords: personality; sex role schema; gender identity; hypopituitarism; growth hormone.

Introduction

The term Combined Pituitary Hormone Deficiency (CPHD) is used to describe the condition where the pituitary gland ceases to produce and release two or more hormones, one of which includes growth hormone (GH). Symptoms of GH deficiency (GHD) in adults commonly include fatigability, poor exercise perfor-

mance, and symptoms of social isolation and cognitive impairment [1, 2]. Deficiency of pituitary hormones cannot only affect the development of the body, but also has been proven to result in psychological consequences [3]. Hormones play a crucial aspect in almost all areas of development so it is no surprise it can present effects on a psychological scale. It has been found

that many patients exhibit a lack of concentration along with impairments of memory performance when pituitary hormones are deficient [4, 5]. However, little is known about the quality of social existence, dimensions of self-esteem, and psychological health in patients with CPHD. Most past studies dealing with this topic were performed on a group of short stature children [6–8]. Relationships with older patients who suffer from CPHD and the psychological and social aspects that are implicated are not currently known.

Furthermore, along with physical and psychological well-being, an important attribute of human existence is personality [9]. Personality can impact individuals in how they interact with the world around them. The influence of personality along with psychological sex roles can vary greatly in their effect on behavior and cognition in individuals [10]. It was suggested that psychological gender affects social competence and psychological health with an emphasis on stress resistance. Sandra Bem claimed that there are four sex types that differentiate people and further condition their behavior, intelligence, and emotional reactions, which can be measured with the Bem Sex-Role Inventory (BSRI). Bem called these types: **masculine, feminine, androgynous, and undifferentiated**. Of course, the masculine and feminine categories can be cross-typed leading to a different psychological sex than an individual's biological sex. Sex type can have a tremendous impact on how individuals view themselves along with their interactions with others and the environment surrounding them. A common understanding of masculinity or femininity within oneself results in visible proprieties and behaviors associated with sexuality. These associations contribute to cultural attitudes and beliefs [11, 12].

All of these factors play a role in the social well-being of individuals. The aim of this study was to further investigate factors influencing social adaptation such as **personality traits and sex role schema as determinants** of style of reaction, perception, and stress management in childhood-onset CPHD patients not treated with growth hormone.

Material and Methods

Subjects

The study was carried out on 28 adult patients (16 males and 12 females) and referred to the Department of Endocrinology due to childhood-onset combined pituitary hormone deficiency.

The mean age when the first hormonal deficiency diagnosis in CPHD patients has been made was $8.7 \pm$

7.0 (range 2–26 years old). In all patients, GH, thyrotropin (TSH), and gonadotropin (LH/FSH) deficiencies were diagnosed and hypoplasia of the anterior pituitary lobe was found on MRI study. Seventeen patients (60.7%) were receiving hydrocortisone because of the early or late onset of adrenocorticotropin (ACTH) deficiency and 12 patients (42.9%) also exhibited prolactin (PRL) deficiency. All patients were receiving hormonal replacement therapy including levothyroxine and sex hormones but no one was treated with recombinant human GH before this study. This criterion emphasized the importance and unique character of the studied group but simultaneously limited the number of examined subjects. The control group consisted of 28 healthy persons matched regarding age, sex, and level of education. Demographic data of CPHD patients and controls were shown in the **Table 1**. The psychiatric diseases in both groups were excluded in preliminary psychological consultation.

Table 1 Characteristics of patients with CPHD.

Variable	CPHD patients (n = 28)
Sex – n (%):	
– males	16 (57.1)
– females	12 (42.9)
Age (years) – mean \pm SD (range) at the time of psychological study	41.7 \pm 11.1 (18–59)
Age, when the testosterone or estradiol/progesterone therapy was initiated – mean \pm SD (range)	19.8 \pm 4.6 (9–30)
Age, when the thyroid hormone therapy was initiated – mean \pm SD (range)	15.6 \pm 6.8 (6–29)
Education – n (%):	
– elementary level	15 (53.6)
– high school	10 (35.7)
– university level	3 (10.7)

Methods

Personality traits

Minnesota Multiphasic Personality Inventory (MMPI) developed by Hathaway and McKinley, adapted to the Polish version, was used to assess personality [13, 14]. This questionnaire consists of 10 clinical scales, which are used to identify different psychological conditions. Scales include: hypochondriasis (Hd), depression (D), conversion hysteria (Hy), psychopathic deviation (Pp), masculinity and femininity (Mf), paranoia (Pa), psychasthenia (Pt), schizophrenia (Sc), hypomania (Ma)

and social introversion (Si). There are also 3 validating scales including: lie (L), infrequency (F), and defensiveness (K). The psychometric investigation was conducted both in studied and control groups.

Sex Role Inventory

The Polish version of Bem's Sex Role Inventory (IPP) adapted by A. Kuczynska [15, 16] was used to assess psychological sex role. The short form has 35 items, which represents half of the items that compose the original form. The 35 items include 15 masculine adjectives, 15 feminine adjectives, and 5 neutral adjectives (Table 2). This scale assesses masculinity, femininity, androgyny, and undifferentiated roles. One can be defined as sex-typed (men score high on the masculinity scale and low on the femininity or vice-versa for women) or cross-sex typed (men score low on the masculinity scales and high on the femininity scales or vice-versa for women). Those individuals classified as masculine have characteristics like the "typical male" while those who identify as feminine have characteristics like the "typical female" according to traditional views of society. Those named undifferentiated represent individuals for whom the dimensions of masculinity and femininity are not essential and do not identify fully with either. People who are defined as androgynous have high levels of both masculine and feminine characteristics [11]. The IPP is a standardized and normalized psychometric tool that allows conducting the study without the requirement for a comparison of the control group.

Statistical analysis

The grouped data were expressed as the mean \pm standard deviation (SD). The D'Agostino & Pearson test was used to check the normality of the data distribution. All data was compared using the Student t-test or Mann-Whitney's test.

Table 2. Short sex-role schema inventory used in the study [15, 16]

Feminine	Masculine	Neutral
- sensitive	- dominant	- reliable
- affectionate	- athletic	- likable
- eager to soothe	- cheerful	- truthful
- hurts feeling	- acts as a leader	- tolerant
- yielding	- self-confident	- sympathetic
- having a sense of aesthetics	- self-sufficient	
- grumpy	- independent	
- able to make sacrifices	- competitive	
- tactful	- set for success	
- image-conscious	- willing to take a stand	
- sensitive to other's needs	- forceful	
- tender	- clever	
- warm	- makes decisions easily	
- gentle	- open-minded	
- coquettish	- experimenting in sexual life	
- gullible		

Ethical approval

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and national research committee and with the 1964 Helsinki declaration and its later amendments on comparable ethical standards.

Results

The analysis of the MMPI results (clinical scales results are showed in Table 3) in CPHD patients in comparison with healthy controls showed significantly different personal characteristics. CPHD patients exhibited evidence of numerous somatic symptoms, tendency to complain, a sense of dissatisfaction, and deductions from life (hypochondriasis; $P = 0.003$); egocentrism, excessive expectations, and care and support of the environment (conversion hysteria; $P < 0.0001$); social alienation with irresponsibility, failure to conform to social norms, deceit, and impulsivity (psychopathic

Table 3 The results of clinical scales of MMPI in CPHD patients and controls.

Groups	Hypochondriasis (Hd)	Depression (D)	Conversion hysteria (Hy)	Psychopathic deviation (Pp)	Masculinity/Femininity (Mf)
CPHD patients	72.0 \pm 8.1	78.0 \pm 13.0	56.0 \pm 5.9	69.0 \pm 14.0	50.0 \pm 4.8
Controls	64.0 \pm 9.0	75.0 \pm 6.2	48.0 \pm 5.7	63.0 \pm 6.0	58.0 \pm 5.5
P value	0.003	0.123	< 0.0001	0.047	< 0.0001
Groups	Paranoia (Pa)	Psychastenia (Pt)	Schizophrenia (Sc)	Hypomania (Ma)	Social introversion (Si)
CPHD patients	62.0 \pm 9.0	72.0 \pm 13.0	78.0 \pm 18.0	58.0 \pm 15.0	62.0 \pm 10.0
Controls	59.0 \pm 11.0	68.0 \pm 12.0	66.0 \pm 10.0	64.0 \pm 11.0	63.0 \pm 6.8
P value	0.323	0.278	0.003	0.006	0.662

deviation; $P = 0.047$). They also presented with feelings of being pushed to the margins of social life, avoiding contact with people, reserve, shyness, poor contact with reality, avoiding new situations, and problems with their own "self" (schizophrenia; $P = 0.003$); decreased level of excitability (hypomania; $P = 0.006$), and the need to show themselves in a better light and hide their psychological problems in comparison with healthy controls ($L - lie$; $P < 0.0001$) (Table 4). In the masculinity/femininity scale, CPHD patients also showed lower scores in comparison with controls ($P < 0.0001$).

The principle finding of the IPP study (Table 5) was that not one of the examined patients with combined pituitary hormone deficiency was psychologically androgynous (the combination of "male" and "female" in the mental processes of individual creativity) with both stereotypical masculine and feminine traits. More than half of all investigated individuals (61%) were undifferentiated (those with low scores on both masculine and feminine scales), almost 18% among 28 subjects with CPHD were identified as "sex-typed" and 21% as "cross-sex". It also appeared that these scores were very similar in both males and females.

uals have poor self-esteem and tend to avoid aggressiveness [3, 17–20]. It is already known that lack of any hormone can potentially result in negative outcomes for the individual; psychological problems in the emotional, motivational, and cognitive processes have all been noted [3]. It has also been found that patients with hormonal deficits tend to retire early [21]. This could perhaps be due to the inability for these patients to cope with the stress of the workforce as they age. Further studies are needed to examine how GH plays a role in the elderly population (> 65 years old).

The individual reaction from hormonal deficiency is additionally connected with personal predispositions, including psychological traits [18, 22]. These personal predispositions play a big role in determining how certain factors can impact social functioning, especially factors that cannot be controlled. For example, people with chronic illness are at a greater risk for psychiatric disturbances and social adjustment problems than those without disease [23]. Chronic conditions are associated with increased psychological distress, functional limitations, and may affect specific personality development [24].

Table 4. The results of validation scales in CPHD patients and controls

Groups	Lying (L)	Infrequency (F)	Defensiveness (K)
CPHD patients	57.0 ± 6.1	61.0 ± 12.0	59.0 ± 8.3
Controls	50.0 ± 5.5	66.0 ± 6.6	55.0 ± 6.6
P value	< 0.0001	0.182	< 0.069

Table 5. Sex-role inventory results in patients with CPHD expressed in % (numbers)

Biological sex	Psychological sex role			
	Sex-typed	Cross-sex	Undifferentiated	Androgynous
Male	13% (2)	31% (5)	56% (9)	0
Female	25% (3)	8% (1)	67% (8)	0
All	18% (5)	21% (6)	61% (17)	0

Discussion

Growth hormone is one of the most important pituitary hormones necessary for proper growth and development of children showing unfavorable results when deficient. Sufficient physiological GH level and function are also necessary to maintain proper mental functioning and cardiovascular status. Adult patients with hypopituitarism and growth hormone-deficiency have shown many social disturbances such as: isolation, problems in rates of employment and marriage, decreased psychological well-being in terms of energy, and sex life disturbances compared with healthy people. It has been also shown that many of these individ-

Furthermore, both the sex role schema and some of the examined personality traits seem to predispose childhood-onset CPHD patients to problems with social adaptation and susceptibility to situational stressors. In our study, we were interested to see the relationship between these two factors and the outcome it has on patients. Following the MMPI scale interpretation, patients presented with a range of social and psychological implications. Our results showed some of the disturbances that patients presented with include: neurotic concern over bodily functioning (Hd), poor awareness of problems and vulnerability and tendency for hysterical reactions in stressful situa-

tions (Hy), social alienation, bizarre thought processes, peculiar perceptions, specific familial relationships, difficulties in concentration and impulse control, lack of deep interests, disturbing questions of self-worth and self-identity (Sc), **irresponsibility, impulsivity, failure to conform to social norms and deceit (Pd)**, low level of excitability (Ma), tendency to stereotypic perception or schematic behavior, and a lack of flexibility involving problems with independent decision making, stress management, and social adjustment (IPP). These negative outcomes range to cover many different aspects of family life. It was suggested that the poor coping mechanisms and social adaptations are due to bigger underlying issues. Hathaway and McKinley stated that the tendency for patients to present themselves in a favourable light, reject shortcomings, and contain unfavourable characteristics (L) should be seen as a defence mechanism and a factor hindering the identification of their deeper psychological problems [25]. Perhaps these patients need more support and guidance when it comes to dealing with these defense mechanisms to reach a better understanding of themselves. Further study in therapeutic methods of these patients is needed.

When focusing on gender-schema as an internal cognitive network within each person, which is shaped by culture and society, it is inevitable that certain individual perceptions will be influenced by social interactions. Society has a great impact on what people consider to be stereotypical gender roles. These important factors should not be underestimated when it comes to the **personal dimensions influencing social competence, proficiency, and psychical reactions** [12]. Gender may even affect the stress process by determining whether a person perceives a situation as stressful and therefore influences different coping mechanisms and the final health implication of this stress. This could potentially lead to long-term health issues; however, further study in this area is needed. This could be why it is found that androgynous people, who have both masculine and feminine traits, have beneficial outcomes for behavior and stress management [11]. According to Bem, androgynous people could be more adaptable to the demands of modern life because of an expanded behavioral repertoire and superior sex-role adaptability in comparison to sex-typed individuals. This supports S. Bem's theory that androgyny is manifested as situational flexibility [26]. Examining the specifics of how men and women differ in stress management and the reasons for these differences could shed more light onto this topic. There were no androgynous patients in

studied group found that could suggest poor adaptation skills, lack of stress resistance, and low flexibility of examined CPHD patients.

Our study used the short version of BSRI (which was also applied to a past study in patients with pituitary disease [27]) and showed the increased prevalence of undifferentiated sex-roles among examined patients with CPHD. This means that their personal and behavioral self-concept was not based on socially interpreted sex-role schemas. These undifferentiated patients can have more psychological problems, especially with adaptation and they often suffer from more distress. Therefore, undifferentiated people seemed to be more vulnerable when it comes to a lack of achievement and sociability. Adaptation difficulty may be one of the sources of low achievements and failures of social life among CPHD patients [28]. The short stature and **biological immaturity of CPHD patients may influence the attitudes and social behaviors similar to those addressed in children**. Children are not always recognized as having the characteristics consistent with the gender schema society has established. This is most likely due to the fact that children are still developing and gender identity may not set in fully until adulthood. Children generally are treated as devoid of having qualities of sexuality. In the case of childish looking people, it has been found that lower requirements are used and they are often treated condescendingly [29]. Thus, a certain personality trait in the psychological gender may result from the symptoms of the hormonal deficiency as well as the social reactions to these symptoms that affect the individual.

There is little information about previous similar studies done in such a group of patients with hormone deficiencies, but Sartorio et al. described the results of BSRI testing in eight patients with childhood-onset growth hormone deficiency before and after 6 months of recombinant GH therapy. They concluded that there were no significant changes in BSRI score after hGH treatment [30]. In another study Rekers-Mombarg et al. used MMPI to evaluate personality traits in young adults with idiopathic short stature (hormonal deficits not confirmed) and found that there was no difference between study and control group [19]. This may suggest that early hormonal deficits in childhood and the consequences that follow might affect the personality attributes in CPHD patients compared to later established hormonal deficits. It is evident that deficiencies have a greater effect during the developmental period of a child than in adulthood. Progress in medicine facilitating diagnosis and therapy earlier on in a patient

greatly benefit the quality of life one side, however may limit access to vital material on the other (hormonal therapy routinely administered in cases of hormonal deficiency reduced the sample size without substitution). Future psychological explorations are necessary for further explanation and clarification on social problems of these patients. Studies also focusing on different treatment methods with these patients could shed a great deal of insight into understanding the complex factors pertaining to the disease and different ways patients can potentially benefit.

Conclusions

The sex-role schema and certain personality traits seem to predispose childhood-onset CPHD patients not treated with growth hormone to problems with social adaptation and greater susceptibility to situational stressors. Neurotic reactions, tendency for social alienation, and lack of flexibility have all been observed in these patients. The tendency for stereotypical perception or schematic behavior may involve problems with independent decision-making, stress management, and social adjustment. Therefore, CPHD patients may more often need special support when it comes to coping with disease.

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Conflict of interest statement

The authors declare no conflict of interest.

Author contribution

Substantial contributions to conception and design, data analysis and interpretation: IWS, KZ, MG, AS, KP, NM. Article drafting or critical advice for important intellectual content: IWS, NM, MR. Final approval of the version to be published: KZ, MR. All authors approved of the final version of the manuscript.

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