IV. SUMMARY

Phenylketonuria (PKU) is an inborn metabolic disease, conditioned genetically and inherited in an autosomal recessive manner. It causes a deficit in the activity of phenylalanine hydroxylase (PAH). This enzyme is responsible for catalysing phenylalanine (Phe) into tyrosine (Tyr). The metabolic block results in an increased Phe level in blood. Hyperphenylalaninemia has a toxic effect on the central nervous system (CNS). Thanks to the population screening programme of newborns, which has been conducted in Poland for over 60 years, severe cases of intellectual disability caused by a lack of early diagnosis no longer occur. Treatment is based on a restrictive low-phenylalanine diet. Dietary therapy initiated during the neonatal stage allows the patient with PKU to fully develop socially and intellectually. Despite the fact that this type of conduct is considered a prime example of predictive medicine, parents whose child is diagnosed with the disorder are, from the very first days of the child's life, under chronic stress resulting from the necessity to adapt everyday life to the rules imposed by the disease.. Therefore, from the moment of diagnosis, the medical, psychological and social aspects of the disorder are considered to be of equal importance in the life of a family with a child suffering from PKU. Treatment requires both the patient and his/her parents to understand diet principles, monitor meals rigorously as well as to comply with therapy recommendations for the rest of their life. In the case of children, it is the knowledge and attitude of parents towards the disorder that determine the course of treatment and degree of disease acceptance by the child. Family conditions also have a significant impact on treatment perception among adolescent and adult patients.

Therefore, ascertaining the self-evaluated quality of life of those diagnosed with PKU and their families, as well as determining the knowledge regarding therapeutic recommendations and dietary products in PKU families allow for actions aimed at assisting in the implementation of current therapeutic standards and improving the quality of life of PKU patients and their families.

STUDY AIMS:

1. Evaluation of chosen parameters hof self-evaluated quality of life of individuals diagnosed with PKU (children, adolescents, adults) and their parents. Analysis of results based on the patient's age.
2. Evaluation of the level of disease acceptance and its impact on disease perception.
3. Evaluation of the level of knowledge of current PKU treatment and its impact on the attitude towards the implementation of dietary recommendations.

MATERIALS:

Research participants were patients and their carers remaining under the care of eight specialist Metabolic Clinics in Poland. The study regarding the impact of disease acceptance on self-esteem and interpersonal relationships involved 218 patients aged 10-35 years old and 178 parents of children with PKU.

The study regarding the knowledge of the therapy and its impact on the implementation of dietary recommendations involved 173 patients aged 10-19 years old, 45 patients above the age of 20 and 110 parents of children with PKU.

Inclusion criteria were as follows: PKU diagnosed in infancy during a screening test, exclusion of atypical cases of PKU /BH4 deficiency/, implementation of a low-phenylalanine diet since infancy, intellectual development of the children within the normal range for the appropriate age and professionally active adults.

METHODS:

The study was based on a proprietary survey designed in collaboration with clinical psychologists and experts from Polskie Towarzystwo Fenyloketonurii (The Polish Society for Phenylketonuria) and the analysis of patients' medical records. Survey questions for children and adults were similar. Children below the age of 15 completed the questionnaire unassisted or in the presence of an interviewer.

STATISTICAL ANALYSIS:

All calculations were performed using the Microsoft Excel spreadsheet and STATISTICA, StatSoft, Inc., version 8.0 statistical package (data analysis software system). Statistical evaluation of quantitative data utilised classical measures of location such as arithmetic means and medians, and measures of variation such as standard deviation and range. Normality distribution of variables and variance equality of studied features in groups was established with the use of the Shapiro–Wilk test and variance equality test. In order to compare groups in pairs for quantitative data, the t test or Mann–Whitney test were used with respect to the type of distribution of the tested variables. In the case of multiple group comparisons, the Kruskal–Wallis test was used as a nonparametric equivalent of the one-way analysis of variance (ANOVA). In all these calculations, the statistical significance level was set at $p < 0.05$.

RESULTS:

The first study focused on the impact of disease acceptance on self-esteem and interpersonal relationships within the family and peer group. The following aspects were analysed: needs regarding communication and the impact of disease acceptance on the educational process, social integration, and the subjects' perception of future professional advancement.

The second study focused on the level of awareness regarding treatment recommendations and knowledge of selected food products. The knowledge of the principles of dietary treatment was measured in its impact on the attitude towards following the diet. The study concerned the knowledge regarding the daily requirement of phenylalanine (Phe) and protein as well as the amount of Phe in selected food products. Attitude towards the PKU diet was defined as beliefs about the ability and possibility to chose food products independently, a feeling of helplessness caused by the constant need to control the diet and a feeling of shame caused by the restrictive diet.

Literature data regarding the quality of life in the families of people diagnosed with rare and inborn errors of metabolism are included in the literature overview.

The study demonstrated that the vast majority of children (71%) and their parents accepted the disease. 25% of study participants stated that they would never accept PKU. It was also shown that a lack of disease acceptance had a negative impact on the perception of those diagnosed with PKU among peers.

It was documented that children who did not accept the disease did not want others to know about their condition and felt inferior to their healthy peers. It was shown that those who failed to accept the diagnosis noticed the negative impact of PKU on their educational achievements and were concerned about their future to a greater extent than those who accepted the disease.

The analysis of adult patients indicated that the negative perception of self and of one's prospects of professional advancement intensified in comparison to earlier stages of life. Study results show that the acceptance of PKU has a considerable impact on patients' social integration and perception of their position in the future.

The second study demonstrated that the knowledge of therapy recommendations and food products did not have a direct impact on following the diet. It was shown that only 46% of patients knew the daily Phe intake recommendations and 17% knew the daily intake of protein .

The majority of correct answers regarding the amount of Phe in food products were provided by patients aged 17-19 and parents of children aged 14-16. The study demonstrated no relationship between the feeling of shame caused by the necessity to follow a different diet and the knowledge of dietary recommendation or the amount of Phe in food products.

Among adolescent patients who declared themselves capable of selecting appropriate food products , 40% stated that they wanted to choose their meals independently more frequently, but their parents did not permit them to do so. Study results demonstrated that limiting opportunities for patients to choose their own meals at home and the feeling of shame caused by the necessity to follow a different diet shaped negative attitudes towards PKU

treatment, leading to learned helplessness. Curtailing children's independence in choosing their own meals, patients' growing helplessness resulting from the necessity to control the diet and the feeling of shame caused by the need to eat different meals shape negative attitudes towards dietary treatment.

Literature data regarding attitudes towards the diagnosis and treatment were presented in the literature overview of the quality of life (QoL) of those diagnosed with rare and inborn errors of metabolism and their parents. Literature reports indicate that although inborn errors of metabolism (IEM) follow a clinically different course, patients suffering from them and their families face similar problems, with psychological aspects having a significant impact on disease perception and treatment compliance.

A lower than average level of QoL was identified both among parents and children with IEM. Relevant literature reports confirm a close link between parents' and children's QoL. Studies demonstrate that restrictions experienced within the family significantly impair the patient's cognitive and motivational spheres. Literature reports highlight the fact that parents' emotions regarding their child's disease can profoundly shape the child's attitude towards the diagnosis and treatment. The evaluation of the quality of life associated with the disease and the analysis of attitudes towards the diagnosis and treatment confirm the need for undertaking interventions aimed at facilitating the implementation of therapy recommendations at different stages of the child's development.

CONCLUSIONS:

1. Acceptance of the disease has a significant impact on the patient's social integration and perception of their position in the future.
2. Knowledge of therapy recommendations and food products has no direct impact on the attitude to adherence to the diet.
3. Helplessness and feelings of shame caused by dietary restrictions profoundly shape negative attitudes of PKU patients towards the treatment.
4. It is recommended that actions aimed at improvig intra-family, particularly parent-child, communication are taken.
5. Analysis of attitudes towards diagnosis and treatment in the families of children with phenylketonuria highlights the importance of developing successful interventions aimed at facilitating the implementation of therapy recommenadations and demonstrates the need for launching programmes designed to improve the quality of life of patients diagnosed with rare and inborn errors of metabolism and their carers.