Austin Child & Adolescent Psychiatry

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Rapid Communication

Classification of Children with Chronic Headache from Children without Headache by Stress-Related Biological and Psychological Characteristics

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Received: December 30, 2021; **Accepted:** January 25, 2022; **Published:** February 01, 2022

Abstract

Stress-related psychological and biological characteristics were used to classify young girls to predict girls with chronic headache. This was done by stepwise discriminant function analysis that included at each step biological and psychological characteristics of stress load and stress coping to identify the best predictive power which was evaluated by canonical correlation coefficients. At each step psychological stress load was significant. Lack of problem-solving and seeking social support were important. Also passive avoidance and destructive stress coping. The best classification quality was obtained, when depression and anxiety of the children were included in discriminant function. Hyperactivity of HPA axis did not play an important role.

Keywords: Headache; Adolescents; Stress load; Cortisol; Classification

Introduction

Chronic headache in children and adolescents is frequent. A meta-analysis of [1] was based on data of 50 studies, which were published worldwide and included 80,000 patients. Lifetime prevalence of chronic headache was 58.4%. For migraine in particular 7, 7% are reported, whereby the prevalence for girls is greater than for boys.

Stress load in daily life of adolescents with chronic headache is heightened, which has been shown in a study of [2] in 113 school girls.

The interrelationship between stress and headache in the long-term has been confirmed also by [3].

A very high stress load in university students with chronic headache was observed in a case-control study of [4]. When a high stress load was present in young college students, headache was significantly more present than other somatic complaints [5].

School absenteeism as an indicator of stress load has been found in adolescents with chronic headache by [6].

On the other hand stress coping of youth with chronic headache is characterized by widely in adequate strategies. This has been demonstrated in a study of [7] by using projective test methods.

The empirical evidence suggests that girls with headache are suffering from more stress load and on the other hand are not able to cope adequately with stress. The present investigation is an attempt to confirm previous results. As an extension to previous research a classification in girls with and without headache using stress related biological and psychological characteristics by discriminant function analysis was done.

Methods

All participants with headache were recruited in schools and had to fulfill ICHD-3 criteria for migraine or tension-type headache. The control group was recruited on the University campus in Trier. Before participation, acute diseases were excluded by a medical doctor.

20% of the girls fulfilled the criteria for migraine, 70% criteria for tension-type headache, the rest could not be classified definitely.

Stress load was assessed by the questionnaire for stress and stress coping for children and adolescents (SSKJ) [8].

The subscales comprise: 1) Vulnerability to stress; 2) Physical symptoms of stress such as headache, stomach ache or exhaustion; 3) Psychological symptoms of stress such as depressed mood and anxiety.

Depression and anxiety of the children were measured by [12,13].

Results

Comparison of mean values with MANOVA revealed F (3, 145) = 9.4; $p<0.001$. Girls with headache had physically as well as psychologically more stress load and were also more vulnerable against stress situations.

Comparison of means with MANOVA revealed F (4,144) = 2.1; $p<0.10$. There was a tendency for inadequate stress coping in girls with headache.

Comparison of group means with MANOVA yielded F (2, 146) = 10.9; $p<0.001$. Girls with headache were significantly more anxious and depressed.

Group means were analyzed by MANOVA for repeated measurement. A significant interaction cortisol by group was obtained F (3,145) = 4.6; $p<0.05$. Excluding awakening the mean values for patients with headache were significantly higher.

Discriminant function analysis

Step 1: Predictors were passive avoidance of stress situations,

Citation: Bung S, Saile H and Laessle R. Classification of Children with Chronic Headache from Children without Headache by Stress-Related Biological and Psychological Characteristics. Austin Child Adolesc Psychiatry. 2022; 6(1): 1019.

Table 1: Stress load for girls with chronic headache and controls.

	Controls	Chronic Headache
Physical stress load	7.3 ± 1.7	8.8 ± 2.4
Psychological stress load	18.0 ± 4.5	21.4 ± 5.4
Stress vulnerability	15.3 ± 2.5	16.2 ± 2.5

Table 2: Stress coping in girls with chronic headache and controls.

Stress coping	Controls	Chronic headache
Seeking social support	36.2 ± 7.8	34.1 ± 6.6
Problem solving	45.3 ± 7.4	44.8 ± 6.9
Destructive and anger	23.8 ± 7.5	26.1 ± 7.8
Passive avoidance	23.9 ± 6.1	25.2 ± 6.2

Table 3: Anxiety and depression in girls with chronic headache and controls.

	Controls	Chronic headache
Anxiety	30.8 ± 5.7	35.3 ± 6.4
Depression	9.3 ± 4.9	12.1 ± 6.5

Table 4: Cortisol after awakening for girls with chronic headache and controls in nmol/ml.

Time of sample	Controls	Chronic headache
Awakening	8.2 ± 4.5	6.8 ± 3.5
30 minutes	9.8 ± 5.6	10.4 ± 6.3
45 minutes	8.3 ± 5.3	9.3 ± 6.0
60 minutes	6.6 ± 4.8	7.2 ± 5.0

psychological stress load, physiological stress load and cortisol awakening response at 60 minutes.

A discriminant function results with Chi Square = 24.5 and a canonical correlation of 0.40 $p<0.001$. Psychological stress load was a significant predictor.

Step 2: Instead of passive avoidance of stress situations, problem-solving was included as a predictor whereas all other predictors remained. The resulting discriminant function has a Chi Square of 26.2 with a canonical correlation of 0.41 $p<0.001$ and also psychological stress load as a significant predictor.

Step 3: Instead of problem-solving seeking social support was included. A discriminant function was obtained with Chi Square = 27.3 and a canonical correlation of 0.42, $p<0.001$. Psychological stress load as well as physiological stress load were significant predictors.

Step 4: Instead of coping strategies anxiety and depression were included. The discriminant function now had a Chi Square of 29.3 and a canonical correlation of 0.43, $p<0.001$. Significant predictors were psychological stress load, physiological stress load, and in particular anxiety, but not hyperactivity of HPA axis.

Discussion

Our results with respect to the significance of anxiety and depression have also been found by [9] and were integrated in a psychobiological model of chronic headache in adolescents.

A strong relationship of stress and headache in particular in adolescents is also reported by [10] and is well in accordance with our data.

Cortisol may be able to reduce pain sensitivity. As a consequence, girls with chronic headache may have a very early perception of the beginning of headache and therefore believe it to be very heavy, especially when they are anxious in addition [11].

The findings have limitations. Sample size was small. Only girls were investigated, a generalization to boys is not possible, but girls are much more affected by headache. Some clinical implications are shortly outlined. The importance of stress and psychopathological features of youth with headache is a recommendation to pay special attention on both aspects in treatment programs, that could be school-based or offered in a group format also including when necessary family members.

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