

Research Article

Psychobiological Influences for Stress Load in Young Girls with Chronic Headache

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University of Trier, 54290 Trier Germany**Received:** November 15, 2022; **Accepted:** December 17, 2022; **Published:** December 23, 2022**Abstract**

Chronic headache in adolescents is frequent, and stress may play an important role. The empirical literature suggests that stress load of headache sufferers is increased but stress coping is limited. The present study investigated in a controlled design differences between girls with chronic headache and controls in stress load and stress coping. Additionally psychopathological characteristics such as anxiety and depression were measured and a biological indicator for chronic stress (the cortisol awakening response) was obtained. 148 girls were investigated. Stress load and stress coping was measured by validated German questionnaires. Saliva samples were collected at home after awakening. Girls with headache had a higher stress load and higher stress vulnerability, but significant deficits in stress coping. The cortisol awakening response was increased specifically for girls with headache. Physiological as well as psychological stress load could be significantly predicted by multiple linear regressions. Significant predictors were inadequate stress coping, anxiety and depression, but not hyperactivity of HPA axis. The results were integrated into the available literature and further discussed within a psychobiological model of chronic headache in adolescents.

Keywords: Headache; Stress; Stress Coping; Adolescents; Cortisol

Introduction

Chronic headache in children and adolescents is frequent. A meta-analysis of [1] was based on data of 50 studies, which were published world wide and included 80,000 patients. Lifetime prevalence of chronic headache was 58.4%. For migraine in particular 7, 7% are reported, where by 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 inter relationship 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 seen 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 inadequate strategies. This has been demonstrated in a study of [7] by using projective test

methods. A long-term study of [8] found a high comorbidity of headache and anxiety as well as depression. This was supported by [9]. A third study by [10] presented the same results. Children with migraine are responsible for high costs in health service in Germany and seemed to have a very high stress load. This is indicated by an analysis of the data of 5600 children [11]. Stress load on a biological level only a few studies are available, which have been measured cortisol in association with headache in children and adolescents. A significantly increased cortisol awakening response was seen by [12] in girls with recurrent pain. In unstimulated children with headache were not different from controls [13]. Stimulated cortisol, however, was higher in an experimental group compared to controls [25]. The result may indicate that a stress induced hyperactivity of HPA axis can reduce pain threshold. 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 findings anxiety and depression were assessed and influences of these psychopathological

characteristics on stress load were evaluated. This is also true for influences of the activity of the HPA axis in children with chronic headache.

Method

All participants were recruited at schools and the university campus in Trier. Girls were searched who were willing to take part in an investigation on stress and headache. Headache patients had to fulfill I CHD-3 criteria form migraine-tension-type headache. Controls never had headache or only seldomly. For diagnostic purpose patients and controls were seen by a medical doctor.

Measurement

Physical and psychological stress load as well as stress coping was obtained with the questionnaire for stress and stress coping in children and adolescents (SSKJ). [14] This questionnaire has several subscales, which have a test-retest reliability of .80. Depression and anxiety were measured by two instruments [15,16]. Saliva samples to analyze cortisol for the girls were collected at home after awakening.

Results

Means between comparison groups were compared by MANOVA for the 3 subscales simultaneously which resulted in $F(3, 145) = 9,4$ $p < .001$. The stress load in the girls with headache was more pronounced physically as well as psychologically and they were more vulnerable to the perception of stress situations.

The comparison of the means for the 5 subscales simultaneously yields $F(5, 143) = 2,3$ $p < .05$. Stress coping was more inadequate in girls with headache, in particular the lack of seeking social support but instead reacting with anger. On the other hand, constructive coping was also seen in headache patients under favorable circumstances.

Group means were compared by MANOVA for both psychopathological characteristics simultaneously with $F(2, 146) = 10,9$ $p < .001$. The girls with headache were far more depressed and anxious.

The statistical analysis was performed by MANOVA for repeated measurement. A significant interaction effect (cortisol X group) for linear trend was found. $F(3, 145) = 4,6$ $p < .05$. Excluding awakening all means were higher for the girls with headache. Multiple linear regression was used to identify influences on physical and psychological stress load.

Regression Analysis 1

dependent variable was physical stress load

The regression equation was significant with $F(6, 144) = 7,7$ $p < .001$ and an explained variance of 25%. A significant predictor was anxiety.

Regression Analysis 2

dependent variable was psychological stress load

The regression equation was significant with $F(6, 144) = 22,8$ $p < .001$ and an explained variance of 48%. Significant predictors were a lack of problem-solving, destructive coping and anxiety and depression.

Table 1: Stress load according to subscales of SSKJ for girls with headache and controls.

| stress load | Controls | 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 according to subscales of SSKJ.

| Stress coping strategy | Controls | Headache |
|---------------------------|------------|------------|
| Search for social support | 36,2 ± 7,8 | 34,1 ± 6,6 |
| Problem-solving | 45,3 ± 7,4 | 44,8 ± 6,9 |
| Destructive with anger | 23,8 ± 7,5 | 26,1 ± 7,8 |
| Passive avoidance | 23,9 ± 6,1 | 25,2 ± 6,2 |
| Constructive | 27,0 ± 7,7 | 29,8 ± 8,8 |

Table 3: Anxiety and depression.

| | Controls | Headache |
|------------|------------|------------|
| Anxiety | 30,8 ± 5,7 | 35,3 ± 6,4 |
| Depression | 9,3 ± 4,9 | 12,1 ± 6,5 |

Table 4: Cortisol after awakening in nmol / ml.

| time of sample | Controls | Headache |
|----------------|-----------|------------|
| Awakening | 8,2 ± 4,5 | 6,8 ± 3,5 |
| + 30minutes | 9,8 ± 5,6 | 10,4 ± 6,3 |
| + 45minutes | 8,3 ± 5,3 | 9,3 ± 6,0 |
| + 60minutes | 6,6 ± 4,8 | 7,2 ± 5,0 |

Discussion

This study investigated, whether children with chronic headache were different from controls with respect to stress related characteristics. Data on stress load and stress coping were obtained in detail. Anxiety and depression were also hypothesized to be related to stress. As a biological indicator for stress cortisol was measured. The results confirm already known findings in so far as children with headache reported more stress but much more inadequate stress coping [17]. Support for our results comes from a study in daily environment of children with headache [18]. Inadequate coping reinforced severity of headache at the following day. Other results, however, do not argue for inadequate coping generally by children with headache [19]. These children may have some positive resources for stress coping, which should be applied in treatment programs. Depression and anxiety are clearly associated to headache symptomatology. This is well in accordance with the previous results of [20,21]. Dysfunctional coping was present in particular when previously anxiety and depression had been observed [22]. Therefore destructive coping is rather a consequence than a cause of anxiety or depression. Previous results are extended by our findings on HPA axis activity.

HPA axis activity as an indicator of chronic stress was increased specifically in children with chronic headache. In adult patients with headache short term increase of cortisol after stress has been reported [23]. In consequence of increased cortisol, the threshold for the perception of pain may be lowered

[24]. Children with headache therefore may perceive their pain earlier and interpret it as more severe.

Clinical Implications

The areas with the greatest stress load and the most dysfunctional coping should be explored extensively and intervention elements must be tailored to modify stress and stress coping directly for example by cognitive behavior therapy.

Because of the significance of anxiety and depression as a cause and consequence of headache additional therapeutic and diagnostic efforts are necessary, may be in form of family treatment. Pharmacological treatment one is not recommended, but may be useful as an adjunct to psychological interventions.

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