

Stress-related depression and anxiety in young girls with chronic headache

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Objective: The present study aimed to examine the role of stress for the development and maintenance of anxiety and depression in young girls with chronic headache.

Methods and Materials: The degree of depression and anxiety was studied in 148 young girls with either migraine or tension type headache. Physical and psychological stress load was measured by validated questionnaires. As a biological indicator of stress the cortisol awakening response was analyzed.

Results: Multiple regression showed significant relationships between stress

load and depression as well as anxiety. The predictive power of physical stress symptoms was larger for anxiety. Cortisol after awakening was significantly more correlated to anxiety than to depression.

Conclusion: The stress load of young girls with chronic headache seems to be an important factor in explaining depression as well as anxiety symptoms of these young adolescents. The greater predictive power of physical stress symptoms for anxiety might be due to a focusing on bodily changes as a consequence of headache. Treatment programs for chronic headache should include specific interventions addressing stress coping with depression and anxiety.

Key Words: *Chronic headache; Adolescents; Depression; Anxiety; Stress; Cortisol*

Headache in young girls can be frequently observed. Epidemiological studies report a prevalence for migraine of 28,8 % and for tension headache of 60,4 %. Very often the headache (migraine or tension type) is significantly associated to depression and anxiety. This has been previously reported in a comprehensive meta-analysis, including 10 controlled publications [1]. Barton-Donovan and Blanchard compared young headache sufferers to non-headache controls [2,3]. Headache was characterized by more physical as well as psychological stress symptoms. Carasco and Kroener-Herwig found in 509 headache children dysfunctional stress coping to be a significant predictor for the occurrence of headache two years later [4-6]. Concluding from the available empirical studies, depression and anxiety seem to be clearly related to stress and stress coping in adolescents with headache.

The present investigation therefore addressed the question, to what degree physical and psychological stress load contributes to the occurrence of depression and anxiety in young girls suffering from chronic headache. In addition, a biological indicator of chronic stress (the cortisol awakening response) was correlated to anxiety and depression in the girls.

MATERIALS AND METHODS

All participants were recruited by advertisements in schools in Trier for adolescent girls who suffered frequently from headaches and would like to take part in an investigation on stress and headache. Those who responded were examined by a physician; those with a physical illness at time of study were excluded. The physician also asked the potential participants for a previous history of mental illness such as depression or anxiety, and excluded subjects in case of suspicion. All participants with headache had to fulfill the International Classification of Headache Disorders 3rd edition ICHD-3, Beta version criteria for migraine or tension type headache to be included. A total of 148 adolescent girls met the criteria for inclusion in the study. The participants attended high school (82%), secondary school (11%), or professional school (7%). Nearly all lived in their parental home (98 %) and were mainly upper middle class. Cortisol was assessed from saliva with the Salivette sampling device (Sarstedt, Rommelsdorf, Germany). This non-invasive technique can be used at home, where subjects collected samples at 0, 30, 45, and 60 minutes after awakening in the morning [7-9].

Stress symptoms were measured by a standardized German questionnaire for children and adolescents, the SSKJ 3-8 [10,11].

The SSKJ 3-8 contains the following scales:

Physical stress symptoms

These include headache, sleep disturbances, stomach complaints, increased heart frequency, feelings of dizziness, and nervous restlessness. Cronbach's alpha is 0.71.

Psychological stress symptoms

These include anxiety, depressed mood, and anger. Cronbach's alpha is 0.87.

Depression was measured by the Depression Inventory for Children and Adolescents Stiensmeier-Pelster et al. [12]. Cronbach's alpha for this instrument is 0.92.

RESULTS

Depicts mean cortisol after awakening in girls with chronic headache Table 1.

The cortisol release follows a normal pattern with a peak after 30 minutes and a subsequent decrease up to 60 minutes.

As a biological indicator of acute stress, the cortisol secretion during the Trier Social Stress Test for Children was used. Neither anxiety nor depression were significantly correlated to the acute stressor [13,14].

Physical and psychological stress load measured by scales of the SSKJ was used to predict depression and anxiety. The statistical analysis was done by multiple regression.

In the regression equation we included the cortisol awakening response, coping strategies according to SSKJ and physical and psychological stress load.

TABLE 1

Mean Cortisol after awakening (\pm SD) for girls with chronic headache (in nmol/ml).

Time of saliva sample	
Awakening	6.8 \pm 3.5
30 minutes	10.4 \pm 6.3
45 minutes	9.3 \pm 6.0
60 minutes	7.2 \pm 5.0

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For depression as dependent variable the regression equation was highly significant with $F(4,148) = 18,6$, $p < .001$, $R^2 = 0.32$. The standardized beta coefficient for psychological stress as a predictor was 0.40, for physical stress 0.30.

For anxiety as dependent variable the regression equation was also highly significant with $F(4,148) = 20,6$, $p < .001$, $R^2 = 0.35$. The standardized beta coefficient for psychological stress as a predictor was 0.31, for physical stress 0.41.

Cortisol after awakening was taken as a biological indicator for chronic stress and correlations between cortisol and depression and anxiety were calculated. The correlation between cortisol and depression was 0.75 ($p < .001$). The correlation between cortisol and anxiety was 0.87 ($p < .001$). The correlation between cortisol and anxiety is significantly higher Meng et al. [11].

DISCUSSION

Some support for the present results of the relationship between stress load and depression comes from a study that investigated young adolescents with chronic alcohol misuse. The sample included 761 adolescents recruited from an alcohol research Center. Data analysis was done by structural equation modeling. Negative affective states, such as depression were significantly correlated to problematic drinking Creswell et al. [5].

The connection between physical stress load and anxiety is well supported by the data of Yavuz et al. [15] who investigated a sample of younger migraine outpatients.

Focusing on somatic stress load of pain by pain catastrophizing amplified anxiety significantly in young girls with chronic headache [16]. Therefore, it was suggested as a major source for anxiety related psychopathology in young headache sufferers.

The present results on the relevance of depression and anxiety in chronic headache have also been found in 600 adult patients, investigated by Devlen where 50% experience d anxiety and 20% experienced depression [6]. Unfortunately, the data on psychopathology had not been correlated to stress or stress coping of the participants.

A large population-based study is in accordance with our results on the association between basal cortisol and anxiety Greaves-Lord et al., [7]. They assessed persistent anxiety and cortisol awakening response. The findings indicated a significant positive relationship between HPA axis activity and persistent anxiety. Alterations in HPA axis activity might underlie persistent anxiety problems or result from the stress accompanied by long lasting anxiety. Further support for our results on depression comes from a longitudinal study in adolescents with frequent headaches, where depressive symptoms significantly predicted headache frequency at a long-term follow-up Larsson et al. [9]. Another large scale study of 7850 young girls from Finland is also in line with our results on depression, reporting a prevalence of 18,6 % for patients with chronic headache. Harma et al. [8]. A review of Bellini [3] further supports the present results for adolescents with chronic headache considering a strong comorbidity to anxiety and depression. Our results in addition suggest a strong connection to stress load, in particular for anxiety. If an adolescent develops headache as a consequence of stress, then headache may lead to anxiety. The anxiety then may promote a focus of the perception on physical stress symptoms namely the headache itself which then acts as an additional stressor and would, considering restricted coping resources, reinforce the original stress level.

This interpretation is strongly supported by an experimental investigation of Chen and Jackson [17]. After an acute stressor the focus on the physical components of pain by pain catastrophizing significantly increased anxiety, controlling for coping resources.

CONCLUSION

The Interpretation of the present results has to consider that only young girls had been investigated. Whether the relationships can be generalized to male adolescents might be questioned. On the other hand, headache as well as

anxiety and depression symptoms in general are more pronounced in girls.

Another limitation might be that increased depression or anxiety may not be specific for headache, but for chronic adolescent pain disorders in general.

Methodologically the study is limited by using a cross-sectional design. Only a prospective longitudinal investigation would allow to interpret causal relationships, that means physical stress load is more responsible that the girls develop anxiety than that they develop depression.

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