Caffeine-induced headache in children and adolescents

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Caffeine is the most widely used behaviourally active substance. Excessive caffeine consumption, mostly in the form of coffee and tea, is a well-recognized cause of headache or migraine, and withdrawal can cause headache. Nevertheless, caffeine abuse headache is not listed as a separate category in the International Headache Society classification, 1988. We report our experience with children and adolescents with daily or near-daily headache and excessive consumption of caffeine in the form of cola drinks. Over a period of 5 years we have encountered, in a tertiary headache clinic in a general hospital, 36 children and adolescents (17 girls and 19 boys) with daily or near-daily headache related to excessive caffeine intake in the form of cola drinks. The mean age of the subjects was 9.2 years (range 6–18) and mean headache duration was 1.8 years (range 0.6–5). All were heavy cola drinks consumers; at least 1.5 L of cola drinks per day (192.88 mg of caffeine daily), and an average of 11 (range 10.5–21) L of cola drinks a week, which amounts to 1414.5 mg of caffeine (range 1350.1–2700.3). Patients were encouraged to achieve gradual withdrawal from cola drinks, which led to complete cessation of all headaches in 33 subjects, whereas one boy and two adolescent girls continued to suffer from migraine without aura not frequent enough to justify prophylactic medication. Children and adolescents with high daily caffeine consumption in the form of cola drinks may suffer from caffeine-induced daily headache. Gradual withdrawal can be achieved without withdrawal headache and with complete disappearance of the induced chronic daily headache.

☐*Caffeine, children and adolescents, chronic daily headache, withdrawal*

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Introduction

Recurrent headache is a common complaint in paediatric practice. It may be caused by migraine and tension headache as well as headache secondary to intracranial and extracranial infections, intracranial mass lesions and head or neck trauma. Reported prevalence rates of childhood headache vary greatly from 5.9% to 78.4% (1–6). The prevalence of migraine increases with age from 1.4% for all children younger than 7 years of age up to 13.8% at the age of 15 years (1, 5–7). In contrast to adults there is a male preponderance of childhood migraine (1, 3, 4, 6). The precise prevalence of tension headache in children is unknown but is considered to be rare (3, 6). Epidemiological data regarding other headache types in children are still needed.

Caffeine is one of the most popular 'stimulants'. The consumption of caffeine-containing fluids became a socially acceptable 'vice'. In the early 1990s, world-wide per capita daily caffeine consumption was calculated as around 70 mg regardless of age or gender. This is almost the amount of caffeine in a large cup of instant coffee or a small cup of ground coffee (the average content is 82.5 mg). In the USA, Canada, UK and Sweden the daily per capita caffeine consumption was estimated as 211, 238, 444 and 425 mg, respectively. Presently, the per capita consumption of cola drinks, coffee and tea is extremely high in most western countries (8).

Acute consumption of caffeine causes stimulation of the central nervous system, increased diuresis, cardiac muscle contraction and gastric, lacrimal and nasal mucus secretions. It also decreases peripheral vascular resistance concomitant with increased cerebrovascular resistance and decreases smooth muscle tone, especially of the bronchial tree.

After oral administration to humans, caffeine is rapidly and completely absorbed, reaching maximal plasma levels after about 30 min. It is principally eliminated by the liver and has an average plasma half-life of about 3–6 h. The rapid absorption and short-term elimination make caffeine an ideal substance for abuse.

Caffeine abuse is probably the most common of all 'substance' abuses. The chronic use of a tolerance-inducing drug that has a moderate to rapid elimination rate makes that compound an excellent candidate for producing physical dependency as manifested by biochemical, physiological, or behavioural changes when discontinued (9).

Historically, caffeine has occasionally been labelled as a substance of abuse, with analogies drawn to classic abuse of opioids (10–12).

Analgesics and ergotamines which posses a potential of physical dependency can induce headaches (13–15). Excessive caffeine consumption, mostly in the form of coffee and tea, is an as yet unrecognized cause of headache or migraine. However, caffeine withdrawal headache, which is frequently related to weekends, is recognized by the International Headache Society (IHS) (16–18).

Drug-induced headache has been recognized for more than a decade as the major cause of chronic daily or almost daily headaches in adults (19). The daily headaches may persist for many years and will clear only after cessation of all offending medications (20). Only recently was this phenomenon reported in children (21, 22).

We report our experience with children and adolescents who suffer from daily or nearly daily headache and excessive consumption of caffeine in the form of cola drinks.

Subjects and methods

During the last 5 years, 56 boys and 49 girls were referred to our clinic due to chronic headache occurring daily or at least 4 days a week. The study group consisted of 19 boys and 17 girls, who were consuming excessive quantities of caffeine in the form of cola drinks. Headache characteristics as to type, location, duration and the amount of cola drinks, coffee or tea intake were documented. The pain intensity was scored on a 0–10 visual analogue scale (VAS). A history of migraine or any other type of headache was obtained from patients and family members according to the IHS classification, 1988. Subjects underwent a complete physical and neurological evaluation. Brain computed tomography (CT) and routine blood counts and serum biochemical profile (SMA 16) were obtained in patients who had headaches for <6 months. Parents and/or guardians were informed about the phenomenon of cola-caffeine-induced headache and were encouraged to achieve gradual cola drinks withdrawal in order to prevent possible abrupt caffeine withdrawal headache. Patients kept a headache diary, in which the number, intensity and duration of headaches, as well as any adverse events, were recorded. The follow-up consisted of a visit to the clinic at 2, 4, 6, 12, and 24 weeks following withdrawal of cola drinks. The time required achieving any benefit or improvement after discontinuing daily coke intake was recorded.

Results

The mean age of the 36 subjects with excessive caffeine consumption was 9.2 years (range 6–18), and the mean duration of headache, 1.8 years (range 0.6–5). Patients described their headache as constant, dull, pressure like and bilateral. Physical and neurological examination, blood counts and chemistry as well as brain CT were normal in all subjects. None had a history of migraine.

All were heavy cola drinks consumers, at least 1.5 L of cola drinks a day. This amounts to 192.88 mg of caffeine daily, which is contained in 2.33 large cups of instant coffee or small cups of ground coffee. The weekly average amount of consumed coke was 11 L (range 10.5–21), which amounts to a weekly average caffeine consumption of 1414.5 mg (range 1350.1–2700.3). This is the equivalent of 17.14 large cups of instant coffee or small cups of ground coffee. Tea consumption was very limited, 0.2 large cups a week (range 0–4). None of the patients drank coffee.

Caffeine daily consumption was low in the remaining 69 children with chronic daily headache (0–0.33 L/day).

The excessive caffeine consumers were persuaded to discontinue the daily use of cola drinks over 1–2 weeks at a rate of 0.2–0.25 L/day. This led to a complete cessation of all headaches in 33 out of the 36 subjects at the end of 2 weeks following cola drinks discontinuation (range 0–2), which persisted through the length of the follow-up period. In one

boy and two adolescent girls, the daily headache was replaced by intermittent episodic migraine without aura, not frequent enough to justify migraine prophylaxis.

A family history of headaches or migraine was present in seven (19.4%) of the 36 subjects including the three who suffered from migraine without aura following withdrawal of cola drinks.

Other causes of daily headaches in the remaining 69 children were coexisting migraine and tension-type headache, tension-type headache and analgesic-induced headache (AIH). In the 26 children with AIH analgesic overuse withdrawal was successful in 25 (23).

Discussion

Soft drinks containing caffeine, such as cola drinks, are widely consumed by children and adolescents around the world. Although cola drinks are regarded as a harmless soft drink, this might not be the case. Its popularity and extensive consumption may be accounted for by its caffeine content, which at high doses may probably lead to daily or nearly daily headache.

Indeed, the amount of caffeine contained in 12 ounces of different brands of cola drinks, according to the National Soft Drink Association is: Coca-Cola and Diet Cola, 45.6 mg; Pepsi Cola and Diet Pepsi, 37.2 mg; RC Cola and Diet RC cola, 36 mg; Shasta Cola, 44.4 mg; and Canada Dry Cola, 30 mg (24).

Children and adolescents with high daily consumption of caffeine, in the form of cola drinks, may develop caffeine-induced daily headache. The daily and weekly caffeine intake in our patients was quite high. Successful gradual withdrawal from cola drinks/caffeine was achieved without adverse side-effects, particularly without withdrawal headache. All subjects enjoyed complete cessation of the induced chronic daily headache. Our experience justifies taking a detailed history of caffeine intake in the form of tea, baked goods, dairy beverages and desserts, candies and in particular soft drinks, in order to calculate the daily caffeine intake in youngsters with chronic daily headache. If this is found excessive, the diagnosis of caffeine-induced headache should be strongly considered.

The present observation should serve as an alert and guideline for paediatricians and health providers, as approximately 55% of caffeine intake in young American schoolchildren is in the form of soft drinks (25).

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