

The role of diet and lifestyle in adolescents with headache: a review

F. Moschiano · D. D'Amico · M. Cotta Ramusino · G. Micieli

© Springer-Verlag Italia 2013

Abstract Several dietary habits and lifestyles can be associated with different headache types or with their progression to chronic forms. Different population-based studies have tried to investigate this relationship with poor or contradictory results. We shortly reported the current knowledges available in literature in this regard, paying particular attention to the role that certain factors play in modifying frequency and intensity of headache in adults and in adolescents. Future studies are necessary to clarify the real weight which the different factors have in natural history and in clinic evolution of headache, especially in adolescence, but the already known data suggest an important modulating action. If they will be confirmed, these results will be likely to influence clinical practice as well to address educational programs in preadolescents and adolescents.

Keywords Headache · Lifestyle · Diet · Adolescent · Adult

Introduction

Headache is one of the most frequently reported health complaints among adolescents. Epidemiological studies showed that 58.4 % of children and adolescents report

headaches, with higher prevalence in females [1–5]. Migraine occurs in 5–11 % of the adolescent population and tension-type headache (TTH) in 5.1–18 % [1–4], while the prevalence of chronic daily headaches is estimated to be around 3 % [5].

Several studies investigated the potentially modifiable factors associated with headache and with its progression to chronic forms [6]. Eating behaviors and lifestyle may be factors of risk associated with headaches and its progression. In the last years, this issue was mostly investigated in adults, while to date poor evidences are available in children and adolescents.

What we know about adults

Several studies evaluated the role of lifestyle for the onset of headache in general and for specific headache types. In addition, dietary habits and single lifestyle factors, as alcohol and caffeine consumption, smoking status, physical activity and body mass index, were found to be associated with headaches in adults [7–9].

Several studies found no association between alcohol consumption and headache prevalence [10, 11] as well as alcohol consumption and headache subtypes [12]. In contrast, Aamodt et al. [13] found a significant decrease of migraine prevalence with increase of alcohol consumption among 51.383 participants of the Head-HUNT Study. In a recent population-based study in Sweden [7], women, but not men, who sometimes to often consumed large amounts of alcohol, more often complained recurrent headache and migraine. In a Dutch study [14], alcohol consumption tended to be associated with a decreased but no significant risk of experiencing migraine and TTH.

A possible association between smoking and headache was investigated in recent years with contradictory results

F. Moschiano (✉) · M. C. Ramusino · G. Micieli
National Institute of Neurology, IRCCS “C. Mondino”
Foundation, Via Mondino 2, 27100 Pavia, Italy
e-mail: franca.moschiano@mondino.it

D. D'Amico
Department of Clinical Neuroscience, Headache Unit,
“C. Besta” Neurological Institute and Foundation,
Via Celoria 11, 20133 Milan, Italy

[7, 12–18]. In a longitudinal study [19], the risk of frequent headache was increased among smokers in childhood and adolescence but not in adulthood.

The consumption of coffee or caffeine-containing beverages was found significantly more frequent in migraineurs than in non-headache subjects [12]. Its chronic and excessive use was shown related to chronic headache types, such as migraine and TTH [20] and to negative effects on health, such as insomnia and psychomotor agitation, which in turn can cause headache [21].

Some foods and beverages are commonly considered to cause headache and particularly migraine [22, 23] and the reduction of their average consumption was associated with a reduction in the monthly frequency of headache [24]. Takeshima et al. [12] suggested that foods high in fat increase the risk of migraine and daily fish consumption plays a protective role in the Japanese population. In contrast, Medina and Diamond [25] reported that diet appeared to be relatively unimportant in migraine attacks. In fact foods, such as cheese and chocolate, long considered important triggers of headache attack, are to date thought to be less powerful in this regard [18]. Some published studies found associations between headache and skipping meals, in both adults and adolescent [7, 26]; in contrast, Takeshima et al. [12] denied a significant association. The fasting appears to be an important precipitating factor for headache attacks and individuals who fast may more easily develop fasting headache [27]. Thus, subjects who already suffer from headache, especially TTH, may develop headache more frequently during prolonged fasting, as during Ramadan, Yom Kippur [28–30] or preoperative fasting [31]. These data may suggest that diet and eating behaviors can play an important role in modifying frequency and evolution of headache.

A regular and frequent physical activity was reported to reduce severity and frequency of headache [32, 33]. Studies investigating the potential association between physical activity and headache prevalence found contradictory results [7, 17, 34–37]. In a prospective study [35], subjects with low physical activity had at baseline a higher prevalence of headache, especially of migraine. After 11 years of follow-up, physically active group, compared with inactive group, complained less headache, especially less non-migraine headache.

Some studies investigated a possible association between BMI and headache in adults, and a greater body weight (overweight and obesity) seems to correlate with increased clinical severity of migraine [6, 38]. Peres et al. [39] were the first assessing primary headache diagnosis in obese patients and migraine was the most common diagnosis, while chronic daily headache (chronic migraine and chronic TTH) was present in 12.2 %. In 2008, Keith et al. [40] reported that a BMI of ~ 20 was associated with the

lowest likelihood of headache, while obese women had significantly increased risk for headache. On the other hand, an increased risk of migraine in underweight subjects [41] was also recently reported, making the correct understanding of the relationship between body weight and headache even more difficult.

What we know about adolescents

Anecdotal evidence suggests that a healthy lifestyle including regular physical exercise, healthy diet and weight control may improve headache in children and adolescents.

However, a few population-based studies are available in these issues in children and adolescents [19, 42–45]. A limited number of lifestyle factors were evaluated as smoking [19, 42, 45], physical inactivity [42, 44], consumption of alcohol or coffee [42].

Smoking is associated with headache in adolescents [46] and may have a negative influence on the course of headache. A cohort study [19] investigated the relationship between smoking and frequent headache. The risk of frequent headache was increased among smokers than non-smokers (OR 2.16, 95 % CI 1.39–3.35) both in childhood and in adolescence, but not in adulthood. In contrast, subjects who suffered from frequent headaches in childhood/adolescence were then 2 times more likely to smoke in adulthood than those without headache (OR 2.20, 95 % CI 1.3–1.7).

A recent study [43] investigated the association between diet, lifestyle factors and different types of headache in adolescents. A total of 1,260 adolescents of high schools filled in questionnaires in which a wide range of factors were evaluated (intake of meals, coffee, non-alcoholic and alcoholic drinks, smoking and physical activity). Smoking (OR 2.7; 95 % CI 1.4–5.1), physical inactivity (OR 2.2, 95 % CI 1.3–3.7), high consumption of cocktails (OR 3.4, 95 % CI 1.9–6.0) and coffee (OR 2.4, 95 % CI 1.3–4.7) were significantly associated with migraine plus TTH episodes. Consumption of coffee (OR 3.4, 95 % CI 1.6–7.0) and physical inactivity (OR 4.2, 95 % CI 2.2–7.9) were particularly associated with migraine, while physical inactivity was related to TTH (OR 1.7, 95 % CI 1.1–2.7). No correlation was found between different headache types and skipping of meals.

Recently, we reported the preliminary results of the first population-based study [47] performed in Italy on preadolescent/adolescent students to assess the possible association between headache and specific habits or lifestyle factors. The data obtained from 800 students, divided in two groups (with headache and without headache), showed that headache patients were prevalently women (P value = 0.006), irregular meal consumers ($P < 0.0001$), particularly breakfast ($P < 0.0001$) and reported more frequent sleep disorders

($P < 0.0001$). Individuals belonging to the “worst forms” (i.e., who reported more frequent or more painful attacks) were also those who skipped more often meals and had more disturbed sleep. Coffee and drugs use, smoking, physical activities as well as “body mass index” (BMI) values were not associated with headache. In this study, the different types of headache were not assessed.

Conclusions

To date, the data in literature about this issue are contradictory and mostly related to studies in adults. The available results are difficult to be understood, but it can be assumed that different socio-cultural backgrounds, in the different investigated populations, can influence the significance of the associations between various factors and headache. To date, there are poor population-based studies with a good statistic power and evaluating the risk stratified by types of headache. Further studies are necessary to improve our knowledges about the effective role of diet and lifestyle in headache and in its clinical types.

Modification of lifestyle habits is a key preventive strategy in many diseases and could play a role in preventive strategies of headache, especially in childhood and in adolescence. In future, addressed educational programs would be desirable to inform and raise the awareness of the patients and their families and the knowledge of the operators who at various levels operate with children and adolescents.

Conflict of interest The authors declare that there is no actual or potential conflict of interest in relation to this article.

References

- Lu SR, Fuh JL, Juang KD, Wang SJ (2000) Migraine prevalence in adolescents aged 13–15: a student population-based study in Taiwan. *Cephalgia* 20:479–485
- Abu-Arafeh I et al (2010) Prevalence of headache and migraine in children and adolescents: a systematic review of population-based studies. *Dev Med Child Neurol* 52:1088–1097
- Kröner-Herwig B, Heinrich M, Morris L (2007) Headache in German children and adolescents: a population-based epidemiological study. *Cephalgia* 27:519–527
- Zwart JA, Dyb G, Holmen TL, Stovner LJ, Sand T (2004) The prevalence of migraine and tension-type headache among adolescents in Norway. The Nord-Trøndelag Health Study (Head-HUNT-Youth), a large population-based epidemiological study. *Cephalgia* 24:373–379
- Seshia SS (2012) Chronic daily headache in children and adolescents. *Curr Pain Headache Rep* 16:60–72
- Bigal ME, Lipton RB (2006) Modifiable risk factors for migraine progression. *Headache* 46:1334–1343
- Molarius A, Tegelberg A, Öhrvik J (2008) Socio-economic factors, lifestyle and headache disorders—a population-based study in Sweden. *Headache* 48:1426–1437
- Kelman L (2007) The triggers or precipitants of the acute migraine attack. *Cephalgia* 27:394–402
- Panconesi A (2008) Alcohol and migraine: trigger factor, consumption, mechanisms. A review. *J Headache Pain* 9:19–27
- Boardman HF, Thomas E, Millison DS, Croft PR (2005) Psychological, sleep, lifestyle, and comorbid associations with headache. *Headache* 45:657–669
- Mannix LK, Frame JR, Solomon GD (1997) Alcohol, smoking, and caffeine use among headache patients. *Headache* 37:572–576
- Takeshima T, Ishizaki K, Fukuhara Y, Ijiri T, Kusumi M, Wakutani Y, Mori M, Kawashima M, Kowa H, Adachi Y, Urakami K, Nakashima K (2004) Population-based door-to-door survey of migraine in Japan: the Daisen study. *Headache* 44:8–19
- Aamodt AH, Stovner LJ, Hagen K, Brathen G, Zwart J (2006) Headache prevalence related to smoking and alcohol use. The Head-HUNT Study. *Eur J Neurol* 13:1233–1238
- Winter AC, Hoffmann W, Meisinger C, Evers S, Vennemann M, Pfaffenrath V, Fendrich K, Baumeister SE, Kurth T, Berger K (2011) Association between lifestyle factors and headache. *J Headache Pain* 12:147–155
- Lopez-Mesonero L, Marcuez S, Parra P, Gamez-Leiva G, Munoz P, Pasqual J (2009) Smoking as a precipitating factor for migraine: a survey in medical students. *J Headache Pain* 10(2):101–103
- Payne TJ, Stetson B, Steven VM, Johnson CA, Penzien DB, Van Dorsten B (1991) The impact of cigarette smoking on headache activity in headache patients. *Headache* 31:329–332
- Rasmussen BK (1993) Migraine and tension-type headache in a general population: precipitating factors, female hormones, sleep pattern and relation to lifestyle. *Pain* 53:65–72
- Wober C, Holzhammer J, Zeitlhofer J, Wessely P, Wober-Bingol C (2006) Trigger factors of migraine and tension-type headache: experience and knowledge of the patients. *J Headache Pain* 7:188–195
- Waldie KE, McGee R, Reeder AI, Poulton R (2008) Association between frequent headaches, persistent smoking, and attempts to quit. *Headache* 48:545–552
- Seltzer S (1982) Foods, and food and drug combinations, responsible for head neck pain. *Cephalgia* 2:111–124
- Wierzejska R (2012) Caffeine-common ingredient in a diet and its influence on human health. *Rocz Panstw Zakl Hig* 63:141–147
- Dalton K (1975) Food intake prior to a migraine attack—study of 2,313 spontaneous attacks. *Headache* 15:188–193
- Fukui PT, Goncalves TR, Strabelli CG, Lucchino NM, Matos FC, Santos JP, Zukerman E, Zukerman-Guendler V, Mercante JP, Masruha MR, Vieira DS, Peres MF (2008) Trigger factors in migraine patients. *Arq Neuropsiquiatr* 66:494–499
- Grant EC (1979) Food allergies and migraine. *Lancet* 1:966–969
- Medina JL, Diamond S (1978) The role of diet in migraine. *Headache* 18:31–34
- Kelman L (2007) The triggers or precipitants of the acute migraine attack. *Cephalgia* 27:394–402
- Torelli P, Evangelista A, Bini A, Castellini P, Lambru G, Manzoni GC (2009) Fasting headache: a review of the literature and new hypotheses. *Headache* 49:744–752
- Mosek A, Korczyn AD (1995) The Yom Kippur headache. *Neurology* 45:1953–1955
- Mosek A, Korczyn AD (1999) Fasting headache, weight loss, and dehydration. *Headache* 39:225–227
- Awada A, Al Juman AI (1999) The first-of-Ramadan headache. *Headache* 39:490–493
- Nikolajsen L, Larsen KM, Kierkegaard O (1994) Effect of previous frequency headache, duration of fasting and caffeine abstinence on perioperative headache. *Br J Anaesth* 72(3):295–297

32. Kumar KK (1988) Exercise for prophylaxis of migraine. *Headache* 28(3):228
33. Van Gijn J (1987) Relief of common migraine by exercise. *J Neurol Neurosurg Psychiatry* 50(12):1700–1701
34. Queiroz LP, Peres MF, Piovesan EJ, Kowacs F, Ciciarelli MC, Souza JA, Zukerman E (2009) A nationwide population-based study of tension-type headache in Brazil. *Headache* 49(1):71–78
35. Varkey E, Hagen K, Zwart JA, Linde M (2008) Physical activity and headache: results from the North-Tondelarth Health Study (HUNT). *Cephalalgia* 28(12):1292–1297
36. Yokoyama M, Yokoyama T, Funazu K, Yamashita T, Kondo S, Hosoi H, Yokoyama A, Nakamura H (2009) Associations between headache and stress, alcohol drinking, exercise, sleep, and comorbid health conditions in a Japanese population. *J Headache Pain* 10:177–185
37. Fernandez-de-Las-Panes C, Hernandez-Barrera V, Carasco-Garrido T, Alonso-Blanco C, Palcios-Cena D, Jimenez-Sanchez S, Jimenez-Garcia R (2010) Population-based study of migraine in Spanish adults: relation to socio-demographic factors, lifestyle and co-morbidity with other conditions. *J Headache Pain* 11(2): 97–104
38. Bigal ME, Tsang A, Loder E, Serrano D, Reed ML, Lipton RB (2007) Body mass index episodic headaches: a population-based study. *Arch Intern Med* 167:1964–1970
39. Peres MFP, Lerario DDG, Garrido AB, Zukerman E (2005) Primary headaches in obese patients. *Arq Neuropsiquiatr* 63(4): 931–933
40. Keith SW, Wang C, Fontaine KR, Cowan CD, Allison DB (2008) BMI and headache among women: results from 11 epidemiologic datasets. *Obesity* 16(2):377–383
41. Le H, Tfelt-Hansen P, Skyttte A, Kyvik KO, Olesen J (2011) Association between migraine, lifestyle and socioeconomic factors: a population-based cross-sectional study. *J Headache Pain* 12:157–172
42. Ghandour RM, Overpeck MD, Huang ZJ, Kogan MD, Scheidt PC (2004) Headache, stomachache, backache, and morning fatigue among adolescent girl in the United State: associations with behavioral, socio-demographic, and environmental factors. *Arch Pediatr Adolesc Med* 158:797–803
43. Milde-Busch A, Blaschek A, Borgrafe I, Heinen F, Straube A, von Kries R (2010) Associations of diet and lifestyle with headache in high-school students: results from a cross-sectional study. *Headache* 50:1104–1114
44. Kujala UM, Taimela S, Viljanen T (1999) Leisure physical activity and various pain symptoms among adolescents. *Br J Sports Med* 33:325–328
45. Järvelaid M (2004) Adolescent tobacco smoking and associated psychosocial health risk factors. *Scand J Prim Health Care* 22:50–53
46. Holmen TL, Barrett-Connor E, Holmen J, Bjermer L (2000) Health problems in teenage daily smokers versus nonsmokers, Norway, 1995–1997: the Nord-Trondellag Health Study. *Am J Epidemiol* 151:148–155
47. Moschiano F, Messina P, D’Amico D, Grazi L, Frediani F, Casucci G, d’Onofrio F, Demurtas A, Beghi E, Bussone G (2012) Headache, eating and sleeping behaviors and lifestyle factors in preadolescents and adolescents: preliminary results from an Italian population study. *Neurol Sci* 33(1):S87–S90