Chronic headache in tabari cohort population: Prevalence and its related risk factors

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ABSTRACT

Background: Due to uncertainly of chronic headache status as a society health problem, this study was conducted to determine total prevalence of headache and related factors.

Methods: In Tabari cohort study (TCS), a variety of demographic and clinical data were collected from individuals aged between 35 and 70 years using a standard questionnaire. The prevalence of chronic headache and the duration of the outcome were obtained through self-reported information. In statistical analysis, Chi-square and multivariate logistic regression tests were used to evaluate the association between outcome and risk factors.

Results: 10255 adults living in Mazandaran, Sari, 4149 women and 6106 male, were included in this study. The total prevalence of chronic headache was 13% (12.3%–13.6%). Factors such as female gender (OR: 4.10; 95% CI: 3.41–4.93), mountainous residence (OR: 1.26; 95% CI: 1.07–1.49), depression (OR: 1.73; 95% CI: 1.44–2.08), back pain (OR: 1.54; 95% CI: 1.36–1.74), history of head trauma (OR: 1.85; 95% CI: 1.44–2.37) and blood pressure (OR: 1.43; 95% CI: 1.24–1.65) significantly increases the odds of chronic headache.

Conclusion: The prevalence of chronic headaches in the Mazandaran province is more than. Other parts of the world, and this region needs special attention. A significant proportion of the adolescent population, especially women, suffer from chronic headaches in the cohort of Tabari, which is affected by factors such as location, back pain and depression.

1. Introduction

Headaches affect approximately half of the world's population as an Underlying and non-Underlying disorder.^{1–4} Headache disorders have been shown to be an immensely problematic issue for the individual and society as a whole. Although the pathogenesis of headaches are not clear, there are several factors which affect the individual's susceptibility to headaches, such as: neural connection disorders, Pia mater disorders, bone structure and posture.^{5,6}

Research shows that the global annual prevalence rate of all primary headache disorders is 46%, of which 3% belongs to chronic daily headaches (CDH).^{2,7} This CDH prevalence is reported to be 2.9% in Asia⁸ and approximately 4% in Europe.⁹

Headache disorders tend to regularize and usually become chronic. A chronic headache is defined as headache which afflicts an individual in more than 180 days in 1 year or during a 3-months period, occurs more than 14 days each month. These headaches massively affect the

daily functions of the afflicted person.¹⁰ Brain function decreases in patients inflicted by chronic headaches. Furthermore, reduced memory functions is a common compliance of those suffering from chronic headaches. The intensity of this dysfunction in memory, directly correlates to the chronic advance of the disorder (Mariantonietta Savarese). Therefore, it's highly unlikely for such memory dysfunction to occur subsequent to brain damage.¹¹

The average annual cost per capita for headaches resulting from direct (medication and treatment) and indirect (Being absent from work and reduced productivity) causes are estimated to be €1223 for migraines, €303 for tension headaches and €3501 for headaches resulting from overmedication.¹² As of yet, there is little evidence of various therapeutic modalities for patients suffering from chronic headaches.¹³ Sometimes, abusing analgesic medication can itself result in headaches becoming chronic. As a result and to limit the usage of analgesic medications, the preventive treatment is given priority for chronic headaches.¹⁴

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Table 1
Prevalence of chronic headache and its related factor in Tabari cohort population.

Variables		Sample total	Univariate (Chi square)		Multiple logistic regression		
			Chronic headache; n(%)	P	OR	CI 95%	P
Gender	Male	4149	201(4.8)	< 0.001	1	1	1
	Female	6106	1131(18.5)		4.10	3.41–4.93	< 0.001
Age group	35–44	3331	424(12.7)	0.008	1	1	1
	45–54	3379	486 (14.4)		1.06	0.91–1.24	0.443
	55–70	3545	422 (11.9)		0.87	0.73–1.04	0.139
Area residence	Urban	7012	859 (12.3)	0.001	1	1	1
	Mountainous	3243	473 (14.6)		1.26	1.07–1.49	0.006
Social economic level	1(lowest)	2051	301 (14.7)	0.015	1	1	1
	2	2052	272 (13.3)		1.00	0.83–1.22	0.977
	3	2050	259 (12.6)		1.01	0.82–1.26	0.896
	4	2051	227 (11.1)		0.95	0.75–1.20	0.666
Education level	5(highest)	2051	273(13.3)	< 0.001	1.31	1.02–1.68	0.035
	University/college	2374	239 (10.1)		1	1	1
	9–12	2896	325 (11.2)		0.99	0.82–1.20	0.924
	6–8	1121	153 (13.6)		1.24	0.97–1.58	0.084
	1–5	2332	384(16.5)		1.24	0.99–1.55	0.064
	Illiterate	1532	231 (15.1)		0.97	0.73–1.29	0.831
BMI	< 25	2473	258 (10.4)	< 0.001	1	1	1
	25–29.9	4343	557 (12.8)		1.03	0.88–1.22	0.686
	≥ 30	3439	517 (15)		0.95	0.80–1.13	0.582
Marital status	Single(single-widow-divorce)	835	124 (14.9)	0.095	1	1	1
	Married	9420	1208 (12.8)		1.22	0.99–1.50	0.063
Smoking	No	9326	1278 (13.7)	< 0.001	1	1	1
	Yes	929	54 (5.8)		1.07	0.78–1.46	0.671
Depression	No	9445	1134 (12)	< 0.001	1	1	1
	Yes	810	198 (24/4)		1.73	1.44–2.08	< 0.001
Diabetes	No	8490	1125 (13.3)	0.083	1	1	1
	Yes	1765	207 (11/7)		0.75	0.63–0.89	0.001
Hypertension	No	7947	943 (11.8)	< 0.001	1	1	1
	Yes	2281	389 (17.1)		1.43	1.24–1.65	< 0.001
back pain	No	5691	555 (9.8)	< 0.001	1	1	1
	Yes	4564	777 (17)		1.54	1.36–1.74	< 0.001
History of head injury with Anesthesia	No	9775	1233 (12.7)	< 0.001	1	1	1
	Yes	480	94 (19.6)		1.85	1.44–2.37	< 0.001
	Total	10255	1332 (13)		–	–	–

Risk factors affecting the occurrence, prevalence and prognosis of chronic headaches can be categorized in demographic, non-demographic and changeable potential risk factors such as; Demographic and non-demographic include age, gender (CDH prevalence is nearly identical in adults and women are almost twice at risk, compared with men), socioeconomic status (low socioeconomic conditions not only plays an active part in being a risk factor for prevalence and occurrence,^{15–19} but also implicates lower prognosis)²⁰ and marital status (an American study shows that married people are at lower risk of CDH and retain good prognosis compared to bachelors). Changeable potential risk factors, which are variable, include obesity, snoring, sleep disorders, Comorbid pain situation, head and neck injury, smoking cigarettes and caffeine absorption.⁴

Various studies have shown that in fact, chronic dehydration can also be a primary risk factor for headaches. Sleep deprivation²¹ (and heavy sleeping as well)²² can both lead to intense and chronic headaches. This can be remedied and prevented by naturally benefiting from 7 to 9 h of sleep each night.²³ Cutting Histamine-rich food such as cheese and other fermented food can be a beneficial strategy for people susceptible to chronic headaches.²⁴ Sweet pea essential oil and lavender tea can immensely aid people in reducing headache symptoms resulting from tension or migraines²⁵.

Numerous studies have been conducted to find out to what extent people are affected by headaches and to evaluate its impact on society as a whole by employing a socioeconomic approach by analyzing prevalence, frequency of attacks and headache related disabilities.²⁶ Since 60.11% of the population of Iran is in the +25 years of age group (25–54 years of age, 48.57%; 55–64 years of age, 7.22% and +65 years of age, 5.32%), and there is limited information on the prevalence of

primary headaches among Mazandarani adults, this study aims to evaluate the prevalence of chronic headaches and its related factors on the **PERSIAN-TCS** population.

2. Material and methods

In this study, we use information collected in enrollment phase from **PERSIAN-TCS** population. **PERSIAN-TCS** is a part of national cohort studies named the Prospective Epidemiological Research Studies in Iran (**PERSIAN**)^{27,28} Further details concerning **PERSIAN-TCS** is provided in cohort profile article. 10255 individuals (7012 from urban and 3243 from **mountainous** areas) aged 35–70 living in urban and mountainous regions of Sari (Capital city of Mazandaran province, in northern Iran) were enrolled in this study.

The process of collecting information included filling a questionnaire and taking blood samples. The questionnaire used in this study was a standardized questionnaire which is explored in detail in methodology and cohort profiling studies.^{27–29} Evaluation of important variables in this study (the results of which are presented later in this study) were done in the following fashion:

Blood pressure and anthropometric measurements were measured for all participants. Anthropometric data were collected by trained personnel, in accordance with standard protocol. Height was measured using SECA226 (SECA, Hamburg, Germany). Participants were requested to take off footwear, keep feet close together and lean on the wall in a way that their head would align with their body axis and their hands hang on the side of their body. Weight was measured using SECA755 (SECA, Hamburg, Germany) scales.³⁰

Blood samples were collected from all participants in the cohort

study, after a 12 h fast. Blood sugar was measured using AutoAnalyzer BT 1500 device (Biotechnica, Italy). For CBC test, the Alfa Cell Counter device (Nihon Kohden, Tokyo, Japan) was used.

Participants with fasting blood sugar exceeding 126 or a history of diabetes were considered diabetic. All participants recording a systolic blood pressure of over 140 mmHg and/or a diastolic blood pressure over 90 mmHg and/or with a history of high blood pressure were considered hypertensive. Depression history was extracted based on physician's diagnosis. Concussion was deduced as an incidence of prior trauma to the brain which resulted in a loss of consciousness, even if mild. Back pain is described as a serious pain preventing everyday chores lasting for more than a week. It should also be mentioned that chronic headache in this study is described as a headache occurring for more than 15 days a month in a 3 months times period.

Data analysis was done using SPSS ver.16 software. Data is shown in percentage, mean, standard deviation, minimum and maximum. In a univariate analysis, the variable quality comparison between participants suffering from chronic headaches and participants not afflicted are done using Chi Square test. To average out the effect of confounding variables, multivariate logistic regression test was applied. The p -value < 0.05 is considered significant.

3. Results

1332 participants out of 10255 were diagnosed with chronic headaches or in other words, 13% prevalence in **PERSIAN-TCS** (95%CI: 12.3–13.6).

As shown in [Table 1](#), women are more prone to chronic headaches, compared to men (18.5% vs 4.8%; $p < 0.001$). **Mountainous** areas have a higher prevalence compared to urban areas (14.6% vs 12.3%, $p = 0.001$). Prevalence is lower for participants in the highest socioeconomic level compared to the lowest level (13.3% vs 14.7%, $p = 0.015$).

Higher prevalence is noticed for participants suffering from depression (24.4% vs 12%, $p < 0.001$), high blood pressure (17.1% vs 11.8%, $p < 0.001$), back pain (17% vs 9.8%, $p < 0.001$) and traumatic head injury (19.6% vs 12.7%, $p < 0.001$). Chronic headache prevalence is lower for diabetics, compared to non-diabetics (11.7% vs 13.3%, $p = 0.083$), which is statistically insignificant.

Multivariate logistic regression shows that women are more likely to have chronic headache than men (OR: 4.10, 95% CI: 3.41–4.93, $p < 0.001$). Residing in **mountainous** areas compared to the urban area, increases the chronic headache by 26% (OR: 1.26; 95%CI: 1.07–1.49, $p = 0.006$). Belonging to the highest socioeconomic level, compared to the lowest, increases chronic headache by 31% (OR: 1.31; 95%CI: 1.02–1.68, $p = 0.038$).

Multivariate logistic regression also indicates an increased chance of affliction in patients suffering from depression (73%) (OR: 1.73; 95%CI: 1.44–2.08, $p < 0.001$) and high blood pressure (43%) (OR: 1.43; 95% CI: 1.24–1.65, $p < 0.001$). Risk factors such as back pain and traumatic head injury increase the chance of affliction by 54% (OR: 1.54; 95% CI: 1.36–1.74, $p < 0.001$) and 85% (OR: 1.85; 95%CI: 1.44–2.37, $p < 0.001$) respectively. Results were different for diabetic participants, as the chance of affliction was 25% lower for diabetics in compare of non-diabetics (OR: 0.75; 95%CI: 0.63–0.89, $p = 0.001$). In spite of dissimilar prevalence rate of each group, multivariate logistic regression results for other parameters indicated insignificant correlations.

4. Discussion

CDH is a group of headache disorders with a high prevalence and sometimes disability. The prevalence of chronic headache in **PERSIAN-TCS** was 13%, which is relatively higher than the majority of reported studies. Zhang (2016) reported 10.30% prevalence of chronic headache in a population over 60 years of age (95% CI: 9.46–11.14), which is

close to present study. In addition, it has been reported, a much higher incidence which was conducted in the general population.³¹ However, in most studies, this rate is lower than the present study, as reported in Park (2014), a population-based study, the 1-year prevalence of CDH was 1.8% (95% CI: 1.1–2.5), while the population was 1507 and their definition of headache is having at least 1 min of pain for more than 15 days each month for more than three months in the last year.³² The prevalence of 2.9% in a cross-sectional study with a small sample size (less than 1000) in the age range of 30–44 years was reported by Grande (2008), meanwhile in terms of study strength, the sample size and age range of the present study was very different, while headache is defined by a person's reported pain in 15 days or more in the past month or 180 days or more in the past year.³³ In a cross-sectional study, Vukovic (2013) conducted a survey for adolescent population based on a different headache definition (more than 15 days or more per month on average for three months or more in one year), pain was present,³⁴ the prevalence of 2.4% was reported. So by Lanteri (2003), a study on the general population and with the definition of headache occurrence for more than 15 days each month, the prevalence was reported 2.98%.³⁵ In both of these studies, the sample size was about 1500 people which did not have the comprehensive coverage of the current study. However, Ahmadi (2016) conducted a study in the same region (Mazandaran), the prevalence of headache in the elderly population (over 60 years old) with a sample size of 1500, was reported to be 42%, while their definition of chronic pain was a pain present for at least 90 days in a 6-month period before the interview, which could justify the difference in results.³⁶

The results of this study showed that women suffered from headache more than men. These results were consistent with the results of Vlasta (2013) (OR: 2.82; 95% CI: 1.35–5.9, $p = 0.006$) and Ahmadi (2016) (OR: 3.83; 95% CI: 3.08–4.75).³⁶ But in Park (2014), there was no significant difference in the incidence of headache in men and women (1.4 vs 2.3%, respectively, $p = 0.28$). Perhaps hormonal changes during menstruation can cause this inconsistency.³⁷

The results of this study showed that there was a significant correlation between the place of residence and the prevalence of headache in mountainous areas that were geographically located in mountainous regions was higher than urban areas (OR: 1.26, 95% CI: 1.07–1.49). An individual-based analysis of sensitivity to environmental variables showed that 24% of women were sensitive to atmospheric humidity and 16% to atmospheric pressure and the systolic and diastolic blood pressure of women depended on atmospheric factors during an annual period.³⁸ The weather affects the headache and the relationship between headache and air pressure and the role of temperature - absolute humidity of 12.9% and 33.7% respectively were reported in the study.³⁹ Since Mazandaran is a humid region with villages located in the foothills, it may be possible to confirm the effect of air pressure and humidity on the high prevalence of chronic headaches.

Depression as a risk factor in this study has a potential role in chronic headache (OR: 1.73; 95% CI: 1.44–2.08). In addition as the same of our results, the relationship between dose and rate of depression and headache was observed in Ahmadi (2016) study, so that the severity of OR in patients with mild depression to severe depression (OR: 2.59; 95% CI, 2.03–3.31) to (OR: 6.04, 95% CI, 3.54–10.3) respectively, was obtained.³⁶

Also, there was a significant relationship between the prevalence of headache and back pain in current study. The odds of headache was 1.54 times the rest (OR: 1.54, 95% CI: 1.36–1.74, $p < 0.001$). There is a significant correlation after adjustment for all covariates for headache and back pain in the Ahmadi study, (OR = 2.72; 95% CI, 2.17–3.4), which is consistent with the results.

CDH usually occurs as an episodic headache after a period of increased recurrence of more than a month or one year, which has an effective association with some risk factors such as age, sex, obesity, snoring and socioeconomic status.⁴ But in the current study, there was no relationship between the incidence of headache and factors such as

age, body mass index and socioeconomic status.

The greatest lack of credibility in observational studies is due to the small samplers used in a geographical area and therefore the cause-effect- relationship cannot be guaranteed.⁴⁰ A large sampling screen with a high response rate based on PERSIAN-TCS baseline provided enough information to accurately assess the prevalence of chronic headache in the general population living in Mazandaran province. Despite the present-day methodological challenges, we assume that the current survey is valid and feasible, as it has been done in a large sampler, in the form of a cohort study.^{41,42}

5. Conclusion

The results of this study showed that a significant proportion of adult population in Tabari cohort (especially women) suffer from chronic headaches, which is affected by factors such as depression, location, hypertension, back pain and history of head injury.

Ethics approval

This cohort has been approved by the ethics committee of Mazandaran University of Medical Sciences, Sari, Iran (IR.MAZUMS.REC.1395.2524).

Conflicts of interest

The authors have no conflicts of interest.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.cegh.2019.05.003>.

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