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Review article

Which came first, the risk of migraine or the risk of asthma? A systematic review

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ABSTRACT

Objectives: We conducted this review to systematically assess the association and risk of the migraine in the patient with asthma and vice versa.
Methods: We systematically searched publishes articles indexed in PubMed, Scopus, Cochrane library, PsycINFO, CINAHL, ISI Web of Science, Science Direct from inception, and Embase databases until June 2017. The quality assessment of the involved studies was done using the Newcastle-Ottawa Scale (NOS).
Results: Eight studies with 389,573 participants were reviewed and selected for data extraction. Among the selected studies, 5 were reported the association between migraine with asthma risk, and the rest three studies reported the risk of asthma in patient with migraine compared to non-moraine individuals. Odds ratio (OR) of migraine for patient with asthma as compared with non-asthmatic individuals was 1.62 (95% CI 1.43–1.82). Data pooling using a random-effect model showed that migraine was associated with a significant increased risk of asthma (relative risk (RR): 1.56; 95% CI: 1.51–1.60; $p < .00001$). Besides, sub-group and sensitivity analyses supported the positive association between asthma and migraine, and risk of asthma in migraine patients.
Conclusion: Now it is unknown if control of the asthma will impact the severity of migraines or vice versa, but it is necessary to perform more research to further explain the mechanisms through which asthma increases the frequency of migraine or vice versa. If two conditions linked, once an individual undergo better control of asthma symptoms, might the excruciating migraine ease, too.
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Abbreviations: MOOSE, meta-analysis of observational studies in epidemiology; PRISMA, preferred reporting items for systematic reviews and meta-analyses; NOS, Newcastle-Ottawa Scale; OR, odds ratio; RR, relative risk or risk ratio; HR, hazard ratio; CI, confidence interval.

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1. Introduction

Asthma is one of the most common chronic diseases of airway with clinical respiratory *symptoms* such as *chronic* inflammation, irritability and lung stenosis [1]. Epidemiology of asthma is important due to increased prevalence and severity, as well as poor asthma control leads to socio-economic and burden control costs impacts on health-care systems [2]. The prevalence of asthma varies widely among different countries, and is continuing to rise over the last decades in both industrialized societies and developing countries [3–5]. Despite the fact that the prevalence of asthma symptoms has increased over the past 30–40 years, there is a horizontal curve in developed and industrialized countries, and despite the fact that the percentage is high; it has stopped continues growing. Moreover, in developing countries, although the prevalence of asthma is lower, it has a rising trend [6,7].

Migraine is a severe neurological disorder that can cause stroke and headaches, and may cause nausea, vomiting, and severe sensitivity to light and sound [8,9]. Migraine attacks can cause severe pain that persist for hours or days. Although, underlying factors and exact cause of migraine is unknown, however, they can related to the mix of genetic and environmental factors [10]. Generally, migraine accounts for 11% of the total adult population and creates a significant socio-economic burden on the community [11]. The prevalence of migraine in Europe and North America is the highest (13%) and in 9% reported in Asia [12]. Migraines are more common in women than men (ratio: 3:1) [13]; although, it is more common in boys than in girls before puberty [14].

Migraine and asthma both comprise inflammation and smooth muscle activation in the blood vessels or airway; thus, asthma-related inflammation may lead to a progression of migraine [15]. It is also possible that patients with asthma have excessive activated parasympathetic nerves that predispose them to migraine attacks [16]. Moreover, asthma does not directly trigger acute migraine, but environmental or genetic factors are commonly caused by the simultaneous onset of asthma and migraine attack [17].

However, evidence about the association and risk of migraine in patient with asthma and vice versa is somewhat confusing; thus, we conducted this meta-analysis to systematically assess the association and risk of migraine in patient with asthma and vice versa.

2. Methods

The protocol was registered in PROSPERO, an international prospective register of systematic reviews (Registration number: 42017072472). This systematic review was conducted according to the Meta-analysis of Observational Studies in Epidemiology (MOOSE) [18] and Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines [19]. Ethical approval was not necessary for preparation of this article.

2.1. Search strategy

We systematically searched publishes articles indexed in PubMed, Scopus, Cochrane library, PsycINFO, CINAHL, ISI Web of Science, Science Direct from inception, and Embase databases until June 2017. Searched was performed using the following items: (asthma) and (migraine or headache or cephalgia or cephalalgia). Besides, to find more eligible evidences the reference lists of relevant publications were manually searched.

2.2. Inclusion criteria

Studies that fulfilled the following criteria, including observational studies (prospective cohort, retrospective cohort, case–control, or cross-sectional), the risk of migraine associated with asthma or vice versa that expressed as an adjusted hazard ratio (HR) or risk ratio (RR), as well as studies reported quantitative summaries on the relationship between asthma and migraine (e.g., odds ratios [ORs]), and those which full-text was accessible, were considered in the meta-analysis.

2.3. Exclusion criteria

Other article types include reviews (narrative or systematic), commentaries, letters to the editor, case series or case reports, and pooled analyses of original data were excluded. Besides, no language limitation was performed.

2.4. Data collection

Information was extracted using a data collection form, including first author name along with publication year, location, study design, sample size, demographic characteristics such as age and sex, criteria for enrolling, ascertainments of asthma, ascertainments and definitions of migraine, and disease of interest and comparison. Overall, two authors (F.R. and K.SH.) individually extracted the data of interest from studies. We contacted the authors of the eligible articles for missing data, if necessary.

2.5. Quality assessment

The quality assessment of the involved studies was done using the Newcastle-Ottawa Scale (NOS), including, comparability between groups, study group selection, and ascertainment of outcomes [20]. NOS scores of 7 or higher were considered as high quality. Any disagreements in the quality assessment findings were resolved with a third author (A.SM.) discussion.

2.6. Publication bias

To examine the potential for publication bias, visual inspection of funnel plots and the Egger test were used [21].

2.7. Statistical analysis

We combined the estimation of studies to investigate the relation between asthma and the subsequent development of

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