Prevalence of Migraine Among School Children (Primary, Preparatory and Secondary) in Assiut City-Egypt

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ABSTRACT

Background and purpose of study: Headache is one of the most common complaints of patients presenting to physicians, one of the most debilitating headache is migraine. This work was designed to study the prevalence of migrainous headache among school children (primary, preparatory and secondary).

Patients and Methods: A total of 2088 school children were included in this study, of whom 734 children chosen from the 4th and 5th grades of primary schools, aged 9-11 years, 834 children from the 1st and 2nd grades of preparatory schools with age ranged from 11-13 years and 520 students from secondary school representing 1st grade whose aged from 14-15 years. Results: This study demonstrated that the overall prevalence of migrainous headache among school children was 21.1% with significantly higher prevalence rate among secondary school children (34.2%) compared to primary (14.2%) and preparatory (18.8%) school children. The prevalence of migraine was higher among the studied females (22.7%) than males (19.1%) as a total and in different studied school children. Migraine without aura was the most frequently reported type of migrainous headache among studied school children (82.2%), followed by migraine with typical aura (10.7%) and basilar migraine (7.1%) with female predominance compared to males. Sleep disturbances, stress, vigorous exercise, bright sunlight, noise, hunger or missed meals, watching TV and bad odors constitute the commonest precipitating factors. Conclusion: our findings clarified high prevalence rate of migraine among school children especially secondary school children. Females predominated over males. IHS criteria should be revised before application on children. (Egypt J. Neurol. Psychiat. Neurosurg., 2006, 43(1): 131-140)

INTRODUCTION

Headache is a widespread symptom of several diseases and a frequent cause of medical consultation. Eighty percent of the general population in developed countries has been reported to suffer from headache, while in the population of developing countries (among university students in Nigeria), approximately 70% report recurrent headaches.

Headache is one of the most frequent somatic complaints among children and adolescents, but the estimated prevalence rates of primary headache disorders like migraine vary between different studies. In epidemiological studies, appropriate case definitions are necessary to obtain reliable and valid diagnoses. The International Headache Society criteria (IHS) provide standardized definition, but the applicability of the IHS criteria in the pediatric population has been debated, and some modifications have been proposed.

The diagnostic criteria for migraine in children and adolescents were not changed significantly in the 2nd edition of the international Classification of the Headache Disorders (ICHD-
It is mentioned that in children, attacks may last 1-72 hours as compared with 2-48 hours in the 1st IHS edition\textsuperscript{11,12}. Moreover, migrainous disorder not fulfilling the criteria (IHS 1.7) is renamed as probable migraine without aura in the new edition (coded as ICHD-II 1.6.1)\textsuperscript{11}.

An important but controversial issue is whether the prevalence is increasing in children and adults or not\textsuperscript{13-15}. Although some study results support an increase, methodological artifacts have been suggested\textsuperscript{15,16}. Migraine is a common headache disorder among adolescents, in whom it frequently causes disability and absence from school\textsuperscript{17}. However the prevalence is still discrepant among studies. For example, two studies in Europe revealed 1-year prevalence rates of 2.9 and 19\% in adolescents aged 13-15 years\textsuperscript{18,19}.

The prevalence of migraine and other headache types has been estimated in more than 70 population-based studies. However, little is known about the prevalence and distribution of headaches among school children in developing countries. So the main purpose of the present study was to estimate the prevalence of migraine among this critical age group in Assiut city, Egypt.

**PATIENTS AND METHODS**

This study was designed on two stages. The first stage was carried out on 1568 school children (primary and preparatory) of both sexes in Assiut City, 828 (52.8\%) of them were females and 740 (47.2\%) were males. The sample included 868 children from the fourth and fifth grades ($9-$<11 years) of the primary schools, of whom 457 (52.6\%) were females and 411 (47.4\%) were males. And 700 children from first and second grades ($11-$<13 years) of the preparatory schools ($371$ (53\%) were females and $329$ (47\%) were males). These schools (4 primary and 4 preparatory) were selected from different geographical areas of Assiut City. This stage was carried out from October 1995 to the end of April 1996. The finding of increased prevalence of migraine in the preparatory school versus primary school children stimulates the research group to arrange for the second stage of the study. The second stage was carried out on 520 secondary school students representing the first grade (14-15 years), of whom 270 (51.9\%) were females and 250 (48.1\%) were females from October\textsuperscript{14} to April\textsuperscript{2004}.

All children included in this study were interviewed individually and any pupil had suggestive history of headache was subjected to detailed history and full medical and neurological examination. Diagnosis and classification of migraine was carried out according to International Headache Society 1\textsuperscript{st} edition (IHS, 1988) in the first and second stage of the study.\textsuperscript{9}

The local ethical committee of Assiut University Hospital approved the study. Written informed consent was obtained from all students, parents and teachers.

**Statistical analysis**

The number of cases with migraine per 100 students in the studied sample, in different schools and both sex were calculated. $\chi^2$ tests were used for comparisons when appropriate. P-value of <0.05 was considered statistically significant.

**RESULTS**

The total prevalence rate of migraine among the studied sample was 21.1\% (34.2\%, 18.8\% and 14.2\% among secondary, preparatory and primary school children respectively). There was a significantly higher prevalence rate among secondary compared to primary and preparatory school children in typical and probable migraineurs ($P<0.001$) (Table 1).

Females had higher prevalence rate of migraine than males in primary, preparatory and
Secondary schools children but the difference was not significant (Table 2).

The prevalence of migraine without aura (82.2%) was significantly higher than migraine with typical aura (10.7%). Basilar migraine was recorded only in 7.1%. Secondary and preparatory school children had higher significant rate when compared to primary school children (P<0.01 and P<0.01 respectively) in migraine without aura, typical migraine and basilar migraine. Females had higher rate compared to males in typical migraine and migraine without aura (Table 3).

Primary, preparatory and secondary school children had significantly higher prevalence rate of migraine in children with a history of parental separation compared to children living with both parents (P<0.001, P<0.01 and P<0.05 respectively). Handedness had no significant difference in migraine (25.6% left and 20.8% right).

The commonest frequency of migraineous attacks among studied school children (one attack or more every month) was reported in 97.3%, while the less frequent attacks (one attack every 2 to 4 months) was reported only in 2.7% of migrainous children. More frequent attacks (one or more attacks per month) had higher significant rate in secondary (40.7) and preparatory (36.1) than primary school children. Regarding sex, females were predominated with more frequent attacks (one or more attacks per month) (56.7% versus 43.3%) and the reverse occurred in less frequent attacks (41.7% versus 58.3%) but the difference was insignificant (Table 4).

Our results clarified that; sleep disturbances (85.4%) [Whether hypersomnia (58.5%) or insomnia (55.4%)], bright sunlight (80.9%), noise (72.7%), hunger or missed meals (60.6%), watching TV (29.6%), bad odour (30.5%) and perfume (4.1%) were the commonest precipitating factors for migraine among school children. Stressful situations were recorded in 83.6% and vigorous exercises in 54.7%. Traveling by train (21.4%) precipitate attacks less frequent than traveling by cars (26.8%).

Our results showed that migrainous attacks in children were followed by a variety of post migrainous headache symptoms in the form of generalized exhaustion (63.3%), anorexia (49.7%), frequent yawning (31.2%) and lastly polyurea in 21.4%.

Table 1. Prevalence of migraine among school children: (Primary, Preparatory and Secondary).

<table>
<thead>
<tr>
<th>Types of school</th>
<th>Total</th>
<th>Typical migraineurs</th>
<th>Probable migraineurs</th>
<th>Non migraineurs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>2088</td>
<td>100%</td>
<td>439</td>
<td>21.1%</td>
</tr>
<tr>
<td>Primary school</td>
<td>734</td>
<td>35.2</td>
<td>104</td>
<td>14.2</td>
</tr>
<tr>
<td>Preparatory</td>
<td>834</td>
<td>39.9</td>
<td>157</td>
<td>18.8</td>
</tr>
<tr>
<td>Secondary</td>
<td>520</td>
<td>24.9</td>
<td>178</td>
<td>34.2*</td>
</tr>
</tbody>
</table>

N.B Probable migraineurs: children fulfilled all criteria of migraine except the duration of the attack, which lasted, for less than 2 hours.

Chi square = 97.796

P < 0.001
Table 2. Prevalence of migraine among schools children according to sex.

<table>
<thead>
<tr>
<th>Sex</th>
<th>Total N= 2088</th>
<th>Typical migraineurs N= 439</th>
<th>Probable migraineurs N= 80</th>
<th>Non migraineurs N= 1569</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total female</td>
<td>1098</td>
<td>52.6%</td>
<td>250</td>
<td>22.7%</td>
</tr>
<tr>
<td>Primary school</td>
<td>457</td>
<td>41.6%</td>
<td>63</td>
<td>13.8%</td>
</tr>
<tr>
<td>Preparatory</td>
<td>371</td>
<td>33.7%</td>
<td>93</td>
<td>25.1%</td>
</tr>
<tr>
<td>Secondary</td>
<td>270</td>
<td>24.7%</td>
<td>94</td>
<td>34.8%</td>
</tr>
<tr>
<td>Total male</td>
<td>990</td>
<td>47.4%</td>
<td>189</td>
<td>19.1%</td>
</tr>
<tr>
<td>Primary school</td>
<td>411</td>
<td>41.5%</td>
<td>41</td>
<td>9.9%</td>
</tr>
<tr>
<td>Preparatory</td>
<td>329</td>
<td>33.2%</td>
<td>64</td>
<td>19.5%</td>
</tr>
<tr>
<td>Secondary</td>
<td>250</td>
<td>25.3%</td>
<td>84</td>
<td>33.6%</td>
</tr>
</tbody>
</table>

In typical and probable migraine
Total female versus male (NS) non-significant
Primary female school children versus male (NS)
Preparatory female school children versus male (NS)
Secondary female school children versus male (NS)

Table 3. Distribution of common types of migraine in relation to sex among school children.

<table>
<thead>
<tr>
<th>Common types of migraine</th>
<th>Total N= 422</th>
<th>Primary school (9-&lt;11) N= 104</th>
<th>Preparatory school (11-&lt;13) N=156</th>
<th>Secondary school (≥ 13) N=162</th>
</tr>
</thead>
<tbody>
<tr>
<td>Migraine without aura</td>
<td>347</td>
<td>82.2%</td>
<td>95</td>
<td>27.4%</td>
</tr>
<tr>
<td>Female</td>
<td>203</td>
<td>58.5%</td>
<td>57</td>
<td>28</td>
</tr>
<tr>
<td>Male</td>
<td>144</td>
<td>41.5%</td>
<td>38</td>
<td>26.3</td>
</tr>
<tr>
<td>Migraine with typical aura</td>
<td>45</td>
<td>10.7%</td>
<td>5</td>
<td>11.1%</td>
</tr>
<tr>
<td>Female</td>
<td>24</td>
<td>53.3%</td>
<td>4</td>
<td>16.7</td>
</tr>
<tr>
<td>Male</td>
<td>21</td>
<td>46.7%</td>
<td>1</td>
<td>4.8</td>
</tr>
<tr>
<td>Basilar migraine</td>
<td>30</td>
<td>7.1%</td>
<td>4</td>
<td>13.4%</td>
</tr>
<tr>
<td>Female</td>
<td>17</td>
<td>56.7%</td>
<td>2</td>
<td>11.7</td>
</tr>
<tr>
<td>Male</td>
<td>13</td>
<td>43.3%</td>
<td>2</td>
<td>15.3</td>
</tr>
</tbody>
</table>

N.B. One child (0.4%) in preparatory school had childhood periodic syndrome.

Typical migraine
Secondary versus primary P= 0.01
Preparatory versus primary P= 0.01
Preparatory versus secondary P= 0.01

Migraine without aura
Secondary versus primary P= 0.01
Preparatory versus primary P= 0.01

Basilar migraine
Secondary versus primary P= 0.01
Preparatory versus primary P= 0.01
Table 4. Frequency of migrainous attacks in relation to sex among children of different schools.

<table>
<thead>
<tr>
<th>Frequency of the attacks</th>
<th>Total N= 439</th>
<th>Primary school (9-&lt;11) N= 104</th>
<th>Preparatory school (11-&lt;13) N= 157</th>
<th>Secondary schools (≥ 13) N= 178</th>
</tr>
</thead>
<tbody>
<tr>
<td>One or more attacks every month</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>427</td>
<td>99</td>
<td>154</td>
<td>174</td>
</tr>
<tr>
<td>Male</td>
<td>242</td>
<td>60</td>
<td>93</td>
<td>89</td>
</tr>
<tr>
<td>One attack every 2 to 4 month</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>12</td>
<td>5</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Male</td>
<td>7</td>
<td>3</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

Female versus male N S

DISCUSSION

Headache is one of the most common complaints in childhood and adolescence. Despite this fact, relatively little was known about the variations of migraine prevalence by age, sex and race.

The overall prevalence rate of migraine in our study according to IHS criteria (1988) was 21.1%. Our results were higher than those reported by many authors in different nations. Al Jumah et al. studied the prevalence of migraine in Saudi Arabia among school children ageing 6-18 years in a sample of 1400 and documented that the overall prevalence of migraine was 7.1%. Abu-Arefeh and Russell found that migraine prevalence increased with age from 3.4% at the age of 5 years to a peak of 19.1% at the age of 12 years. In France, the prevalence rate of migraine was reported to be 17% among a sample with higher age group (≥ 15 years).

Further increase in prevalence among the secondary school could be explained by coincident hormonal changes associated with pubertal changes at this age period.

Our results showed that the prevalence of migraine proportionally increases significantly (P<0.001) from 14.2% in primary to 18.8% in preparatory and 34.2% in secondary school (Table1). This was in agreement with Abu-Arefeh and Russell, who found that migraine prevalence increased with age from 3.4% at the age of 5 years to a peak of 19.1% at the age of 12 years. In France, the prevalence rate of migraine was reported to be 17% among a sample with higher age group (≥ 15 years). Further increase in prevalence among the secondary school could be explained by coincident hormonal changes associated with pubertal changes at this age period.

However it was worthy to note that 80 studied child (3.8%) of our studied sample (2088 school children) had headache, which fulfilled all the IHS (1988) criteria for migraine without aura except one diagnostic criterion; (headache duration less than 2 hours) this group was termed to have probable migraine. These observations were supported by Gallai et al., who found that 96 (24.3%) from 719 Italian school children under 18 years old with headache had migrainous disorders which did not fulfill the 1988 IHS diagnostic criteria for migraine of whom, 58.3% had a headache duration less than 2 hours duration. Also Raieli et al., who assessed...
prevalence of migraine among 1445 school children aged 11 – 14 years old found that 14 of them did not fulfill the 1988 IHS diagnostic criteria for migraine duration. So, together with Mortimer et al.\textsuperscript{23}, we suggest that, while the 1988 IHS diagnostic criteria are sensitive and specific for adults, the criteria must be applied to further populations of children to test concordance of data especially that of duration oh headache attacks.

Taking in consideration sex distribution in our studied sample, we found that typical migraine was higher among females (22.7%) than males (19.1%) but the difference was not significant. In agreement with our results Rasmussen and Olesen\textsuperscript{26} said that, female preponderance in migraine is more consistent across studies than the overall prevalence figures of migraine. Also Richard et al.\textsuperscript{27} suggested that as adolescence approaches, incidence and prevalence of migraine increase more rapidly in girls than in boys. On the other hand, using IHS criteria, Mortimer et al.\textsuperscript{23} identified more boys with migraine (62.5%) than girls (37.5%) with a male to female ratio 5:3, in a population based study of children aged 3-11 years old, but using Ad Hoc criteria, they gave almost equal sex ratio.

Study of different types of migraine according to sex and age, our results clarified that the prevalence of migraine without aura was significantly higher than migraine with typical aura and females predominated more than males in the two types. Migraine without aura, migraine with typical aura and basilar migraine were significantly higher with increasing age (P = 1.01). Females were predominated than males especially in migraine without aura. In accordance with our results, Gallai et al.\textsuperscript{25} recorded higher prevalence of migraine without aura (44.5%), than migraine with typical aura (29.9%). As far as the sex of the patient, Rasmussen and Olesen\textsuperscript{26} reported that both-migraines with and without aura show female preponderance. The over presentation of women seems more clear-cut in migraine without aura\textsuperscript{28,29}. In men, the two major subtypes of migraine have been found to be nearly equally common, whereas in women the prevalence of migraine without aura is clearly higher than that of migraine with aura.\textsuperscript{30} These sex differences may reflect an influence of female hormones, which may be even more important in migraine without aura than in migraine with aura.\textsuperscript{31}

Primary, preparatory and secondary school children had significantly higher prevalence rate of migraine among children with a history of parental separation compared to children living with their parents (P<0.001, P<0.01 and P<0.05 respectively) and this was manifest at younger age group (primary school children). This was in agreement with results of Abu-Arefeh and Russell\textsuperscript{18}, as they stated that family breakdown was more frequent in association with migraine (11%) than in the control group (7%).

The prevalence of left-handedness among migrainous children was higher than non-migrainous children but the difference was non-significant. Geschwind and Behan reported similar results in two different studies.\textsuperscript{32,33} Meanwhile, Messinger et al.\textsuperscript{34} found that left-handedness in migraine patients was 12.2% in males and 10.0% in females. This was not significantly different from the expected prevalence of 10% in general population. Furthermore Lipscombe and Prior\textsuperscript{35} found no relationship between the side of headache and handedness.

Regarding the frequency of migrainous attacks we found that the more frequent attacks (one or more attacks per month) were reported in 97.3% while the less frequent attacks (one attack every 2-4 months) in 2.7% only. This was in agreement with Raieli\textsuperscript{19}, who found high frequent attacks (one or more attacks per month) in 80% of their cases. By contrast, other studies Rasmussen et al.\textsuperscript{36} and Phillips et al.\textsuperscript{37} in general populations reported that usually migraineurs have less than one attack per month; while in clinic samples Manzoni et al.\textsuperscript{38} found that, the frequency of attacks was somewhat higher. However, this may be expected because high frequency may be a compelling reason for consultation. The high
frequent migrainous attacks reported among children in our study may be attributed to the fact that non of those studied children received prophylactic treatment and many of them attributed the cause of headache whatever its type to other causes (Toothache, sinusitis, refractive error ..........etc) to avoid the stigma of neuropsychiatric illness which was a common idea in our culture. Moreover, we found that females reported to have more frequent attacks than males. This was in agreement with the results of King and Sharpley, who evaluated headache in 900 Australian youth aged 10-18 years using a self-report questionnaire and found that girls reported more frequent, attacks of headaches than boys.

Our results clarified significant high rate of different precipitating factors such as, sleep disturbances whether hypersomnia or insomnia this may be attributed to fact that our students especially in secondary school may have sleep disturbance due to bad methods of studying in addition to extra school courses (private lessons). Other reported precipitating factor includes bright sunlight, noise as most of our schools were present in noisy areas which may increase the migrainous attacks, as well as hunger or missed meals where most of our students delay breakfast to 11-12 Am. In agreement with our results, those mentioned by Blaue, who reported that too much or too little sleep provokes headache in 5% of normal population and in a proportion of migraineurs. These environmental triggers, light, sound and smell, are transmitted directly to the CNS by the special senses; and cause direct excitation of the neural pathways, but light is a more common precipitant than others, which corresponds with our results. Also he recorded that hunger or missed meal represents a precipitating factor in 60.6% of patients. However, it does not affect blood vessels directly but acts on the brain as a whole. Meanwhile Dewey et al. stated that fasting induces attacks in some patients, although there is no consistent relationship between blood glucose level and the occurrence of migrainous attack. Migraineurs usually learn that, it is not wise to go for long periods without eating. Waheed et al. found that hunger or delayed meal was a precipitant factor for migraine in 39% of cases, environmental stimuli in 83% of cases light in 22-40%, noises in 36% and smell in 3% of cases. On the other hand, stressful situations represent another precipitant factor in 83.6% of cases. Also Hanington stated that stress is the most common precipitant of migraine.

Traveling, stimulating the nervous system through the eyes and labyrinth, also provokes migrainous attacks. In our study, traveling by train precipitate attacks less frequent than traveling by cars (21.4% versus 26.8%). Waheed et al. found that traveling by cars is a great precipitant factor for migraine in adults than traveling by train (20 % versus 4%).

During the recovery phase of migrainous episode, some children were still symptomatizing. Because these symptoms persist when the headache phase has resolved, and because they are explicable on the neurological basis, these continuing symptoms support a neuronal hypothesis of migraine. The most common reported symptoms in our study were physical and mental tiredness, depressed mood, impaired concentration, and reduced physical activities, yawning and fluid imbalance. Blau and Waheed et al. reported nearly the same results of our study.

Conclusion
1- Overall prevalence rate of migraine in the studied sample was 21.1% with significantly higher prevalence rate among secondary compared to preparatory and primary school children.
2- Migraine without aura had significantly higher prevalence rate than migraine with aura. Migraine without and with aura had female predominance than males.
3- There was a considerable percent of children who had migrainous attacks that fulfilled all criteria of IHS (1988) for migraine except the duration. All those children had headache of high frequency (one or more per month).
So we recommend that the IHS criteria should be revised before application on children. Even the 2nd edition that developed from IHS in 2003 (2-48 hours) 1st edition to (1-72 hours) 2nd edition did not greatly respect children’s appreciation of time for the duration of each attack.

REFERENCES


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الملخص العربي
مدى انتشار الصداع النصفي بين طلاب المدارس (الابتدائية والإعدادية والثانوية) في مدينة أسوان
يعتبر الصداع النصفي أحد الأمراض التي تصيب الأشخاص في مختلف المراحل العمرية. إلا أنه يكتسب أهمية خاصة لدى الأطفال وخاصة في المراحل الأولى من الدراسة حيث يعانون من الأعراض البدنية والمزاجية كما أن الكثير من الأطفال لا يجيد التعبير عن الصداع بصورة واضحة وبالتالي يصعب تشخيص الصداع في هذه المراحل العمرية. ولذا تم تصميم هذه الدراسة بهدف تحديد هذه المشكلة من خلال معرفة مدى انتشار الصداع النصفي بين أطفال المدارس (الابتدائية والإعدادية الثانوية) وأيضاً لمعرفة الأنواع المختلفة للصداع النصفي والعوازل المرتبطة به وأعراض ما بعد الصداع في هذه المرحلة من العمر.

وقد تم أجراء هذه الدراسة على مرحلتين المرحلة الأولى كانت على 734 من المدارس الابتدائية و834 من المدارس الإعدادية والمرحلة الثانية على 520 من المدارس الثانوية في مدينة أسوان، وقد تم سؤال جميع الأطفال الذين شملتهم هذه الدراسة بطريقة مباشرة وفريدة عن وجود صداع وأي طفل كان يعاني من أي نوبات صداع كان يخضع لفحص الكناري الكافي وتطبيق الاختبار المعنوي بواسطة المجتمع الدولي للصداع والصاداء في سنة 1988 لتشخيص الصداع النصفي وتحديد أنواعه المختلفة.

وقد أثبتت هذه الدراسة أن معدل انتشار الصداع النصفي بين العينة التي تم فحصها هو 21.2% وكان معدل الانتشار أعلى بين طلاب المدارس الثانوية (34.2%) عن طلاب المدارس الإعدادية (18.8%) عن طلاب المدارس الابتدائية (14.2%)

وكان الفروق ذات دلالة إحصائية.

كما أظهرت هذه الدراسة أن معدل انتشار الصداع النصفي كان أكثر شيوعاً بين الذكور (22.7%) نسبياً في النكورة (19.1%).

وبدراسة العوامل المرتبطة للصداع في الأطفال أعترض أن التعرض المباشر لأشعة الشمس (80.9%)، اضطرابات النوم (85.4%)، الضوضاء (72.6%)، التوتر العصبي (83.6%)، الجوع (60.6%) هي أكثر العوامل المرتبطة للصداع لدى الأطفال الذين يعانون من الصداع النصفي. أما الأعراض التي تعقب الصداع فقد تتمثل في الإجهاد العام (63.3%)، فقد الشهية للأكل (49.7%)، كثرة النفايات (31.2%)، كثرة التبول (21.4%).

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