Prevalence of Iron Deficiency Anemia among Nursing Students in St Theresa International (Health Promoting) College

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Abstract

As iron deficiency anemia (IDA) decreases learning ability and increases infectious diseases. This study aimed to investigate the prevalence of IDA among 1st year students in Faculty of Nursing in St Theresa International (Health Promoting) College and to study the association of IDA with respect to infectious diseases, food frequency consumption, blood loss due to menstruation and Body Mass Index (BMI) using weight and height for calculation. The study was a cross – sectional study which was conducted during the annual physical examination at the college. A total number of 64 students were recruited in this study. A self administered questionnaire concerning IDA related an issue was distributed to each of the students. The prevalence of IDA (Hb<12 g/dL) was 23.4%. It was statistically significant difference between IDA and students' body weight ($p< 0.05$). It was also noticeable that the anemic students have less regular menstruation, duration days of menstruation and days of heavy blood loss compared to the non-anemic students.

Key word: iron deficiency anemia, body's weight, student

INTRODUCTION

Iron is an essential element for blood production. About 70 percent of the body's iron is found in the red blood cells of the blood called hemoglobin (Hb) and in muscle cells called myoglobin. Hemoglobin is essential for transferring oxygen in the blood from the lungs to the tissues. Myoglobin, in muscle cells, accepts, stores, transports and releases oxygen.

IDA is a common type of anemia. The term "anemia" usually refers to a condition in which the body blood is lower than normal number of red blood cells.

IDA usually develops over time. The first stage, iron depletion, iron is reduced and is characterized by low serum ferritin. The second stage, iron deficiency erythropoiesis, impaired release of iron into the blood circulation defined by free erythrocyte protoporphyrin. The third stage, IDA, iron store are insufficient to maintain red blood cell synthesis, leading to anemia is characterized by a significant reduction in hemoglobin levels.

IDA can cause fatigue, shortness of breath, chest pain, and other symptoms. Severe IDA can lead to heart problems, infections, problems with growth and development in children, and other complications.

In 1993 -2005, World Health Organization (WHO) reported the prevalence of IDA in WRA in 30.2%.

In Thailand, in 2003, the 5th Nutritional National Survey conducted by the Bureau of Nutrition, Department of Health, Ministry of Public Health, revealed the prevalence of iron deficiency anemia in women of reproductive age of 15-44 years in 18.6%.

Following the WHO health promotion setting, in 2003, the St Theresa International (Health Promoting) College has been established in 2013. As part of the Health Promoting College, weekly iron supplementation is considered a main strategy to combat ID and IDA among the students and college staff. Consequently, Prevalence of iron deficiency anemia among Nursing Students in St Theresa International (Health Promoting) College will be used for further evaluation after a participatory action research being launched.

OBJECTIVES

1. To assess the prevalence and the severity of IDA among the 1st year nursing students in St Theresa International (Health Promoting) College in Academic Year 2013.
2. To study the association of IDA with respect to infectious diseases, food frequency consumption and blood loss due to menstruation and Body Mass Index (BMI).

SUBJECTS AND METHIDS

Study Design

The study was a cross-sectional study which was conducted at St Theresa International (Health Promoting) College.

Sample Size

A number of 64 students of 1st year nursing students were recruited from the annual physical examination organized in September, 2013.

Methodology

A short self-administered questionnaire was given to each of the mentioned target group after the registration. The one-page questionnaires were composed of demographic profile, health related to

IDA, food frequency consumption, blood loss from menstruation and body's weight and height for BMI calculation. Hemoglobin concentration was reported in the result of complete blood count included in the annual physical examination form. Only 64 students came out with both the hemoglobin concentration and the completed questionnaires. Epi info version 3.5.4 was employed for data analysis.

RESULT

Demographic Profile

The 62 (96.9%) students were female and only 2 (3.1%) were male. Their age ranges from 18-22 years with the Mean (SD) of 18.6 (0.9). Their ages grouped into 18, 19 and >= 20 years in 31 (48.4%), 27 (42.2%) and 6 (9.4%) respectively.

Blood examination

The distribution of Hb ranged from 9.3-14.9 gm/dL was shown in Figure 1. The mean (SD) of Hb was 12.6 (0.93). The mean Hb of the IDA group was 11.3 (0.68) and the Normal group was 13.0 (0.67). The Hb distribution in < 11.0, 11.0-11.9, 12.0-12.9, 13.0-13.9 and >= 14 gm/dL were in 3 (4.7%), 12 (18.8%), (43.8%), 19 (29.7%) and 2 (3.1%) respectively and it was revealed that 15 (23.4%) students were anemic (Hb< 12 gm/dL) as shown in Figure/Table 2.

Figure 1 Distribution of Hemoglobin (Hb) concentration among the students

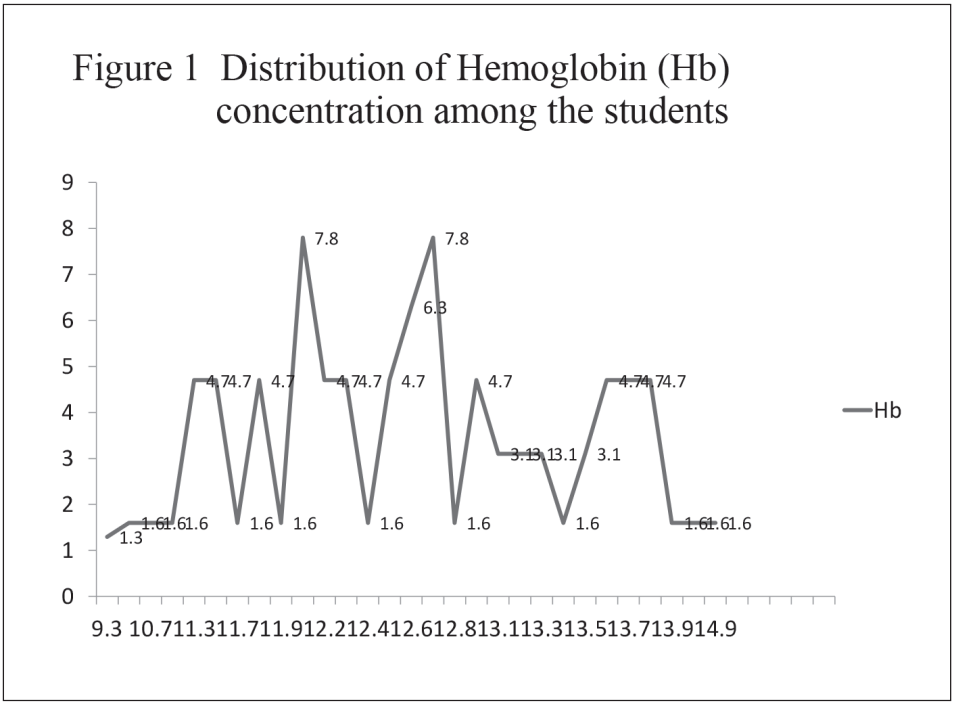
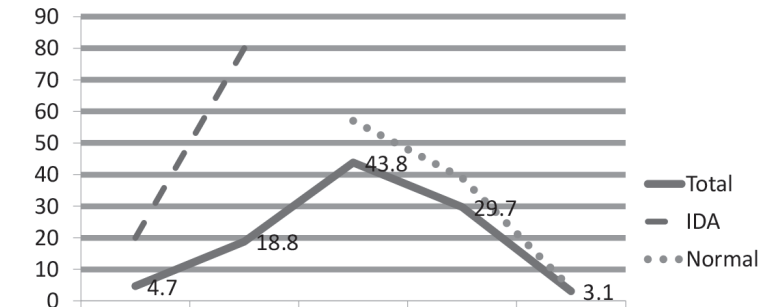


Figure /Table 2 Distribution of Hemoglobin (Hb) concentration among the students



	<11	11-11.9	12-12.9	13.-19.9	>=14
Total	4.7	18.8	43.8	29.7	3.1
IDA	20	80			
Normal			57	39	4

Food frequency consumption

There are two forms of dietary iron: heme and non-heme. Heme iron is derived from animal source that contained hemoglobin – animal foods including red meats, fish and poultry. Non-heme irons do not come from an animal source that can be found in vegetables, grains, iron-fortified breakfast cereal, lentils and beans.

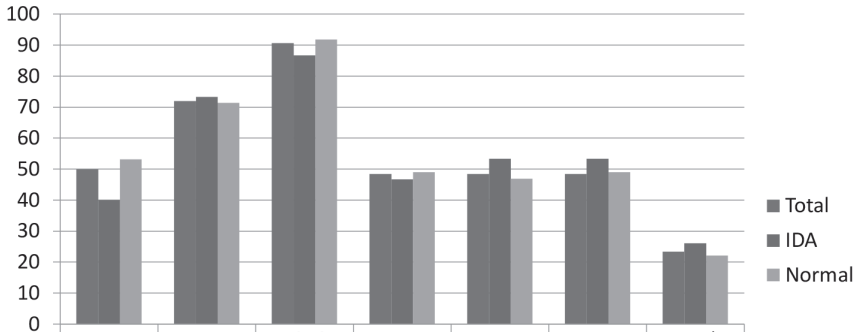
Hame iron is absorbed better than non-heme iron, and its absorption is not affected by anything else in the meal. It is approximately 15-35% of the heme iron the body absorbs, which is a lot. Non-heme iron is not absorbed by the body as well as heme iron. Only 2 - 20% of non-heme iron is absorbed.

In addition, several types of foods known as iron inhibitor can reduce the amount of non-heme iron that the body absorbs such as the tannins in coffee and tea, dairy products, fiber, eggs, and some types of chocolate can inhibit the absorption of non-heme iron. The good news is that vitamin C known as iron enhancer helps to markedly increase the absorption of non-heme iron. For instance, drinking a glass of orange juice with dinner can increase non-heme iron absorption up to six-fold.

Figure/Table 3 showed the history of variety kinds of food frequency consumption among the students. The questionnaire was asked about the 5- food groups; protein, carbohydrate, fat, vegetable and fruit. Both the IDA group and Normal group reported the similar pattern of foods frequency consumption. Egg is consumed widely in Thai dishes while it contains phosphoproteins, which inhibit iron absorption. The students consumed egg regularly in 50%: IDA group: 40% and in Normal group: 53.1%. Tea/coffee/ soya milk, another inhibitor, was consumed in 23.4%: 26.1% in IDA and 22.1% in Normal group.

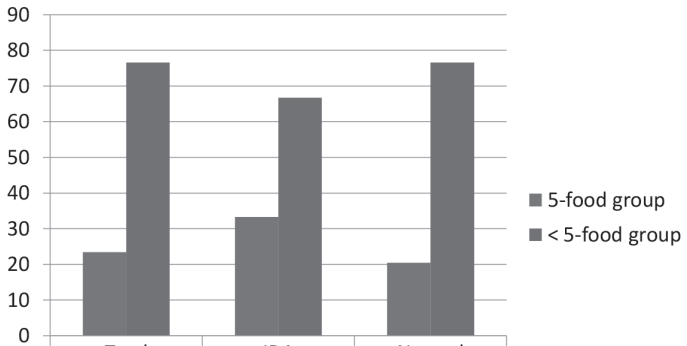
Figure/Table 4 classified the 5-food group consumption regularly in 23.4% among the students: 33.3% in IDA and in Normal group: 20.4%. This figure showed the tendency that the IDA group knowing the importance of 5-food group consumption in everyday practice. Nevertheless, both the quality and quantity of food record were further investigated.

Figure /Table 3 Distribution of food group consumption daily by IDA and normal group.



	egg	protein	carbohy -drate	fat	vegetable	fruit	tea/ coffee
Total	50	71.9	90.6	48.4	48.4	48.4	23.4
IDA	40	73.3	86.7	46.7	53.3	53.3	26.1
Normal	53.1	71.4	91.8	49	46.9	49	22.1

Figure/Table 4 Distribution of 5 food – group consumption daily by IDA and Normal group.



	Total	IDA	Normal
5-food group	23.4	33.3	20.4
< 5-food group	76.6	66.7	76.6

Health and issues related to IDA

As shown in Figure/Table 5:

1. Respiratory tract infection was 6.3%: in IDA group: 6.1% and in Normal group: 6.7%.

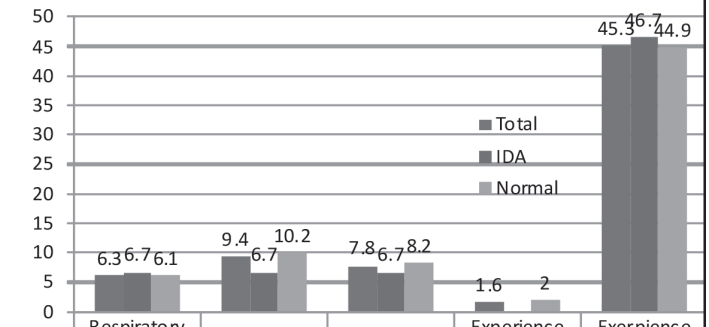
2. Feeling fatigue was 9.4%: in IDA group: 6.7% and in Normal group: 10.2%.

3. Feeling cold (cannot control the temperature) was 7.8%: in IDA group: 6.7% and in Normal group: 8.2%.

4. Experiencing worm infestation in1.6%: in IDA group: 0. % and in Normal group: 2.0%.

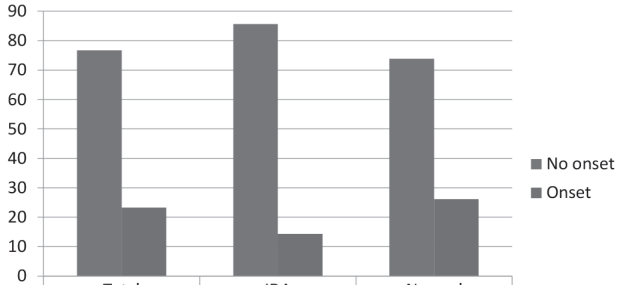
5. Experiencing iron tablet supplementation in 45.3%: in IDA group: 46.7. % and in Normal group: 44.%.

Figure/Table 5 History of diseases and symptoms related to IDA



	Respiratory tract infection	Fatique	Feeling cold	Experience worm infestation	Exerpience iron supplentation
Total	6.3	9.4	7.8	1.6	45.3
IDA	6.7	6.7	6.7		46.7
Normal	6.1	10.2	8.2	2	44.9

Figure /Table 6 Distribution of onset of menstruation on the day of data collection & blood examination

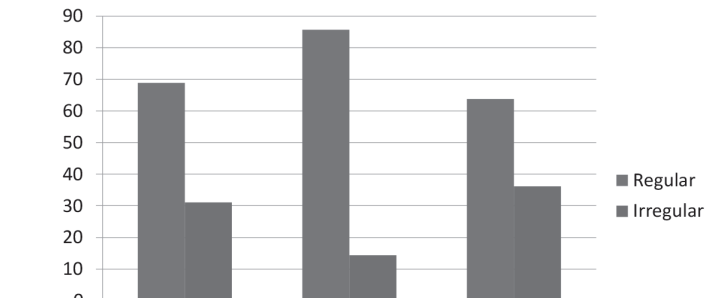


	Total	IDA	Normal
No onset	76.7	85.7	73.9
Onset	23.3	14.3	26.1

Menstruation

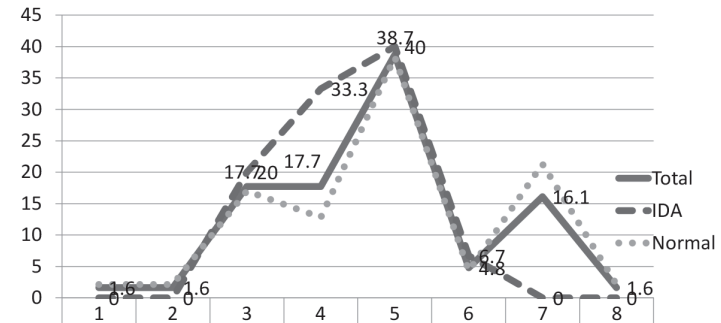
There were 14 (23.3%) out of 60 student reported the onset of menstruation: in IDA group: 2 (14.3%) and in Normal group: 12 (26.1%) at that time of data collection as shown in Figure/Table 6.

Figure/Table 7 Distribution of regular menstruation



	Total	IDA	Normal
Regular	68.9	85.7	63.8
Irregular	31.1	14.3	36.2

Figure/Table 8 Distribution of the students' period of menstruation (days).

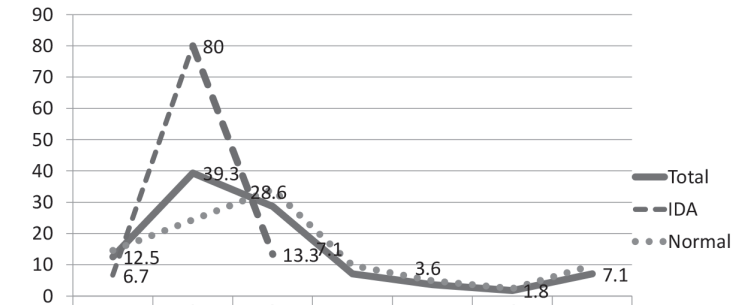


	1	2	3	4	5	6	7	8
Total	1.6	1.6	17.7	17.7	38.7	4.8	16.1	1.6
IDA	0	0	20	33.3	40	6.7	0	0
Normal	2.1	2.1	17	12.8	38.3	4.3	21.3	2.1

It was revealed that 19 (31.1%) out of 61 students had their irregular periods: in IDA group: 2 (14.3%) and in Normal group: 17 (36.2%) as shown in Figure/Table 7.

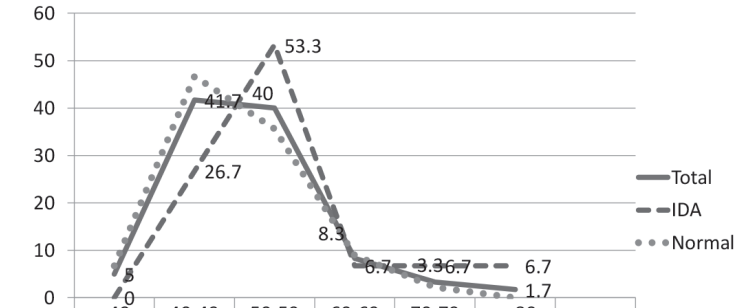
The mean of duration of menstruation was day 4.7 (1.4) among 62 students: in the IDA group: 4.3 (0.9) and in the Normal group: 4.9 (1.6). The average days of heavy blood loss of menstruation was 2.8 (1.6) among 56 students: in IDA group: 2.0 (0.4) and in Normal group: 3.1 (1.7).

Figure /Table 9 Distribution of the days of the students' heavy blood loss.



	1	2	3	4	5	6	7
Total	12.5	39.3	28.6	7.1	3.6	1.8	7.1
IDA	6.7	80	13.3				
Normal	14.6	24.4	34.1	9.8	4.9	2.4	9.8

Figure/Table 10 Distribution of the students' body weight (kg)



	<40	40-49	50-59	60-69	70-79	>=80	
Total	5	41.7	40	8.3	3.3	1.7	
IDA	0	26.7	53.3	6.7	6.7	6.7	
Normal	6.7	46.7	35.6	8.9	2.2	0	

It was noticeable that the IDA students have less regular menstruation, shorter days of menstruation and days of heavy blood loss compared to the Normal students as shown in Figure/Table 9 -10.

Body Mass Index (BMI)

The Figure/Table 10, 11 and 12 demonstrated the students' body weight, height and BMI.

The students' body weight.

The average weight of the IDA group was 55.04(10.53), the Normal group was 49.16 (8.70) kgs.

The minimum weight of the IDA group was 44 kgs, the Normal group was 34kgs.

The maximum weight of the IDA group was 80 kgs., the Normal group was 73kgs.

The median weight of the IDA group was 52 kgs., the Normal group was 48kgs.

The mode weight of the IDA group was 44 kgs., the Normal group was 403kgs.

The students' body height.

The average height of the IDA group was 1.58(0.05) and the Normal group was 1.58 (0.60) m.

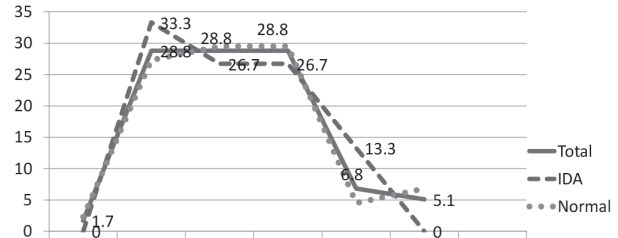
The minimum height of the IDA group was 1.51 m., the Normal group was 1.49 m.

The maximum height of the IDA group was 1.66 m., the Normal group was 1.75 m.

The median height of the IDA group was 1.58 m., the Normal group was 1.58 m.

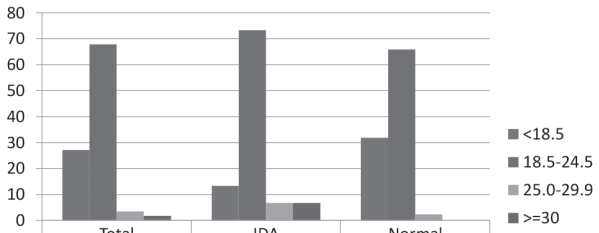
The mode height of the IDA group was 1.51 m. and the Normal group was 1.49 m.

Figure/Table 11 Distribution of the students' body height (m).



	<1.50	1.50-1.54	1.55-1.59	1.60-1.64	1.65-1.69	>=1.70
Total	1.7	28.8	28.8	28.8	6.8	5.1
IDA	0	33.3	26.7	26.7	13.3	0
Normal	2.3	27.3	29.5	29.5	4.5	6.8

Figure/Table 12 Distribution of the students' Body Mass Index (BMI)



	Total	IDA	Normal
<18.5	27.1	13.3	31.8
18.5-24.5	67.8	73.3	65.9
25.0-29.9	3.4	6.7	2.3
>=30	1.7	6.7	0

For adults 20 years old and older, BMI is interpreted using standard weight status categories that are the same for all ages and for both men and women.

The standard weight status categories associated with BMI ranges for adults are shown in the following table.

BMI	Weight Status
Below 18.5	Underweight
18.5-24.9	Normal
25.0-29.9	Overweight
30.0 and above	Obese

Statistical Analysis

There was only one significant statistical difference ($p < 0.05$) between the weight of the IDA and Normal group.

Table 1 Statistical analysis between IDA and Non-IDA groups.

No	Variables	Statistics	P-value
1	Body weight (kg)	Kruskal – Wallis test (4.31)	< 0.05
2	Body height (m)	Kruskal – Wallis test (0.01)	
3	Duration of menstruation	Kruskal – Wallis test (2.08)	
4	Onset of menstruation	Fisher Exact Test (0.30)	
5	Regular menstruation	Fisher Exact Test (0.11)	
6	Coffee/tea consumption usually	Fisher Exact Test (0.19)	
8	Respiratory infection often	Fisher Exact Test (0.67)	
9	Feeling cold frequently	Fisher Exact Test (0.11)	
10	Animal product consumption always	Fisher Exact Test (0.58)	

DISCUSSION

The following cutoff points suggested by the World Health Organization (WHO) were used to determine whether iron deficiency anemia was a major problem among the general population.

Prevalence	Public Health Problem
< 5%	Not a problem
5-14.9%	Low magnitude
15-33.9%	Moderate magnitude
40% and above	High magnitude

In the study, it was found that out of 64 students, the 15 (23.4%) female students were suffering from moderate degree of anemia. This indicated that it was a public health problem of moderate magnitude as per the WHO guidelines. However the body's weight was the only statistically significant difference clinical symptom of IDA group compared to Normal group ($p<0.05$). Hence it was implied that only subclinical of IDA was the prevalent in this college.

The strategy, adopted by the state government and UNICEF was simple and cost effective - target adolescent girls. A single weekly dose of Iron Folic Acid (IFA) – in tablet form - is given to all girls between the ages of 10-19. Students in 13,000 schools in the state are part of the program. Out-of-school girls are reached through more than 38,000 Anganwadi village-based child development and nutrition canters. Providing 52 tablets per girl per year costs only nine rupees. At the current rate the program could change the face of anaemia in the state within a few years.

CONCLUSION

It was revealed in this study that the prevalence of IDA among the nursing students was 23.4% which is considered as the moderate degree of anemia according to WHO criteria. As recommended by the Department of Health, Ministry of Public Health, Thailand, a weekly iron tablets (Ferrous Sulphate with 60 mg elemental iron) was considered as a strategy to combat IDA among the students at St Theresa (Health Promoting) College. Also food-based strategy on the promotion of iron rich-food was employed together with the iron supplementation. Hence, the improvement of both learning performance and healthy appearance will be a part of evaluation other than the decrease of IDA prevalence from this study.

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