



Original Article

Prevalence of Karapada daha-suptata in Madhumeha with reference to diabetic peripheral neuropathy in type 2 diabetes mellitus patients.

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ABSTRACT:

Background: Diabetes mellitus is a major health issue in today's world. Main threat is not the disease itself but its complications like nephropathy, retinopathy and neuropathy etc. Diabetic peripheral neuropathy is the leading cause of foot ulcers, their complications like limb amputation and cost associated with it. *Madhumeha* which has been described as '*Maharogas*' i.e. difficult to treat disease has many similarities with Diabetes mellitus can be understood and studied as same disease. Ayurveda has mentioned the causes, pathophysiology and symptoms of Diabetic Peripheral Neuropathy as '*karapada daha -suptata*' in *purvarupa lakshanas* and *upadrava lakshanas* but inscattered form. It needs depth study to understand the concept of Karapada daha- suptata (DPN). **Objective:** To study prevalence of Karapada daha-suptata (Diabetic peripheral neuropathy) and the relation of Karapada daha- suptata (DPN) with age, gender, duration of disease Madhumeha, blood sugar level, alcohol and smoking habit etc in *Madhumeha* patients. Method: A cross sectional study was carried out in Tribhuvan University Ayurveda Teaching Hospital, Madhumeha patients (Type 2 diabetes mellitus) patients were recruited for the study. MNSI (Michigan Neuropathy Screening Instrument) was used to diagnose Karapada daha- suptata (Diabetic peripheral neuropathy). Result: Among 100 patients 31% patient had Karapada daha- suptata (DPN). Our study showed that the prevalence of Karapada daha-suptata(DPN) increased with increasing age of the study population. Similarly, prevalence of Karapada daha -suptata in patients with disease duration of Madhumeha (DM2) for more than 5 years was 61.29% whereas patients having Diabetes for less than 5 year was 38.71%. Prevalence

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of Karapada daha-suptata (DPN) was very high (43.13%) among uncontrolled fasting blood sugar level (>126mg/dl) and (47.5%) among uncontrolled post prandial blood sugar level (>200mg/dl). In this study mean Fasting blood sugar level was 177.0323 mg/dl in the patients with Karapada daha-suptata(DPN) and mean post prandial blood sugar level in patients with diabetic peripheral neuropathy was 239.1613mg/dl. Conclusion: Our study showed Karapada daha-suptata/DPN is highly prevalent and increasing as the duration of disease Madhumeha increses but it's not uncommon in newly disagnosed disease too. Showed significant relation of Karapada daha suptata with disease duration of Madhumeha, level of blood sugar, and increasing age of the patients. Showed no significant differences in the prevalence of Kara pada daha- suptata in male and female patients and with the smoking habit of the patients.

Key words: *Madhumeha*, Diabetes Mellitus, Diabetic peripheral neuropathy, *karapada daha- suptata*.

Introduction

Madhumeha has been described as one of the ‘*Maharogas*’ i.e. difficult to treat disease by Ayurveda scholars. [1] *Madhumeha* is listed as “*mahagadas*” due to its severity and chronicity. It is one among 20 types of *prameha*. In *Madhumeha* patients passes honey like urine or sweetish urine and sweetness also present in the body of the patients. [2] It has been described under *vataj prameha*. Acharya Susruta has mentioned that *Madhumeha* is the consequence of untreated *prameha*. [3] Almost all *nidana* of *Madhumeha* can be equated with the leading cause of Diabetes mellitus in today's context i.e. change in dietary habit and sedentary lifestyle. Diabetes mellitus (DM) is a chronic hyperglycemic condition due to metabolic derangements mainly attributed to absolute insulin deficiency or defect in insulin action. [4,5] DM poses significant morbidity and mortality if untreated because of its associated late complications in the form of micro vascular and macro vascular structures. [6] Neuropathy has been considered as important micro vascular complication of diabetes and sometimes reasoned as the pathological process for other ab-

normalities in DM. [7,8,9]

Diabetic Peripheral Neuropathy (DPN) is simply defined as “the presence of symptoms and / or signs of peripheral nerve dysfunction in people with diabetes after the exclusion of other causes”. Here nerve damage is caused by high blood sugar and uncontrolled diabetes. [10] Diabetic Peripheral Neuropathy is a relatively early and common complications affecting 300% Diabetic patients. [11] It is estimated that between 12 to 500% of people with diabetes have some degree of DPN and approximately 150% of people develop at least one foot ulcer during lifetime and 60-700% of ulcer are primarily neuro-pathic in origin. [12, 13]

Study conducted in Dhulikhel Hospital, Kathmandu University Hospital Kavre Nepal in 160 clinically diagnosed diabetic patient, the overall prevalence of DPN was 38.1% [14] DPN occurs secondary to metabolic disturbance and prevalence is related to the duration of diabetes and the degree of metabolic control [15]. The symptomatology corresponding to the clinical presentation of DPN is scattered in *purvarupa*, *lakshanas* and *upadrava* of *prameha*, *madhumeha* and *vataavyaadh*. [16] Clinical features like *karapada daha* (burning sensation in hands and feet), *karapada suptata* (numbness in hands and feet), *anga suptata* (numbness of body organs), *angesu paridaha* (Numbness in body organs), *stambha* (rigidity), *kampa* (tremor), *shoola* (pain) etc described under the *purvarupa* and *upadravas* of *Madhumeha* corresponds to Diabetic Neuropathy. [17, 18]

In Ayurveda, direct nomenclature of DPN is not found. In Ayurveda classics symptoms like *karapada suptata* (numbness) and *karapada daha* (burning sensation) in body parts especially in hands and feet are described under *purvarupa* (premonitory symptoms) and *upadravas* (complications) of *Madhumeha*. [19, 20] *Daha* (burning sensation), *suptata* (numbness), *harsha* (tingling sensation), *shosha* (wasting), *dourbalya* (weakness), *anga sada* (lethargy) are the symptoms attributed as the *upadrava* (complication) of *Madhumeha* are almost similar to the description of Diabetic Peripheral Neuropathy.

Timely detection of complications like Karapada

daha-suptata (DPN) helps physicians assert the need for appropriate and timely foot advice to their patients. This will help to spread the awareness about how common is this complication and its related factors so that new researches could be conducted in Ayurveda to reduce such diabetes re-

lated complications like organ amputation and cost associated with its management. We can detect and treat the symptoms like *Karapada daha-suptata* by giving different aushadh yoga and other forms of shodhana and samana chikitsa to maintain quality of life of *Madhumeha* patient.

Table no. 1

Symptomatic correlation between *Karapada daha- suptata* and DPN and dosha involvement [21, 22]

| S.N. | Symptoms mentioned in Modern medical science | Symptoms mentioned in Ayurvedic texts | predominant dosha in symptoms |
|------|---|---------------------------------------|---------------------------------|
| 1 | burning sensation in bilateral lower limbs especially the foot | <i>Pada daha</i> | <i>prakupita pitta</i> |
| 2 | burning sensation in bilateral upper extremities including finger tips and palms. | <i>kara daha</i> | <i>prakupita pitta</i> |
| 3 | tingling sensation | <i>Cumcumayana</i> | <i>prakupita vata</i> |
| 4 | numbness in hands and feet | <i>karapada suptata</i> | <i>prakupita kapha and vata</i> |
| 5 | pain | <i>Shoola</i> | <i>prakupita vata</i> |

From above correlation of *nidana*, *lakshanas* and *samprapti* of both '*Karapada daha- suptata*' and DPN it can be concluded that vata dosha is the prime dosha involved followed by *pitta* and *kapha dosha*.

Methods

This is a hospital based cross sectional study performed in 100 diagnosed Madhumeha (Type 2 diabetes mellitus) patients coming to Tribhuvan University Ayurveda Teaching Hospital, Kirtipur, Kathmandu nepal between May 2021 to November 2021. Madhumeha patients willingly given consent, aged between 30 to 70 years were included in the study and patient with hypothyroidism, Rheumatoid arthritis, vit. B12 deficiency, cerebrovascular diseases, chronic muscular diseases, parkinson's disease, alcohol abuse, chronic renal and liver disease, cancer etc and patients with amputated limbs were excluded from the study. Demographic datas such as age, gender, marital status etc were taken along with history of hypertension, use of alcohol, smoking, family history of madhumeha and information on use of prescribed

madhumehagna (anti- diabetic medicines) drugs were also acquired through patients. Patient's fasting and post- prandial blood glucose level was recorded.

The Michigan Neuropathy Screening Instrument (MNSI) was used for screening for the presence of diabetic peripheral neuropathy. The first part of the screening instrument, the history questionnaire, 15 self-administered "yes or no" questions on foot sensation including pain, numbness and temperature sensitivity were asked. A high score indicates more neuropathic symptoms. The second part of the MNSI, a brief physical assessment (completed by health professionals) involving inspection of the feet for deformities, dry skin, hair or nail abnormalities, callous or infection, semi-quantitative assessment of vibration sensation at the dorsum the great toe, grading of ankle reflexes and monofila-

ment testing was done.

Patient screening positive on the clinical portion of the MNSI (greater than 2 points on a 10 points scale) are considered neuropathic. [23, 24]

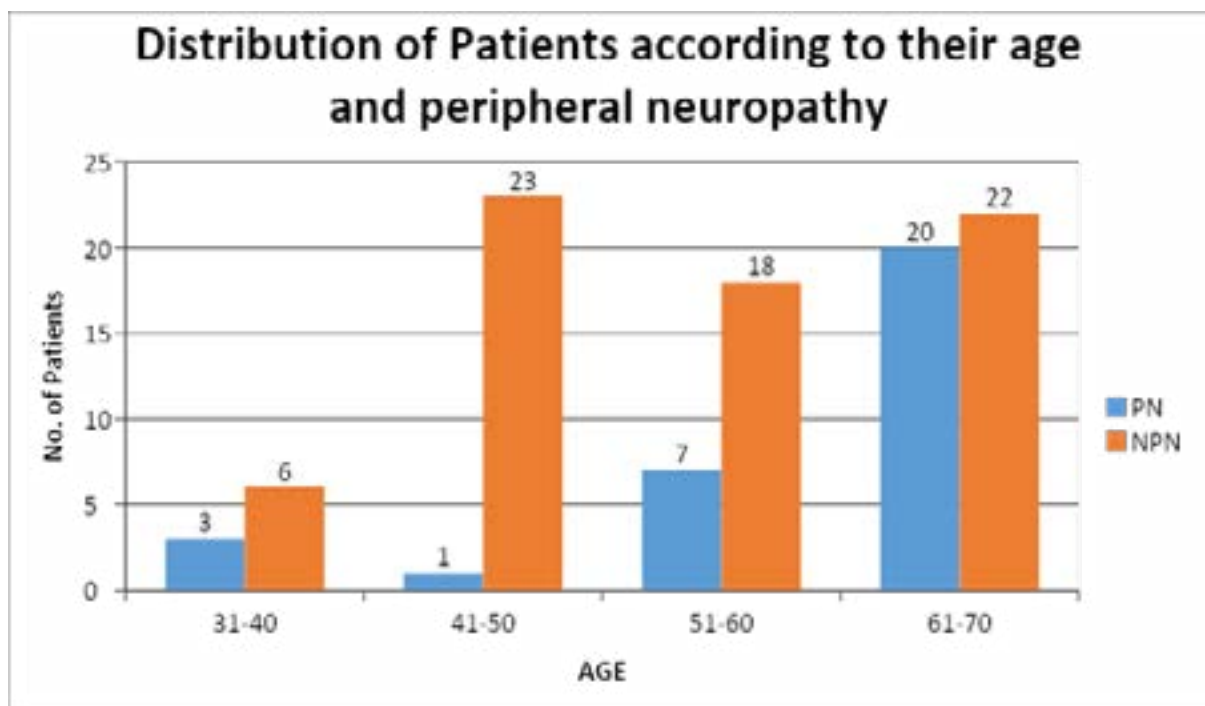
Results:

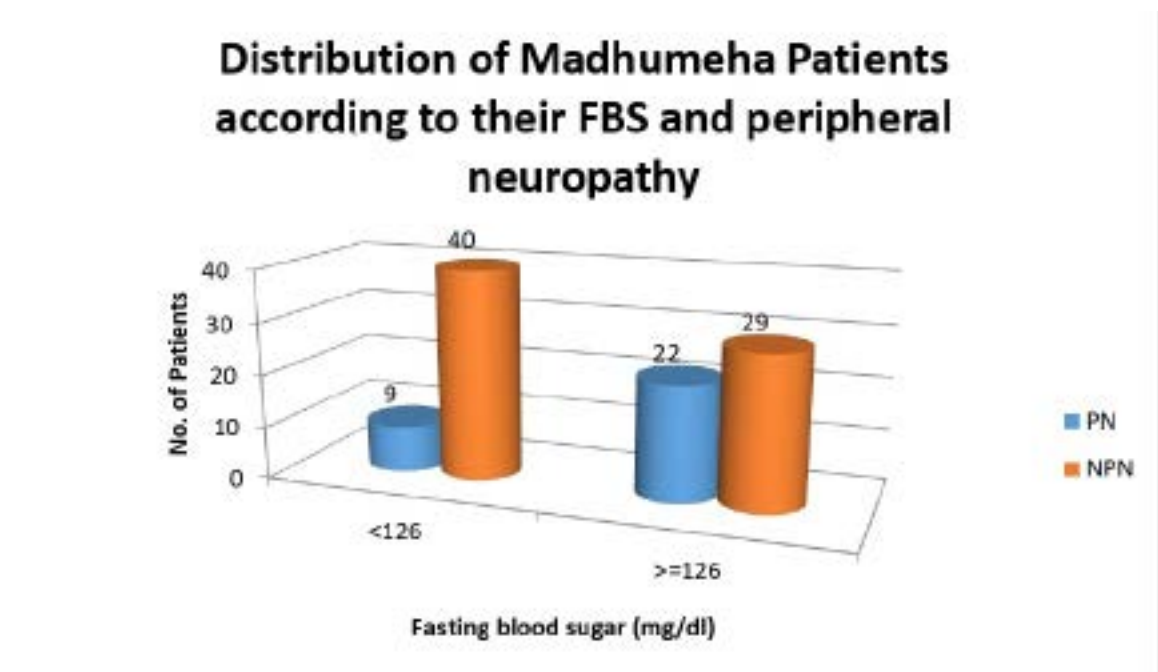
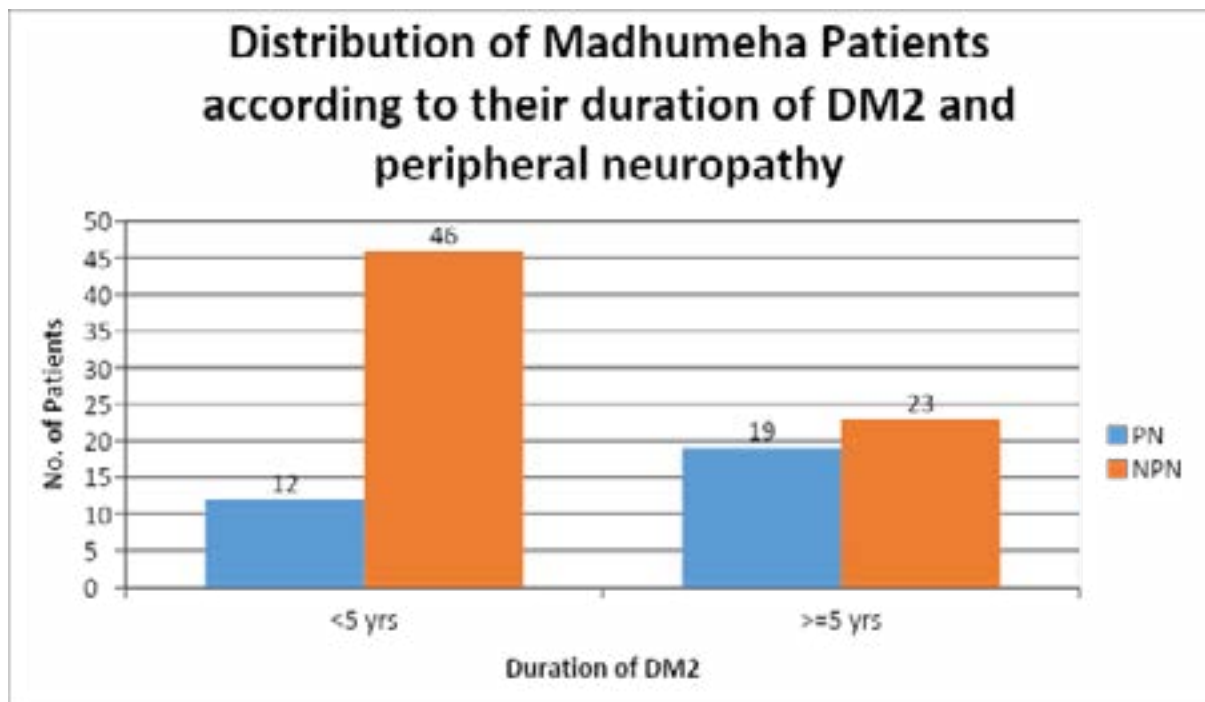
The study was carried in 100 Madhumeha (Type2 diabetes mellitus) patients to find the prevalence of karapada daha- suptata (DPN), the following results was obtained:

The mean age of the patient was 56.03 year ranging from 35 to 70 years. 46% of the patients were female. The mean duration of disease Madhumeha was 5.510 years with range from 0.166 to 20 years. The mean FBS level was 149.319mg/dl and mean PPBS level was 197.685mg/dl.

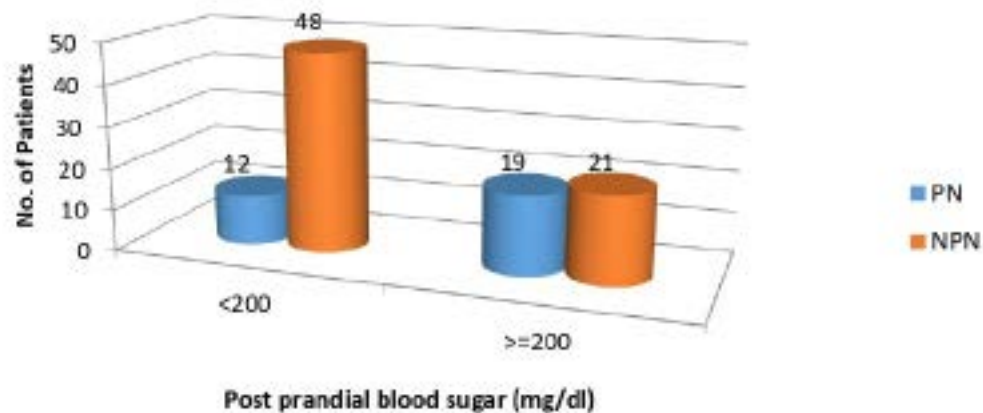
Among 100 patients 31% patient had Karapada daha- suptata (DPN). Our study showed that the prevalence of diabetic peripheral neuropathy increased with increasing age of the study population with prevalence of 33.33% in the age group 31-40

years and 47.62% in the age group 61-70 years. Similarly, prevalence of Karapada daha -suptata in patients with disease duration of Madhumeha (DM2) for more than 5 years was 61.29% whereas patients having Diabetes for less than 5 year was 38.71%. Prevalence of Peripheral neuropathy was very high (43.13%) among uncontrolled fasting blood sugar level ($>126\text{mg/dl}$) as compared to those having normal fasting blood sugar level (18.36%). In this study mean Fasting blood sugar level was 177.0323 mg/dl in the patients with Diabetic peripheral neuropathy and it was 149.319 mg/dl in the patients without Diabetic peripheral neuropathy. Similarly, prevalence of peripheral neuropathy was very high (47.5%) among uncontrolled post prandial blood sugar level ($>200\text{mg/dl}$) as compared to those having normal post prandial blood sugar level (20%). The mean post prandial blood sugar level in patients with diabetic peripheral neuropathy was 239.1613mg/dl and it was 197.685 mg/dl in the patients without diabetic peripheral neuropathy.





Distribution of Madhumeha Patients according to their PPBS and peripheral neuropathy



Discussion

Karapada daha- suptata (DPN) is a condition to be accounted in all patients seen in OPD as well as hospitalized with Madhumeha (diabetes). Karapada daha- suptata (DPN) is the earliest and most common complications of Madhumeha (DM2) and is responsible for serious morbidity and mortality.

The overall prevalence of Karapada daha-suptata/ Diabetic peripheral neuropathy in our study was 31% which is slight less than the prevalence of peripheral neuropathy in the study conducted in Dhulikhel Hospital, Kathmandu University Hospital Kavre Nepal in 160 clinically diagnosed diabetic patient, the overall prevalence of DPN was 38.1% (14). Study done by O. Tabatabaei-Malazy; et al (25) on 'The prevalence of Diabetic peripheral neuropathy and related factors in a hospital on Iran, Tehran, it showed prevalence of 31.9% based on MNSI score which was very much similar prevalence with our study. Similar study conducted by 'khawaja et' in Iran, "the prevalence and risk factors of peripheral neuropathy among patients with type 2 Diabetes mellitus (26) the prevalence was

39.5% based on MNSI assesement.

In our study the prevalence of peripheral neuropathy was 34.78% in the female patients which was higher than that in male patients 27.77% but it was not statistically significant ($p=0.4503$). On their study 'khawaja et al Diabetol Metab Syndr (2018) 10:8' the sex of the patients has no significant relationship with the peripheral neuropathy.

In our study the prevalence of diabetic peripheral neuropathy increased with increasing age of the study population. Three patient (33.33%) in the age group 31-40 years had Karapadadaha suptata (DPN), whereas twenty patients (47.62%) in the age group 61-70 had Karapad daha- suptata (DPN). It showed significant relation statistically in our study with p value of 0.003454. Similarly in the study done by Young MJ, Boulton AJ et al (104) the prevalence of diabetic peripheral neuropathy was 5% and 44.2% respectively in the 20-29 year age group and 70-79 year age group which showed significant relation between the age of the patients and the prevalence of Diabetic peripheral neuropathy. On their study 'khawaja et al Diabetol Metab

Syndr (2018) 10:8 (26) it showed significant association of the patient age with highest prevalence (41.9%) among age group >70 year with p value 0.001.

In our study the prevalence of Karapada daha-suptata (DPN) in the patients with disease duration of Madhumeha (Diabetes mellitus) for more than 5 years was 61.29% where as patients having Diabetes for less than 5 year was 38.71% which was statistically significant ($p=0.008$). The prevalence of DPN was 20.8% (19.1-22.5%) of patients with diabetes duration less than 5 years and in 36.8% (34.9-38.7%) of those with diabetes duration greater than 10 years in a study done by MJ, Boulton AJ et al. (27)

Prevalence of Karapada daha- suptata (DPN) was very high (43.13%) among uncontrolled fasting blood sugar level ($>126\text{mg/dl}$) as compared to those having normal fasting blood sugar level (18.36%). It was statistically significant with p value 0.007421. In this study mean Fasting blood sugar level was 177.0323 mg/dl in the patients with Diabetic peripheral neuropathy and it was 149.319 mg/dl in the patients without Diabetic peripheral neuropathy. Similarly prevalence of peripheral neuropathy was very high (47.5%) among uncontrolled post prandial blood sugar level ($>200\text{mg/dl}$) as compared to those having normal post prandial blood sugar level (20%). It was statistically significant ($p= 0.00358$). Mean post prandial blood sugar level in patients with diabetic peripheral neuropathy was 239.1613mg/dl and it was 197.685 mg/dl in the patients without diabetic peripheral neuropathy.

Study done by O. Tabatabaei-Malazy; et al on 'The prevalence of Diabetic peripheral neuropathy and related factors in a hospital on Iran, Tehran' they found the age > 50 years, duration of diabetes >10 years and Fasting blood sugar >200 as the main risk factors for developing Diabetic peripheral neuropathy. (25)

Similarly study done by 'Shrestha HK, et. al, on Prevalence and risk factors of Diabetic Peripheral neuropathy in T2DM Patient presenting to community Hospital in Nepal, Kathmandu on 2017 (14)

showed important relation of age of the patient, duration of disease diabetes mellitus, and dyslipidaemia etc with peripheral neuropathy.

Conclusion

Karapada daha-suptata/ Peripheral neuropathy is the earliest and most common complication of Madhumeha that can have devastating foot consequences. The incidence of Karapada daha suptata (DPN) in Nepal is a mere tip of the ice berg. There are many undiagnosed cases of madhumeha/ diabetes mellitus which has high chances of developing peripheral neuropathy and its consequences of developing foot ulcers. Even the diagnosed Madhumeha patients are unaware of karapada daha-suptata (DPN), its complications and foot care.

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