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Research Article

“A Comparative Study of *Gymnema Sylvestre* Q And *Cephalandra Indica* Q On Blood Sugar Levels in Diabetes Mellitus Type 2 Along with Conventional Antidiabetics”

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ABSTRACT-

Background- Diabetes Mellitus is a heterogeneous group of disorders characterized by insulin resistance, impaired insulin secretion, and excessive hepatic glucose production [2]. Pharmacotherapies for the treatment of diabetics include oral hypoglycemic agents and insulin. These are, however, not free from side effects and dependency [1]. Clinical trial is outlined for assess and compare effect of *Cephalandra indica* Q and *Gymnema Sylvestre* Q on blood sugar levels. **Method:** The Data/Record of patients is collected from senior physician at Bharati Vidyapeeth (Deemed to be University) Homoeopathic Medical College and Hospital OPD, IPD, and various Rural and Urban Camps conducted by Hospitals, Katraj.

Results: The study involves the enrollment of 32 patient's altogether, of which two cases were withdrawn due to irregular follow-ups, and the rest of the 30 patients were given homoeopathic mother tincture. In 24 cases, there was a noticeable improvement, whereas in 6 cases, there was no improvement. The medicine was prescribed in two groups of 15 each. In group 1 -first 15 patients were given *Cephalandra Indica* mother tincture, while Group 2 remaining 15 patients were included and were given *Gymnema Sylvestre* mother tincture, considering their anti-diabetic properties.

Conclusion: The result of this study show that both the mother tinctures, *Cephalandra Indica* Q and *Gymnema Sylvestre* Q do not significantly differ from one another. Mean changes in blood sugar level of both group is non-significant. This study gives evidence that *Cephalandra Indica* Q and *Gymnema Sylvestre* Q reduce the blood sugar level effectively. Both tinctures are effective in the management of type 2 diabetes mellitus along with conventional medication in individuals aged 45 to 65 years.

Keywords: Diabetes mellitus, *Cephalandra Indica*, *Gymnema Sylvestre*, mother tincture, blood glucose level.

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INTRODUCTION –

Diabetes Mellitus Type 2 (T2DM) is a chronic metabolic disorder characterized by high blood glucose levels due to insulin resistance and relative insulin deficiency [2]. It is the most common form of diabetes,

typically developing in adults, but is increasingly seen in younger populations due to rising obesity rates. Risk factors include genetics, obesity, physical inactivity, age, ethnicity, diet, and conditions like hypertension and dyslipidemia. Symptoms include frequent

urination, excessive thirst, increased hunger, fatigue, blurred vision, slow-healing sores, and unintentional weight loss. Diagnosis involves fasting blood glucose tests, oral glucose tolerance tests, and hemoglobin A1C tests. Management involves lifestyle changes, medications, monitoring, and managing complications. Prevention involves a balanced diet, regular exercise, weight management, and regular screening.

According to WHO, In India, 77 million people above the age of 18 years are suffering from type 2 diabetes and nearly 25 million are prediabetic ^[3]. The 10th edition of the International Diabetes Atlas 2021 states that there were 536.6 million diabetes patients in the 20–79 age range in 2021, and that figure increased to 783.2 million in 2045^[4].

According to the 2023 ICMR, study by the Indian Council of Medical Research, the prevalence of diabetes in India is 101 million ^[5]. The fact that the prevalence of DM is expected to rise to 783 million (12.2%) by 2045 and 643 million (11.3%) by 2030 is alarming. One out of ten adults (20–79 years old), or 537 million people, have diabetes. By 2030 and 2045, respectively, this number is expected to increase to 643 million and 783 million ^[6]. The prevalence of diabetes was found to be 12.4% in women and 13.6% in men ^[7]

Homeopathy is a holistic approach to treating early diagnosed cases through constitutional corrections. Traditional oral hypoglycemic medicines have adverse effects, leading to the popularity of herbal medicines. Homeopathic practices often include mother tinctures (MT). Common Homeopathic medicines for diabetes include *Uranium Nitricum*, *Phosphoric Acid*, *Syzgium Jambolanum*, *Gymnema Sylvestre*, and *Cephalandra Indica*. These medicines are used as physiological active doses, based on the patient's blood sugar level and pathophysiological background.

AIMS AND OBJECTIVES-

Primary objective: To assess and compare effectiveness of *Cephalandra indica* Q and *Gymnema sylvestre* Q on blood sugar level in type 2 diabetes mellitus.

Secondary objectives:

1. To know possible effective of *Cephalandra indica* Q in DMT2 patients.
2. To know possible effective of *Gymnema sylvestre* Q in DMT2 patients.
3. To control blood sugar levels and HBA1C levels to prevent complications of diabetes mellitus.

RESEARCH QUESTION - There is significant difference between efficacy of *Gymnema Sylvestre* Q and *Cephalandra Indica* Q in Case of Type II Diabetes Mellitus.

NULL HYPOTHESIS- There is no significant difference between efficacy of *Gymnema Sylvestre* Q and *Cephalandra Indica* Q in Case of Type II Diabetes Mellitus.

TRIAL REGISTRATION: The trial has been registered in Clinical Trial Registry -India (CTRI) no. CTRI/2023/02/049426, Trial Registered Prospectively.

MATERIALS AND METHODS -

CASE DEFINITION: Diagnosed cases of Diabetes mellitus type 2 patients of age group 45 to 65 years of both sexes, and those which will be fulfilling the inclusive and exclusive criteria will be considered. Data was recorded on clinical and hematological assessment from 1st visit of patient followed by five follows at regular interval of 15 days.

INCLUSION CRITERIA:

1. Patients who fulfill case definition were considered
2. Both sexes male and female
3. Patients of age group 45 to 65 years.
4. Patients with known case of diabetes mellitus who are on conventional anti-diabetic treatment with HBA1C 6.5 to 9 %.
5. BSL fasting >126 mg/dl; postprandial >200mg/dL

EXCLUSION CRITERIA:

1. Patients who do not fulfill case definition were not considered.
2. Patients below 45 years and more than 65 years
3. Patients suffering from life threatening diseases and those who need emergency medical interventions.
4. Patients with any severe concomitant illness like Polyneuropathy, Cardio-vascular diseases, Retinopathy, nephropathy, kidney failure, Diabetic Ketoacidosis, who were not be able to come for regular follow -ups, were not considered.
5. Any patient with gross neurological-nephropathy defects.
6. Patients with any major systemic illness (like malignancies, chronic kidney diseases, cardiac diseases, other endocrine disorders etc.)

STUDY DESIGN- To study and compare effectiveness of *Gymnema Sylvestre* Q and *Cephalandra Indica* Q in type 2 diabetes mellitus. The study was conducted in Bharati Vidyapeeth Homoeopathic Hospital OPD, IPD, and various Rural and Urban Camps conducted by Hospitals, Katraj. 30 cases which satisfy the case definition, inclusion and exclusion criteria were included in the study. It is a longitudinal and experimental clinical study. Each follow-up was done after 15 days, for proper assessment.

INTERVENTION- *Cephalandra Indica* mother tincture and *Gymnema Sylvestre* mother tincture.

DURATION OF STUDY- 18 months.

SELECTION OF SAMPLE – A total of 30 patients aged between 45 and 65 years who met the inclusion and exclusion criteria were enrolled in the study. The participants were split into two groups, each consisting of 15 patients. Group 1 (CI) received *Cephalandra*

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indica Mother Tincture, while Group 2 (GS) was given *Gymnema Sylvestre* Mother Tincture as a homeopathic treatment.

OUTCOME ASSESSMENT: After proper case taking of patients pre-diagnosed with DMT2 and

looking after all their previous reports (like BSL (F / PP), etc.), a well selected remedy shall be administered to the patient for 15 days and, BSL –F/PP, will be done, after 15 days, to assess the blood sugar level, and dose will be managed after assessing the blood glucose reports according to assessment criteria.

ASSESSMENT CRITERIA:

Blood Sugar Level		Cephalandra Indica and Gymnema Sylvestre Mother tincture
Fasting	Postprandial	
120 - 140mg/dL	200 – 220mg/dL	10 drops
140 – 160 mg/dL	220 – 240mg/dL	15 drops
160-180mg/dL	240 – 260mg/dL	20 drops
180-200mg/dL	260 – 280mg/dL	25 drops
>200mg/dL	>300mg/dL	30 drops and more

STATISTICAL ANALYSIS: The analyze and compare effectiveness of *Cephalandra indica* Q and *Gymnema sylvestre* Q on HBA1C and blood sugar levels fasting and postprandial in type 2 diabetes mellitus before and after intervention.

OBSERVATION 1:

BSL-F	N	Before treatment BSL_F Mean+ SD	After treatment BSL_F Mean+ SD	T Statistic Value	P-Value
Cephalandra Indica Q	15	203.13±31.13	182.07±24.56	T-stat 6.06	0.00 *
Gymnema Sylvestre Q	15	193.40±21.54	173.93±18.79		
Overall	30	198.27±26.76	178.0+ 21.88		
95% CI for the mean difference			(13.42, 27.11)		

Table 1: Paired t-test and Descriptive statistics of the Blood sugar level- Fasting before and after the intervention was compared.

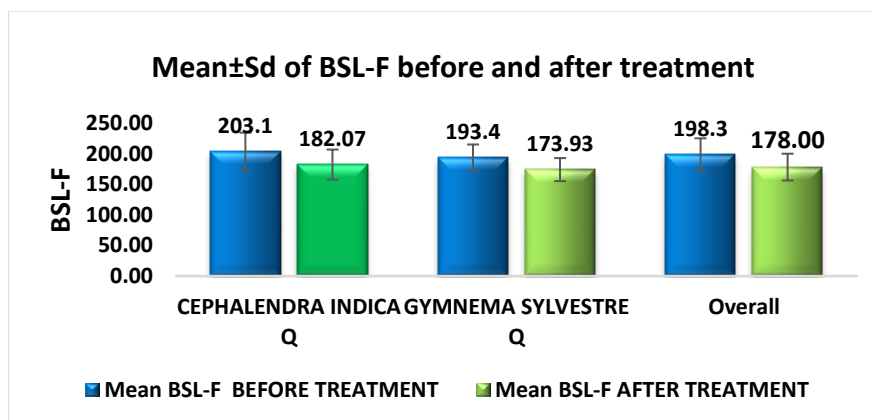


Figure 1: Bar diagram representing the Mean + SD of BSL-F before and after treatment

Table 1 and Fig 1. The average fasting blood sugar level (BSL-F) significantly decreased from 198.27 ± 26.76 before treatment to 178.0 ± 21.88 after treatment, with a t-statistic of 6.06 and a p-value of 0.00. This indicates that homeopathic medicines are effective in lowering fasting blood sugar levels in type 2 diabetes mellitus.

OBSERVATION 2:

BSL-PP	N	Before treatment BSL_PP Mean+ SD	After treatment BSL_PP Mean+ SD	T Statistic Value	P- Value
CEPHALANDRA INDICA Q	15	283.93 ±34.58	261.27±39.90	T-stat 5.75	0.00 *
GYMNEMA SYLVESTRE Q	15	271.20 ± 30.43	247.87±27.73		
Overall	30	277.57 ± 32.65	254.57±34.44		
95% CI for the mean difference			(14.81, 31.18)		

Table 2: Paired t-test and Descriptive statistics of the Blood sugar level- Post prandial before and after the intervention.

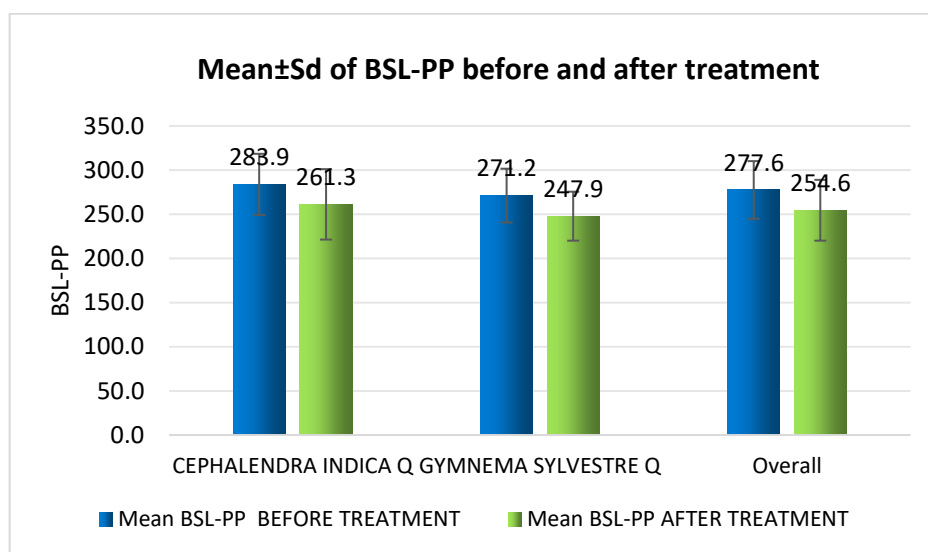


Figure 2: Bar diagram representing the Mean + SD of BSL-PP before and after treatment

Table 2 and Fig 2 The average post-prandial blood sugar level (BSL-PP) significantly decreased from 277.57 ± 32.65 before treatment to 254.57 ± 34.44 after treatment, with a t-statistic of 5.75 and a p-value of 0.00. This suggests that homeopathic medicines are effective in lowering post-prandial blood sugar levels in type 2 diabetes mellitus.

OBSERVATION 3:

BSL-PP	N	Before treatment BSL_PP Mean+ SD	After treatment BSL_PP Mean+ SD	T Statistic Value	P- Value
CEPHALANDRA INDICA Q	15	8.79 ±0.60	8.70±0.67	T-stat 2.07	0.048 *
GYMNEMA SYLVESTRE Q	15	8.79 ± 0.83	8.77±0.76		
Overall	30	8.79 ± 0.71	8.73±0.70		
95% CI for the mean difference			(0.0007, 0.1193)		

Table 3: Paired t-test and Descriptive statistics of the HBA1C before and after the intervention.

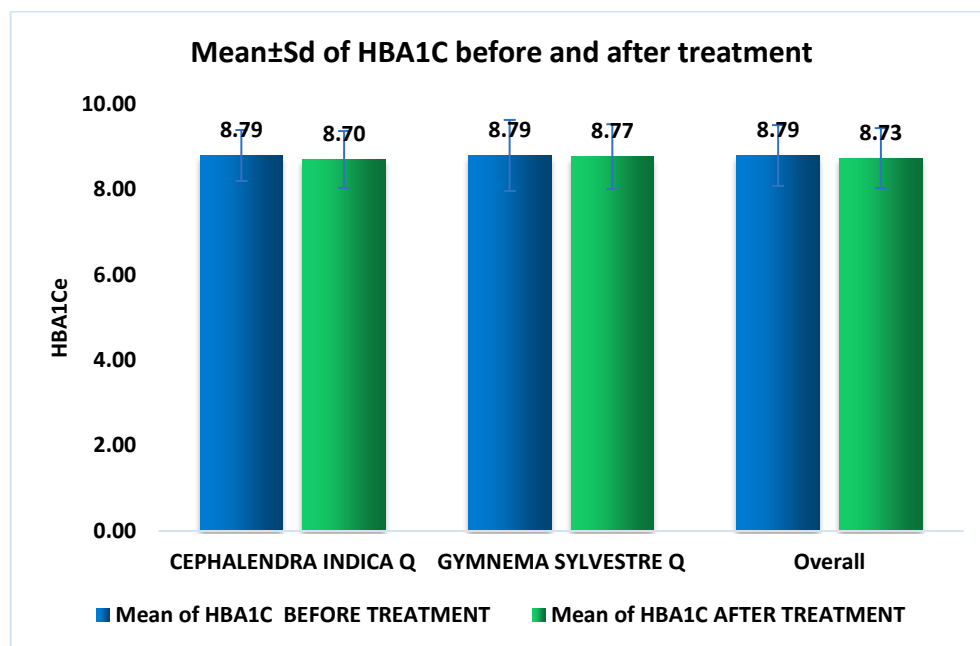


Figure 3: Bar diagram representing the Mean + SD of HBA1C before and after treatment.

Table 3 and Fig 3 Here average HBA1C was compared before and after treatment. Before the intervention of treatment, the average HBA1C was 8.79 ± 0.71 (mean± sd) and after the intervention, the average HBA1C was reduced to 8.73 ± 0.70 (mean± sd). The t-statistic value was 2.07 and the significant p-value of 0.048*. We conclude that there was a significant difference in the average HBA1c, before and after treatment. Hence Homoeopathic medicines are effective in reducing HBA1C in type 2 diabetes mellitus.

OBSERVATION 4:

Follow-ups	Blood Sugar Level-Fasting- Mean±SD	Blood Sugar Level-PP Mean±SD
1	198.3±26.8	277.6±32.7
2	193.6±26.1	269.7±33.3
3	187.8±25.9	265.6±34.1
4	184.3±24.0	262.1±33.3
5	180.9±22.5	258.7±33.0
6	178.0±21.9	254.6±34.4

Table 4: Follow-up wise Descriptive statistics of Blood sugar levels

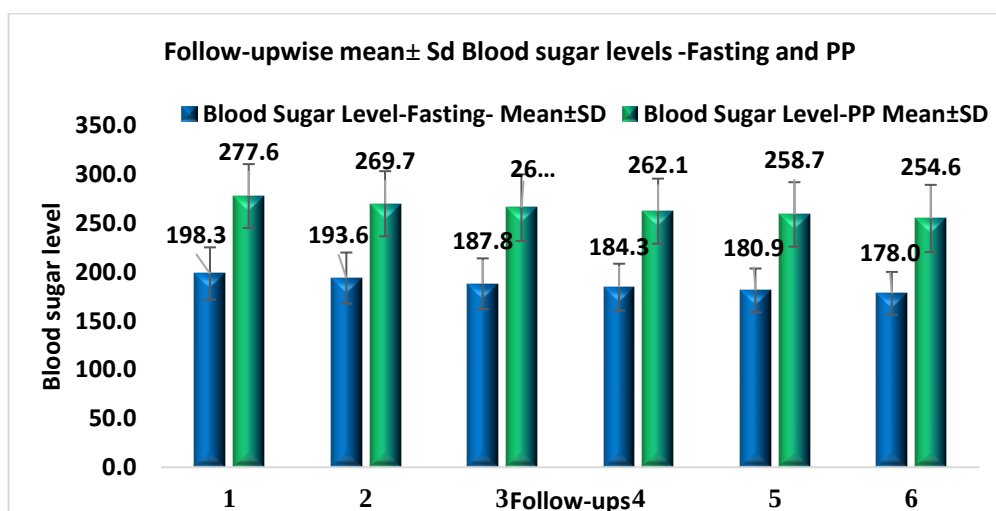


Figure 4: Bar diagram representing the follow-up wise Mean + SD of Blood sugar levels before and after treatment.

Table 4 and Figure 4, During the follow-up of homeopathic treatment for patients with type 2 diabetes mellitus, the average fasting blood sugar level significantly decreased from 198.3 ± 26.8 to 178.0 ± 21.9 . Similarly, the average post-prandial blood sugar level showed a significant reduction from 277.6 ± 32.7 to 254.6 ± 34.4 .

STATISTICAL RESULT:

In order to test our Hypothesis, two sample t-test was applied to compare the effectiveness of *Cephalandra indica* Q and *Gymnema sylvestre* Q on blood sugar levels fasting & post-prandial from the first to last follow-up in type 2 diabetes mellitus. The aim of study was to compare the effectiveness of *Cephalandra indica* Q with *Gymnema Sylvestre* Q in management of Type 2 Diabetes Mellitus. As per the percentage of improved cases in both group is insignificant, but when both the groups were analysed for *p value* by using *paired t test* for comparing the effectiveness, the results are as follow:

For *Cephalandra indica* Q, the average difference of BSL-F before and after the treatment was 21.1 ± 20.8 (mean $\pm$ sd). For *Gymnema Sylvestre* Q the average difference before and after the treatment was 19.5 ± 16.2 . The t statistic value is 0.24 with p value=0.816 non-significant. Hence, there was no significant difference between *Cephalandra indica* Q and *Gymnema sylvestre* Q as far as the average difference between fasting blood sugar levels before and after treatment is concerned.

For *Cephalandra indica* Q, the average difference of BSL-PP before and after the treatment was 22.7 ± 24.9 (mean $\pm$ sd). For *Gymnema sylvestre* Q the average difference of BSL-PP before and after the treatment was 23.3 ± 19.4 . The t statistic value is -0.08 with p-value 0.935 non-significant. Hence, there was no significant difference between *Cephalandra indica* Q and *Gymnema sylvestre* Q as far as the average difference between post-prandial blood sugar levels before and after treatment is concerned.

For *Cephalandra indica* Q, the average difference of HBA1C before and after the treatment was 0.09 ± 0.13 (mean $\pm$ sd). For *Gymnema sylvestre* Q the average difference of HBA1C before and after the treatment was 0.03 ± 0.18 . The t statistic value was 1.16 with p-value 0.259 (non-significant). Hence there was no significant difference between *Cephalandra indica* Q and *Gymnema sylvestre* Q as far as the average difference between HBA1C before and after treatment is concerned.

Before the intervention of treatment, the average HBA1C was 8.79 ± 0.71 (mean $\pm$ sd) and after the intervention, the average HBA1C was reduced to 8.73 ± 0.70 (mean $\pm$ sd). The average fasting blood sugar level decrease significantly during intervention period from 198.3 ± 26.8 (mean $\pm$ Sd) to 178.0 ± 21.9 (mean $\pm$ Sd) similarly follow up wise the average post-prandial blood sugar level decrease significantly from 277.6 ± 32.7 (mean $\pm$ Sd) to 254.6 ± 34.4 (mean $\pm$ Sd).

We accept H_0 and conclude that there is a no significant difference in average fasting blood sugar level, post prandial blood sugar level and HbA1c before and after treatment.

The study concludes that there was a significant difference in the average BSL-Fasting and Post Prandial, before and after treatment. Hence, Homoeopathic mother tinctures *Cephalandra indica* Q and *Gymnema Sylvestre* Q are effective in reducing blood sugar levels in type 2 diabetes mellitus in the age group of 45-65 years. The study also concludes that there was no significant difference between *Cephalandra indica* Q and *Gymnema sylvestre* Q as far as the average difference between fasting blood sugar levels before and after treatment is concerned.

DISCUSSION:

There is adequate context in the literature about the anti-diabetic properties of Homoeopathic mother tinctures, specifically *Cephalandra indica* and *Gymnema sylvestre*, but human clinical trials still requires to be evaluated. The population with Diabetes Mellitus type 2 from the 45–65 age range was included in the study.

The study involves the enrollment of 32 patient's altogether, of which two cases were withdrawn due to irregular follow-ups, and the rest of the 30 patients were given homoeopathic mother tincture. In 24 cases, there was a noticeable improvement, whereas in 6 cases, there was no improvement. The medicine was prescribed in two groups of 15 each. In group 1 -first 15 patients were given *Cephalandra Indica* mother tincture, while Group 2 remaining 15 patients were included and were given *Gymnema Sylvester* mother tincture, considering their anti-diabetic properties.

The main objective of study was to compare the effectiveness of *Cephalandra indica* Q with *Gymnema Sylvestre* Q in management of Type 2 Diabetes Mellitus.

Total of 30 patients who completed the study; 24 cases showed marked improvement while there was not much improvement in 6 cases. We accept H_0 and conclude that there is a no significant difference in average fasting blood sugar level post prandial blood sugar level and HbA1c before and after treatment.

Hence it can be concluded that there is no significant difference between *Cephalandra indica* Q and *Gymnema sylvestre* Q in reducing blood sugar level in type 2 diabetes mellitus. Above clinical study concluded that both *Cephalandra indica* Q and *Gymnema sylvestre* Q are effective in the management of type 2 diabetes mellitus in the age group of 45-65 years, but there is no significant difference between both the mother tinctures.

CONCLUSION:

The result of this study show that both the mother tinctures, *Cephalandra Indica* Q and *Gymnema Sylvestre* Q do not significantly differ from one another. Mean changes blood sugar level of both group is non- significant. This study gives evidence that

Homoeopathic medicine reduce the blood sugar level effectively. Both tinctures are effective in the management of type 2 diabetes mellitus in the age group of 45-65 years.

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Conflict of interest: The author has no conflicts of interest to declare.

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