Journal of Young Pharmacists, 2025; 17(3):581-591.
https://www.jyoungpharm.org

Original Article

Postulation of Therapeutic Potential of *Meha Mudgara Rasa* in Management of Diabetic Neuropathy through High-Performance Thin Layer Chromatography (HPTLC) Analysis

Shailesh Deshpande[1], Meha Gandhi[1,*], Vaishali Deshpande[2]

[1]Department of Kayachikitsa, Parul Institute of Ayurved, Parul University, Limda, Vadodara, Gujarat, INDIA.
[2]Department of Kayachikitsa, Parul Institute of Ayurved and Research, Parul University, Ishwarapura, Vadodara, Gujarat, INDIA.

ABSTRACT

Background: *Meha Mudgara Rasa* (MMR) is a classical Ayurvedic herbo-mineral formulation that is traditionally used in the management of diabetes. Despite its long-standing therapeutic use, scientific validation of its pharmacognostic profile and its antidiabetic efficacy is limited. This study aimed to evaluate the phytochemical composition and antidiabetic potential of MMR using modern analytical techniques. **Materials and Methods:** Raw materials for Meha Mudgara Rasa were verified as per Ayurvedic Pharmacopoeia. Kanta Loha Bhasma was subjected to Amruteekaran and Puta. The drug was formulated through classical process with trituration, Bhavana by Triphala decoction, and tablet making. Physicochemical values (e.g., hardness, disintegration, ash values) were evaluated. Methanolic extracts were analyzed using High-Performance Thin-Layer Chromatography (HPTLC) for phytochemical fingerprints. **Results:** The tablets were black with typical taste and smell. Physicochemical evaluation validated conformance with pharmacopoeial requirements. HPTLC showed clear chromatographic fingerprints at 254 nm and 366 nm, and identification of bioactive compounds using R_f values and comparison to PubChem. **Conclusion:** This study supports the traditional use of *Meha Mudgara Rasa* in the management of diabetes. Its therapeutic effects may be attributed to the synergistic action of its phytochemical constituents. Further pharmacological and clinical studies are warranted to elucidate its mechanisms and confirm its clinical applicability.

Keywords: Ayurveda, Diabetic neuropathy, Hyperglycemia, Peripheral vascular disease.

Correspondence:
Dr. Meha Gandhi
PG Scholar, Department of Kayachikitsa, Parul Institute of Ayurved, Parul University, Limda, Vadodara, Gujarat, INDIA.
Email: 2202022080003@paruluniversity.ac.in
ORCID: 0009-0001-2678-9391

Received: 19-03-2025;
Revised: 09-05-2025;
Accepted: 30-07-2025.

INTRODUCTION

With increasing global interest in Ayurvedic traditional medicines, there is a corresponding need to ensure their safety, purity, and therapeutic efficacy. This growing demand places critical responsibility on pharmaceutical manufacturers and regulatory authorities to implement stringent standardisation (Jahan *et al.*, 2018). Drug standardisation encompasses the evaluation of multiple parameters, including phytochemical profiling and physicochemical characterization, which are essential for confirming the identity, quality, and efficacy of Ayurvedic formulations.

Diabetic neuropathy is a prevalent complication of diabetes mellitus and is characterized by peripheral nerve damage due to microvascular dysfunction affecting the *vasa nervorum*. Among its various forms, distal symmetric polyneuropathy is the most common and involves Type A and Type C nerve fibers. It often remains underdiagnosed, particularly in asymptomatic or painless cases, leading to significant morbidity. The pathological features include distal motor axonal loss, diminished nerve conduction velocity, and degeneration of small and large myelinated as well as unmyelinated sensory fibers. Clinically, it presents with symptoms such as numbness, paresthesia, burning sensations, muscle weakness, reduced reflexes, and impaired coordination-often with nocturnal exacerbation.

Meha Mudgara Rasa is a classical Ayurvedic herbomineral formulation cited in *Bhaishajya Ratnavali* under *Prameha Rogadhikar* (Diabetes) (Sivakumar *et al.*, 2022). It contains 14 medicinal herbs and one mineral ingredient. Notably, components such as *Dadima* (*Punica granatum*) (Alharthy *et al.*, 2023). *Triphala* (Ariya *et al.*, 2006), Bilva (*Aegle marmelos*) (Sayeed *et al.*, 2016), and *Gokshura* (*Tribulus terrestris*) (Caporali *et al.*, 2022) have demonstrated antidiabetic, hypolipidemic,

DOI: 10.5530/jyp.20250163

and neuroprotective properties in pharmacological studies. These phytotherapeutic actions suggest a potential role for *Meha Mudgara Rasa* in modulating the pathophysiological mechanisms underlying diabetic neuropathy. Its use may contribute to the management of both peripheral vascular and neuronal complications associated with diabetes.

MATERIALS AND METHODS

Collection and Authentication of Ingredients

Raw materials of *Meha Mudgara Rasa* were procured from an authorized Ayurvedic pharmacy and authenticated by the Dravyaguna department as per API standards (Table 1).

Authentication of Bhasma

Kanta Loha Bhasma was evaluated as per the Pharmacopoeial Standards for Ayurvedic Formulations (PSAF) and the Ayurvedic Pharmacopoeia of India (API) standards (Table 2).

Method of Preparation

Amruteekaran

Amruteekaran is a process adopted to remove residual toxins and enhance the therapeutic action of drugs. First, the *Amruteekaran* of *Kanta Loha Bhas*ma was performed as classically mentioned by trituration with a decoction of *Triphala* and subjected to 1 *Puta* (800ºC for 3 hr) in an electric muffle furnace.

All the fine powders of the herbal drugs are mixed properly in an end-runner machine.

Guggulu is purified and dissolved in *Triphala Kashaya*, which is used as *Bhavana Dravya* and mixed with fine powders of herbal drugs.

These mixtures were mixed with *Kanta Loha Bhasma* processed for 6 hr and dried in a tray-dried machine.

After proper drying, granules are made in the granulator machine, and a binding agent such as starch is added at a ratio of 1:10 to make tablets in a multiple tablet punching machine.

Analytical parameters

Physiochemical characterization of Meha Mudgara rasa tablets was performed, assessing hardness, friability, pH, ash values, disintegration time, loss on drying, acid-insoluble ash, and extraction values, following the Ayurvedic Pharmacopoeia of India (API) and Indian Pharmacopoeia (IP) standards.

High-Performance Thin-Layer Chromatography (HPTLC)

To evaluate its phytochemical profile, the *Meha Mudgara rasa* methanolic extract was analysed using HPTLC.

Preparation of Test Solution

The sample (5 g) was weighed, and 100 mL of methanol was added. The mixture was sonicated for 15 min and filtered with simple filter paper. The filtrate was used as a test solution and thus obtained for HPTLC fingerprinting. The details of the HPTLC conditions are outlined in Table 3.

Table 1: Ingredients of Meha Mudgara rasa.

Sl. No.	Ingredients	Part used	Quantity
1.	*Amalaki* (*Embilica officinalis* L.)	Fruit	1 part
2.	*Bibhitaki* (*Terminalia billerica* Roxb.)	Fruit	
3.	*Haritaki* (*Terminalia chebula* Retz.)	Fruit	
4.	*Rasanjan* (*Berberis aristate* DC.)	Root	1 part
5.	*Devdaru* (*Cedrus deodara* Roxb.)	Leaves, Bark	1 part
6.	*Bilva* (*Aegle marmelos* C.)	Fruit	1 part
7.	*Gokshura* (*Tribulus terrestris* Linn.)	Fruit	1 part
8.	*Dadima* (*Punica granatum* Linn.)	Fruit	1 part
9.	*Bhunimba* (*Swertia chirayita* Roxb.)	Whole Plant	1 part
10.	*Pippali* (*Piper longum* L.)	Fruit	1 part
11.	*Sunthi* (*Zingiber officinale* Roscae.)	Stem	
12.	*Maricha* (*Piper nigrum* Linn.)	Fruit	
13.	*Trivruta* (*Operculina terpethum* Linn.)	Root bark	1 part
14.	*Guggulu* (*Commiphora wightii* Arnott.)	Extract	4 parts
15.	Loha Bhasma		15parts

OBSERVATIONS AND RESULTS

Macroscopic analysis

The tablets were black. It has a characteristic taste and aromatic odor.

Organoleptic evaluation

The organoleptic analysis was performed as follows (Table 4).

Physicochemical analysis

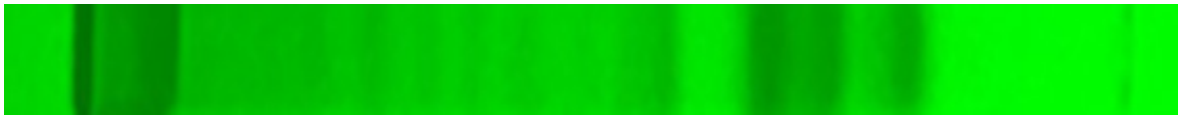
The observations of various physicochemical analyses are mentioned below (Table 5).

HPTLC Analysis

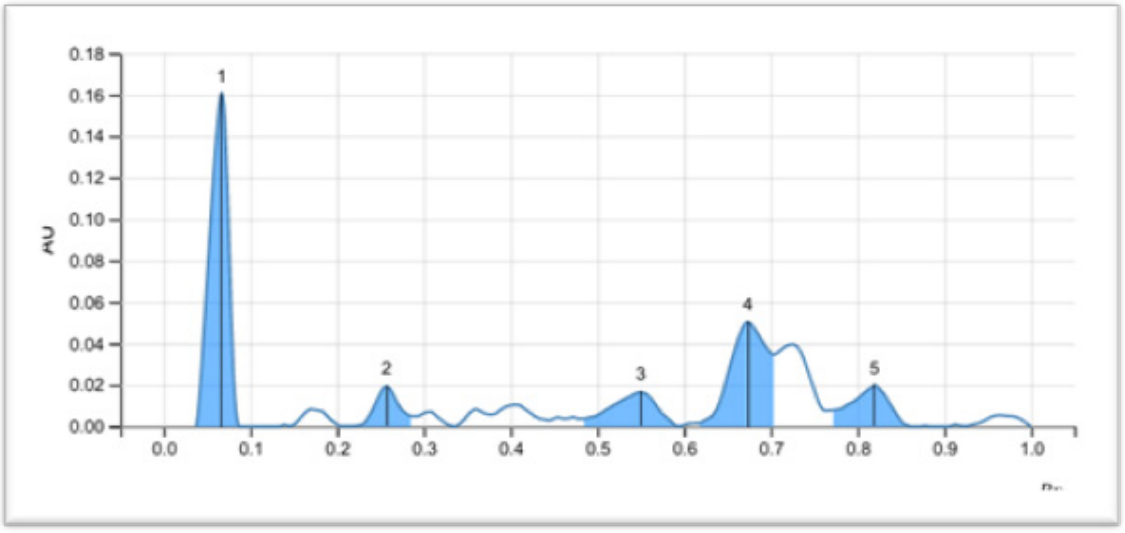
HPTLC analysis was performed at wavelengths of 254 nm and 366 nm with sample volumes of 10.0 µL, 15.0 µL, and 20.0 µL. Chromatographs at 254 nm are shown in Figures 1-3, while Figure 4 depicts the chromatograph at 366 nm using 20.0 µL. The R_f values, fingerprint profiles, peak heights, and percentage areas were recorded. Chemical substances were identified by comparing these results with PubChem data, with detailed findings and bioactivities presented in Tables 6-9 [Source: PubChem, Google Scholar].

Table 2: Authentication of Kant Loha Bhasma.

Sl. No.	Parameters	*Kant Loha Bhasma*
1	Characteristic	Soft and Lusterless
2	Color	Red
3	Magnetic Test	Negative
4	Limit Test	Ferrous sulphate (FeS) is found



(A)



(B)

Peak #	Start		Max			End		Area	
	R_F	H	R_F	H	%	R_F	H	A	%
1	0.037	0.0000	0.067	0.1606	60.18	0.087	0.0000	0.00398	43.42
2	0.218	0.0002	0.257	0.0194	7.25	0.289	0.0048	0.00063	6.83
3	0.478	0.0036	0.550	0.0166	6.24	0.592	0.0000	0.00103	11.25
4	0.617	0.0017	0.674	0.0504	18.88	0.703	0.0347	0.00247	26.94
5	0.764	0.0076	0.819	0.0199	7.45	0.863	0.0000	0.00106	11.55

(C)

Figure 1: HPTLC Chromatograph of *Meha Mudgara rasa* @254 nm and a volume of 5.0 µL (A=Fingerprint, B= Peak height, C= R_f value and area percentage) (A)

Table 3: Chromatographic conditions for HPTLC of *Meha Mudgara rasa.*

Chromatographic Conditions:	
Application Mode	CAMAG Linomat 5 (S/N: 280008) Applicator
Filtering System	Simple filter
Stationary Phase	MERCK - HPTLC Silica gel 60 F_{254} on Aluminum sheets
Application (Y axis) Start Position	8.0 mm
Development End Position	80 mm from the plate base
Sample Application Volume	15 µL
Distance Between Tracks	13.4 mm
Development Mode	CAMAG TLC Twin Trough Chamber
Chamber Saturation Time	20 min
Mobile Phase (MP)	Toluene: Ethyl acetate methanol (7.5:1.5:0.75v/v/v)
Visualization	@ 254 nm and @366 nm
Drying Mode, Temp. and Time	At room temperature for 5 min

Table 4: Organoleptic characteristics of *Meha Mudgara rasa.*

Sl. No.	Parameters	Result
1	Odor	Slightly aromatic
2	Color	Black
3	Taste	Characteristic
4	Consistency	Solid

DISCUSSION

HPTLC and physicochemical tests ensure Ayurvedic medicine quality by verifying authenticity and purity, detecting contaminants, and standardizing formulations, supporting clinical research and advancing evidence-based Ayurveda for improved patient care.

This study analyzed the physicochemical parameters of Meha Mudgara Rasa tablets. The pH was 6.8, the water- and alcohol-soluble extraction values were 41.7% and 4.5%, respectively, and the moisture content was 8.88%, all within acceptable limits. The tablet hardness was 6.8 kg/m². The total ash (34.19%) and acid-insoluble ash (28.6%) contents were greater due to Loha Bhasma but may suggest potential contamination if they exceed standard limits, which are common in herbo-mineral drugs.

The pathophysiology of diabetic neuropathy involves four pathways: the Protein Kinase C signaling (PKC) pathway, Advanced Glycation end Products (AGEs), increased free radical formation and the polyol pathway. In addition, Hypoinsulinemia also contributes to damage to nerves. The mechanism that causes sensory and motor axonal neuron degeneration and the development of neuropathy, along with its types, is outlined in Figure 5.

HPTLC analysis of the methanolic extract of *Meha Mudgara Rasa* revealed multiple phytoconstituents at varying concentrations (Figures 1-4, Tables 6-9). Chromatograms scanned at 245 nm and 366 nm presented diverse peaks and R_f values, which were compared to standards to identify key phytochemicals. The significant compounds detected include quercetin (Sousa *et al.*, 2018), terpenes (Jain *et al.*, 2013), flavonoids (World Health Organization, 2004), and coumarin (Maharaj and Rohan, 2013). These bioactive compounds are known for their anti-inflammatory,

Table 5: Physio-chemical parameters of *Meha Mudgara rasa.*

Sl. No.	Parameters	Result	Normal Range
1	pH	6.8	5.5-7.5
2	Loss on drying at 110 c (%w/w)	8.88	≤ 15%
3	Total Ash (%w/w)	34.19	≤ 10%
4	Acid insoluble ash (%w/w)	28.6gms	(Variable)
5	Water soluble extractive (%w/w)	41.7	15-30%
6	Alcohol soluble extractive (%w/w)	4.5	20-40%
7	Average tablet weight (gm)	0.687	-
8	Highest weight (gm)	0.759	-
9	Lowest weight (gm)	0.602	-
10	Tablet hardness (Kg/cm²)	6.8	4-12
11	Friability test (%)	21.46	≤ 2%
12	Disintegration time (mins)	08	(Variable)

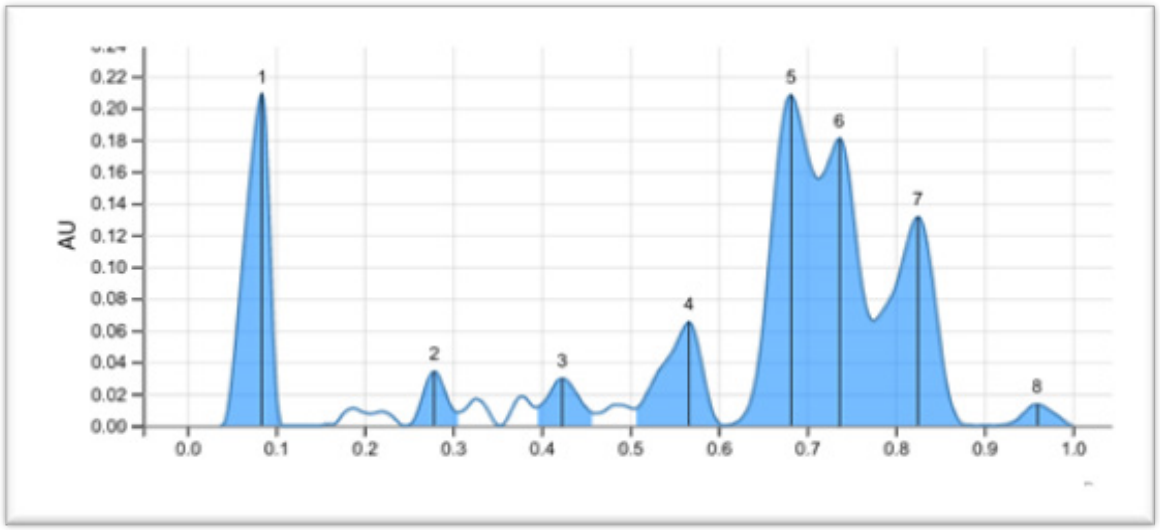
antioxidant, and analgesic properties, potentially contributing to reversing the pathophysiology of diabetic neuropathy.

The PKC pathway, which is influenced by vascular ischemia, inflammation, and oxidative stress, plays a key role in diabetic complications. Quercetin and terpenes enhance blood circulation, reducing ischemia, while quercetin also regulates AGE production. Inflammation is mitigated by quercetin and flavonoids through procytokine and IL inhibition. Additionally, quercetin improves mitochondrial function and reduces ROS, whereas flavonoids act as antioxidants, scavenging ROS to combat oxidative stress. These combined actions help reverse PKC pathway activation, positioning *Meha Mudgara Rasa* as a promising therapeutic for diabetic neuropathy (Figure 6).

The second pathway known to cause DN is endothelial dysfunction and AGE production. Coumarin improves endothelial function and reduces blood viscosity, whereas quercetin and flavonoids combat oxidative stress by scavenging Reactive Oxygen Species (ROS). Additionally, coumarin alleviates vasculitis by inhibiting inflammatory markers, and terpenes aid in reducing ROS formation. Together, these compounds mitigate endothelial dysfunction, oxidative stress, and inflammation and promote vascular health and slow aging processes (Figure 7).

Hypoinsulinemia leads to a disruption in nerve growth factors such as BDNF, IGF, VEGF, and NGF, which are essential for nerve regeneration and maintenance. This imbalance results in reduced nerve repair function, ultimately contributing to neuropathy. Flavonoids counteract this process by increasing nerve growth

(A)



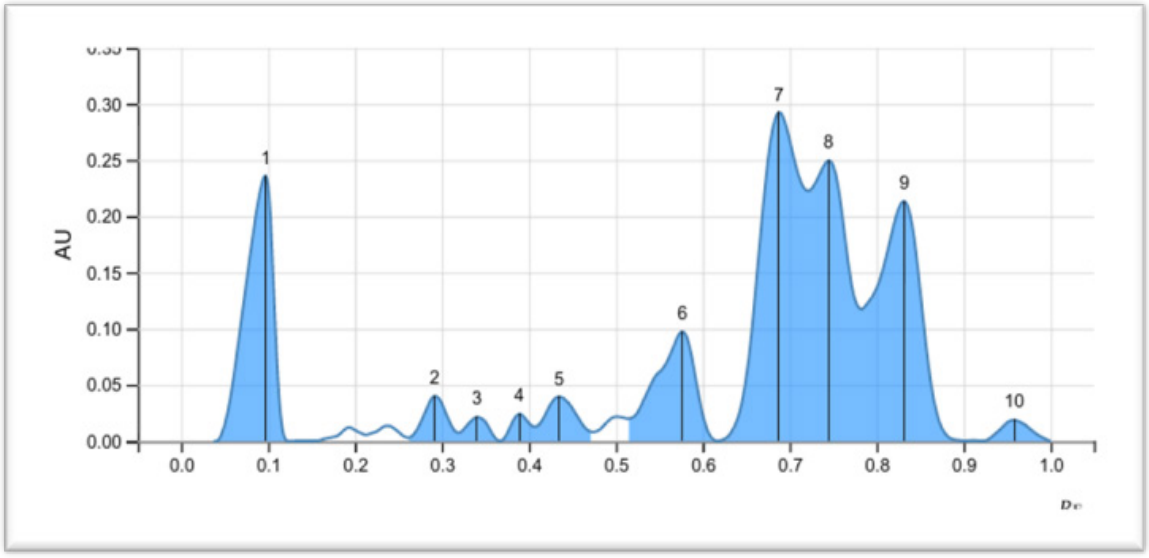
(B)

Peak #	Start		Max			End		Area	
	R_F	H	R_F	H	%	R_F	H	A	%
1	0.039	0.0000	0.085	0.2087	23.97	0.107	0.0000	0.00667	16.61
2	0.247	0.0000	0.279	0.0340	3.90	0.306	0.0083	0.00102	2.55
3	0.394	0.0112	0.424	0.0297	3.41	0.460	0.0076	0.00126	3.14
4	0.506	0.0106	0.567	0.0650	7.46	0.606	0.0000	0.00336	8.36
5	0.607	0.0000	0.682	0.2079	23.88	0.713	0.1554	0.01094	27.25
6	0.713	0.1554	0.736	0.1808	20.76	0.775	0.0658	0.00863	21.49
7	0.775	0.0658	0.825	0.1313	15.08	0.879	0.0004	0.00774	19.27
8	0.911	0.0000	0.960	0.0133	1.53	0.999	0.0003	0.00053	1.33

(C)

Figure 2: HPTLC Chromatograph of *Meha Mudgara rasa* @254 nm and 10.0 µL volume (A=Fingerprint, B= Peak height, C= R_f value and area percentage). (A)

(A)



(B)

Peak #	Start		Max			End		Area	
	R_F	H	R_F	H	%	R_F	H	A	%
1	0.042	0.0000	0.097	0.2358	19.15	0.122	0.0000	0.00871	14.46
2	0.261	0.0030	0.292	0.0401	3.25	0.318	0.0074	0.00124	2.05
3	0.319	0.0073	0.340	0.0213	1.73	0.365	0.0001	0.00061	1.01
4	0.367	0.0000	0.389	0.0241	1.95	0.406	0.0128	0.00057	0.95
5	0.407	0.0126	0.435	0.0394	3.20	0.474	0.0080	0.00165	2.75
6	0.514	0.0199	0.576	0.0972	7.90	0.617	0.0000	0.00516	8.57
7	0.618	0.0000	0.688	0.2922	23.73	0.721	0.2225	0.01623	26.97
8	0.721	0.2225	0.744	0.2494	20.25	0.782	0.1174	0.01244	20.67
9	0.782	0.1174	0.832	0.2131	17.31	0.901	0.0000	0.01286	21.36
10	0.922	0.0000	0.958	0.0187	1.52	1.000	0.0001	0.00073	1.21

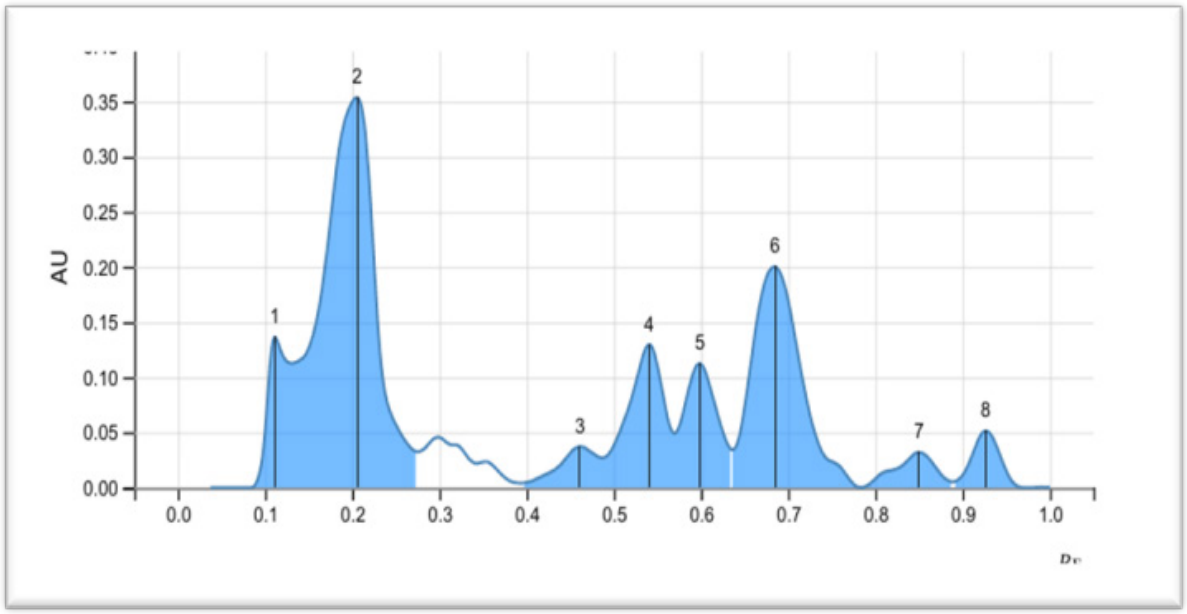
(C)

Figure 3: HPTLC Chromatograph of *Meha Mudgara rasa* @254 nm and 15.0 µL volume (A=Fingerprint, B= Peak height, C= R_f value and area percentage. (A)

Table 6: Substance name and bioactivity on the basis of the R_f value at 254 nm and a volume of 5.0 µL.

Max Peak	R_f value	Area of Percentage	Phytoconstituents [PubChem, Google Scholar]
1.	0.067	60.18%	Quercetin - Antioxidant, Anti-inflammatory, and neuroprotective (Sousa *et al.*, 2018).
2.	0.257	7.25%	Volatile oil (Linalool) - Antioxidant, Anti-inflammatory, Analgesic (Dhiman *et al.*, 2022).
3.	0.550	6.24%	Alkaloids (Piperitone)- antioxidant, anticancer, anti-inflammatory, antihypertensive, hepatoprotective, and neuroprotective (Dhundhuk Nath, n.d.).
4.	0.674	18.88%	Myristicin- Antidiabetic, Antioxidant, B-cell regeneration (Gautam and Ramanathan, 2019).
5.	0.819	7.45%	Umbelliferone -inhibition of oxidative stress, inflammation, and apoptosis, improvement of insulin resistance, myocardial hypertrophy, and tissue fibrosis, in addition to regulation of blood glucose and lipid metabolism (Ginwala *et al.*, 2019).

(A)



(B)

Peak #	Start		Max			End		Area	
	R_F	H	R_F	H	%	R_F	H	A	%
1	0.085	0.0000	0.111	0.1363	12.95	0.131	0.1126	0.00374	6.25
2	0.131	0.1126	0.206	0.3534	33.58	0.275	0.0323	0.02580	43.17
3	0.393	0.0039	0.461	0.0372	3.53	0.486	0.0269	0.00195	3.27
4	0.486	0.0269	0.540	0.1295	12.30	0.569	0.0491	0.00641	10.72
5	0.569	0.0491	0.599	0.1124	10.68	0.635	0.0345	0.00505	8.44
6	0.636	0.0342	0.685	0.2002	19.02	0.782	0.0000	0.01318	22.05
7	0.783	0.0000	0.850	0.0320	3.04	0.887	0.0052	0.00172	2.88
8	0.889	0.0051	0.926	0.0514	4.88	0.968	0.0000	0.00192	3.21

(C)

Figure 4: HPTLC Chromatograph of *Meha Mudgara rasa* @366 nm and 15.0 µL volume (A=Fingerprint, B= Peak height, C= R_f value and area percentage).

Table 7: Substance name and their bioactivities on the basis of the R_f value at 254 nm and 10.0 µL.

Max Peak	R_f value	Area of Percentage	Phytoconstituents [PubChem, Google Scholar]
1.	0.085	23.97%	Terpenes (Linanyl acetate)- Antioxidant, Anti-inflammatory (Jain et al., 2013).
2.	0.279	3.90%	Menthol derivatives (Ajmaline) - Anti-arrhythmic (Kamalakkannan and Prince, 2004).
3.	0.424	3.41%	Carvone -Antidiabetic (Kim et al., 2016).
4.	0.567	7.46%	Apigenin - Antidiabetic, Neuroprotective, Anti-inflammatory (Kumar and Pandey, 2013).
5.	0.682	23.76%	Luteolin 7 - Glucoside -Anti-inflammatory, Antidiabetic, Hypolipidemic (Lin et al., 2023).
6.	0.736	20.76%	Coumarin - Anti-allodynic (Maharaj and Rohan, 2013).
7.	0.825	15.08%	Umbelliferone -inhibition of oxidative stress, inflammation, and apoptosis, improvement of insulin resistance, myocardial hypertrophy, and tissue fibrosis, in addition to regulation of blood glucose and lipid metabolism (Ginwala et al., 2019).
8.	0.960	1.53%	Anthranilate- Antioxidant, Anti-inflammatory, Analgesic (Muruganathan and Srinivasan, 2016).

Table 8: Substance name and bioactivity on the basis of the R_f value at 254 nm and 15.0 µL volume.

Max Peak	R_f value	Area of Percentage	Phytoconstituents [PubChem, Google Scholar]
1.	0.097	19.15%	Terpenes - Insulin Stimulation, Antioxidant, Anti-inflammatory, Anti-hyperglycemic, Hypolipidemic (Jain *et al.*, 2013).
2	0.292	3.25%	Indoline - anti-tumor, antibacterial, anti-inflammatory, analgesic, cardiovascular diseases (Reshma *et al.*, 2020).
3.	0.340	1.73%	Rutinoside - Antioxidant, Anti-inflammatory, Anti-glycation (Russo *et al.*, 2013).
4.	0.389	1.95%	Cineole - Antioxidant, Anti-inflammatory, Analgesic (Russo *et al.*, 2013).
5.	0.435	3.20%	Eugenol - Antioxidant, Anti-inflammatory, Neuroprotective (Suryavanshi *et al.*, 2021).
6.	0.576	7.90%	isoquercetin - Axonal regeneration, Antioxidant (Tian *et al.*, 2021).
7.	0.688	23.73%	Quercetin - Antioxidant, Anti-inflammatory, and neuroprotective (Sousa *et al.*, 2018).
8.	0.744	20.25%	Coumarin - Anti-allodynic (Maharaj and Rohan, 2013).
9.	0.832	17.31%	Umbelliferone - inhibition of oxidative stress, inflammation, and apoptosis, improvement of insulin resistance, myocardial hypertrophy, and tissue fibrosis, in addition to regulation of blood glucose and lipid metabolism (Ginwala *et al.*, 2019).
10.	0.958	1.52%	Glycosides - Anti-allodynic (Tripathi *et al.*, 2022).

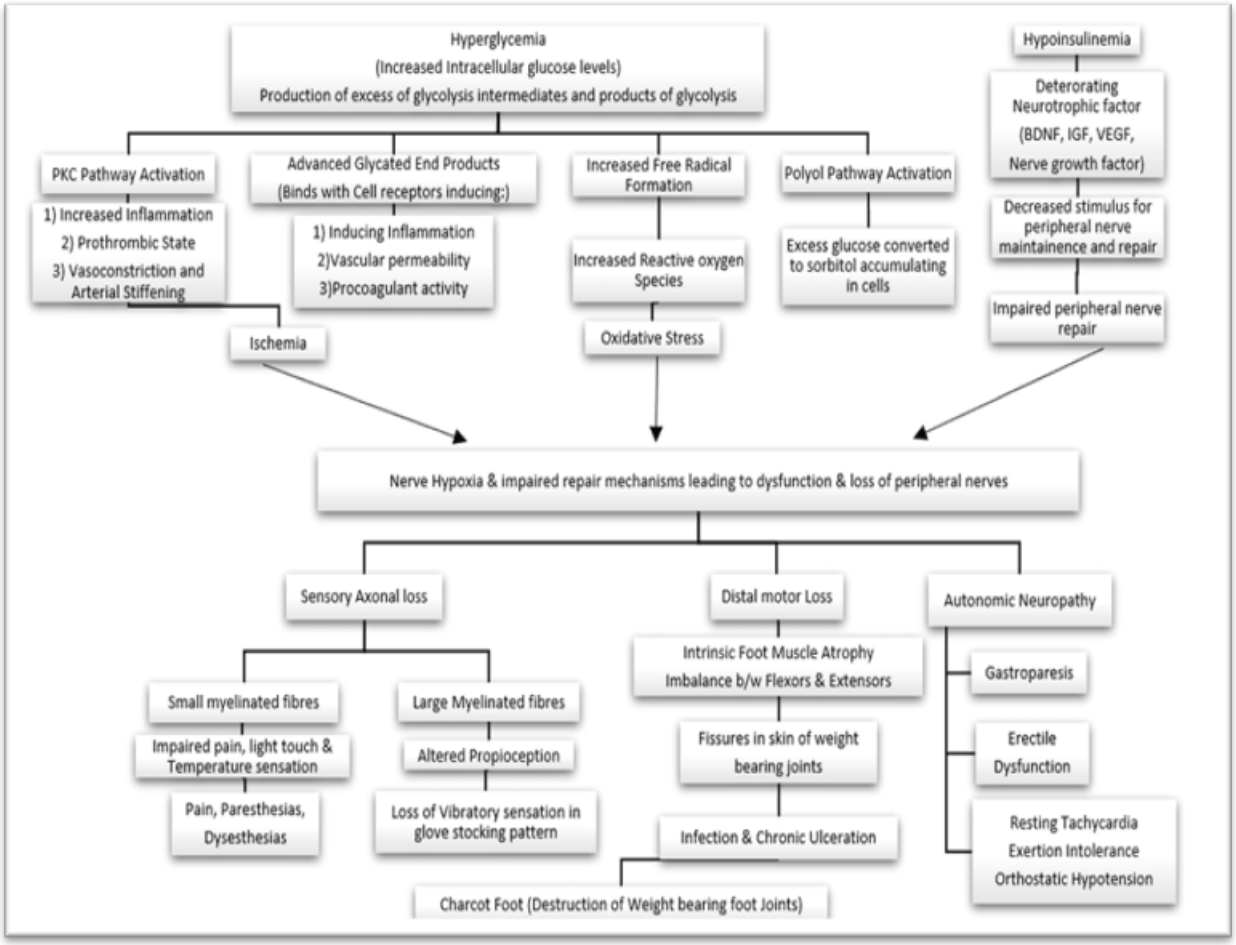


Figure 5: Pathophysiology of diabetic neuropathy.

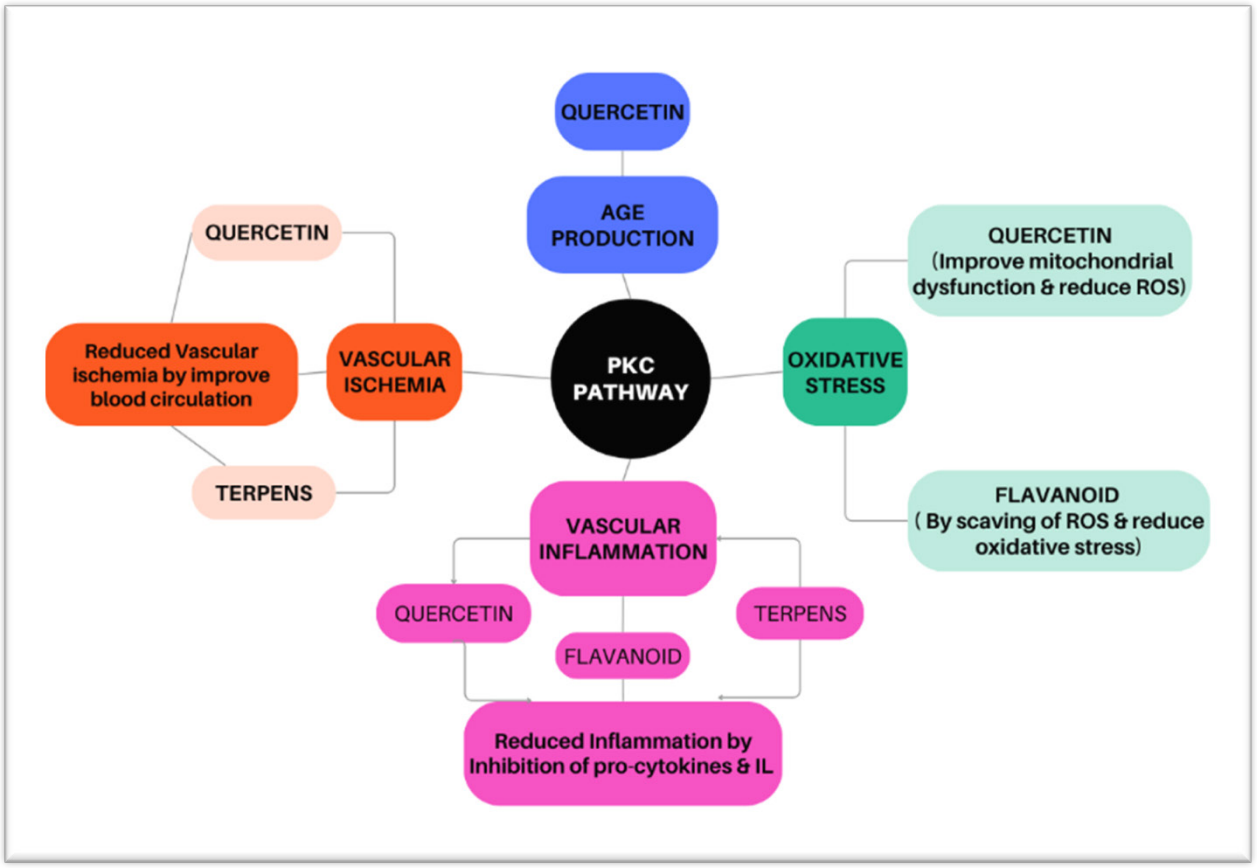


Figure 6: Possible effects of *Meha Mudgara Rasa* on the Protein Kinase C signaling (PKC) pathway.

Table 9: Substance name and bioactivity on the basis of the R_f value@366 nm and 15.0 µL volume.

Max Peak	R_f value	Area of Percentage	Phytoconstituents [PubChem, Google Scholar]
2.	0.206	33.58%	Flavonoid- Antioxidant, Anti-inflammatory, Hypocholesterolemia (World Health Organization, 2004).
3.	0.461	3.53%	Stigmasterol - antioxidant, anticancer, antidiabetic, respiratory diseases, and Hypolipidemic activity (Wu *et al.*, 2016).
4.	0.540	12.30%	Sesquiterpene- antitumor, anti-inflammatory, analgesic, antiulcer, antibacterial, antifungal, antiparasitic (Zhang *et al.*, 2005).
5.	0.599	10.68%	Diterpene- hypoglycemic, hypolipidemic, antimicrobial, antiviral (Zhang *et al* ., 2022).
6.	0.685	19.02%	Sitosterol - Hypolipidemic, antioxidant, anticancer, anti-diabetic (Zhang *et al.*, 2018).
7.	0.850	3.04%	Lanosterol - inhibits the aggregation of crystallin proteins, which contribute to the clouding of vision by forming cataracts (Zhao *et al.*, 2021).

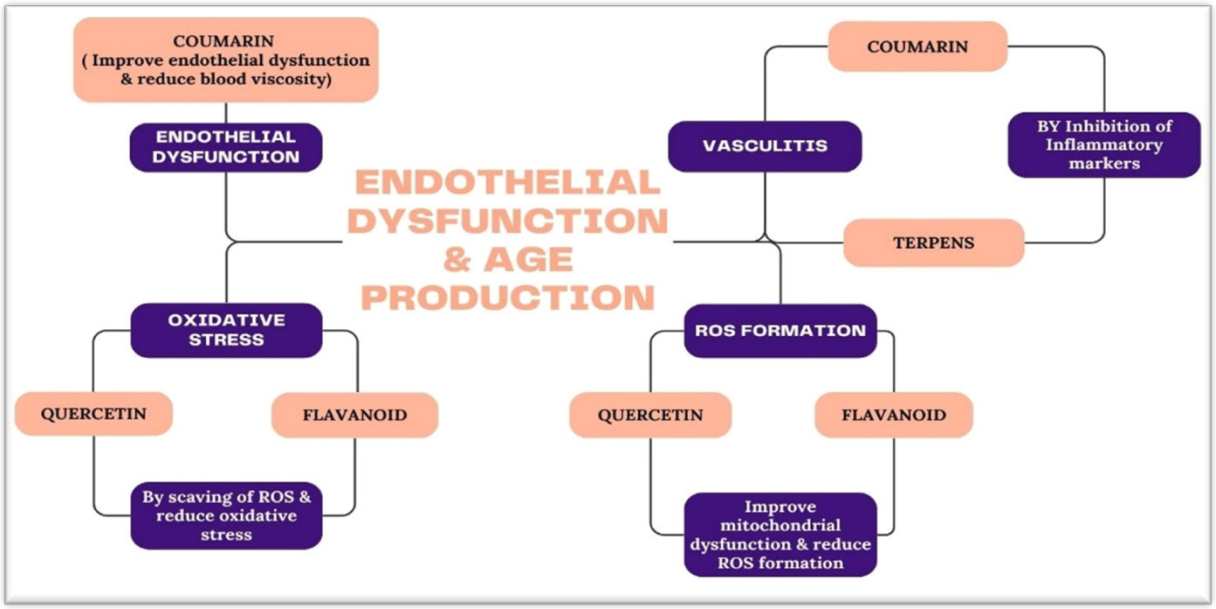


Figure 7: Possible effects of *Meha Mudgara Rasa* on endothelial dysfunction and advanced glycation end products (AGEs).

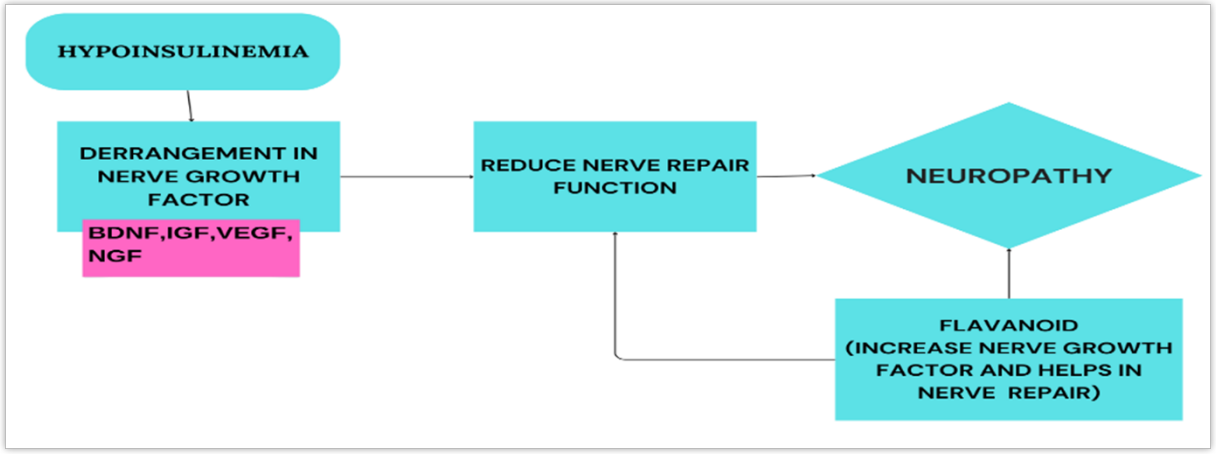


Figure 8: Possible effects of *Meha Mudgara Rasa* on Hypoinsulinemia.

factor levels, thereby assisting in nerve repair and reducing neuropathic damage. Thus, flavonoids serve as crucial protective agents against nerve degeneration, promoting neuroprotection and functional recovery (Figure 8).

In addition, HPTLC also contains many other phytochemicals, such as umbelliferone (Ginwala *et al.*, 2019), myristicin (Gautam and Ramanathan, 2019). and stigmasterol (Wu *et al.*, 2016). in relatively small quantities. These findings can help in the management of diabetes because of their antidiabetic and insulin-stimulating effects. It can mitigate hyperglycemia, which is a major cause of nerve damage in diabetic neuropathy. They are also reported to correct dyslipidemia, which can improve blood circulation and decrease the formation of atherosclerotic plaques in the arteries supplying the nerves, ultimately supporting better nerve function. These additional effects can help in conditions that are contributory but not directly associated with diabetic neuropathy.

CONCLUSION

Hence, the primary phytochemicals observed through HPTLC analysis of *Meha Mudgara Rasa* could be useful in the management of diabetes, peripheral neuronal disorders, peripheral vascular disorders, and inflammatory disorders. Further analyses, such as gas chromatography, liquid chromatography, and experimental and clinical studies, are necessary to substantiate the therapeutic potential of *Meha Mudgara Rasa* in diabetic neuropathy.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

REFERENCES

Alharthy, K. M., Balaha, M. F., Devi, S., Altharawi, A., Yusufoglu, H. S., Aldossari, R. M. *et al.* (n.d.). Ameliorative effects of isoeugenol and eugenol against impaired nerve function in diabetic neuropathic rats.

Ariya, D., Kolesnikova, Q., Xiong, Q., Lodeiro, S., Hua, L., & Matsuda, S. P. T. (n.d.). Lanosterol biosynthesis in plants. Archives of Biochemistry and Biophysics.

Bin Sayeed, M. S., Karim, S. M. R., Sharmin, T., & Morshed, M. M. (2016). Critical analysis on characterization, systemic effect, and therapeutic potential of Beta-sitosterol: A plant-derived orphan phytosterol. Medicines, 3(4), 29. https://doi.org/10.3390/medicines3040029

Caporali, S., De Stefano, A., Calabrese, C., Giovannelli, A., Pieri, M., Savini, I. *et al.* (n.d.). Anti-inflammatory and active biological properties of plant-derived bioactive compounds luteolin and luteolin-7-glucoside.

de Sousa, I. P., Sousa Teixeira, M. V., & Jacometti Cardoso Furtado, N. A. (2018). An overview of Biotransformation and toxicity of diterpenes. Molecules, 23(6), 1387. https://doi.org/10.3390/molecules23061387

Dhiman, A., Sharma, R., & Singh, R. K. (2022). Target-based anticancer indole derivatives and insight into structure–activity relationship: A mechanistic review update (2018–2021). Acta Pharmaceutica Sinica. B, 12(7), 3006–3027. https://doi.org/10.1016/j.apsb.2022.03.021

Dhundhuk Nath, A. (n.d.). Rasendra Chintamani: Prameha Rogadhikar (pp. 296–297). Chuakhambha Orientalia.

Gautam, M., & Ramanathan, M. (2019). Saponins of Tribulus terrestris attenuate neuropathic pain induced with vincristine through central and peripheral mechanisms. Inflammopharmacology, 27(4), 761–772. https://doi.org/10.1007/s10787-018-0502-0

Ginwala, R., Bhavsar, R., Chigbu, D. I., Jain, P., & Khan, Z. K. (2019). Potential role of flavonoids in treating chronic inflammatory diseases with a special focus on anti-inflammatory activity of apigenin. Antioxidants, 8(2), Article 35. https://doi.org/10.3390/antiox8020035

Jahan, H., Choudhary, M. I., Atta, A., Khan, K. M., & Ur-Rahman, A. (2018). Anthranilic acid derivatives: Novel inhibitors of protein glycation and the associated oxidative stress in hepatocytes. Medicinal Chemistry, 14(5), 516–523. https://doi.org/10.2174/1573406413666171020120528

Jain, V., Pareek, A., Bhardwaj, Y. R., & Singh, N. (2013). Attenuating effect of standardized fruit extract of Punica granatum L. in rat model of tibial and sural nerve transection-induced neuropathic pain. BMC Complementary and Alternative Medicine, 13(1), 1–10. https://doi.org/10.1186/1472-6882-13-1

Kamalakkannan, N., & Prince, P. (2004). Antidiabetic and antioxidant activity of Aegle marmelos extract in streptozotocin-induced diabetic rats. Pharmaceutical Biology, 42(2), 125–130. https://doi.org/10.1080/13880200490510937

Kim, C., Lee, J. H., Kim, W., Li, D., Kim, Y., Lee, K. *et al.* (n.d.). Suppressive effects of Cinnamomi Cortex and its phytocompound coumarin on oxaliplatin-induced neuropathic cold allodynia in rats.

Kumar, S., & Pandey, A. K. (2013). Chemistry and biological activities of flavonoids: An overview. TheScientificWorldJournal, 2013, Article 162750. https://doi.org/10.1155/2013/162750

Lin, Z., Cheng, X., & Zheng, H. (2023). Umbelliferon: A review of its pharmacology, toxicity, and pharmacokinetics. Inflammopharmacology, 31(4), 1731–1750. https://doi.org/10.1007/s10787-023-01256-3

Motilal, S., & Maharaj, R. G. (2013). Nutmeg extracts for painful diabetic neuropathy: A randomized, double-blind, controlled study. Journal of Alternative and Complementary Medicine, 19(4), 347–352. https://doi.org/10.1089/acm.2012.0016

Muruganathan, U., & Srinivasan, S. (n.d.). Beneficial effect of carvone, a dietary monoterpene, ameliorates hyperglycemia by regulating key enzyme activities of carbohydrate metabolism in streptozotocin-induced diabetic rats. Biomedicine and Pharmacotherapy.

Resham, K., Khare, P., Bishnoi, M., & Sharma, S. S. (2020). Neuroprotective effects of isoquercitrin in diabetic neuropathy via Wnt/β-catenin signaling pathway inhibition. BioFactors, 46(3), 411–420. https://doi.org/10.1002/biof.1615

Russo, R., Ciociaro, A., Berliocchi, L., Cassiano, M. G. V., Rombolà, L., Ragusa, S., Bagetta, G., Blandini, F., & Corasaniti, M. T. (2013). Implication of limonene and linalyl acetate in cytotoxicity induced by bergamot essential oil in human neuroblastoma cells. Fitoterapia, 89, 48–57. https://doi.org/10.1016/j.fitote.2013.05.014

Sivakumar, P. M., Prabhakar, P. K., Cetinel, S., R, N., & Prabhawathi, V. (2022). Molecular insights on the therapeutic effect of selected flavonoids on diabetic neuropathy. Mini Reviews in Medicinal Chemistry, 22(14), 1828–1846. https://doi.org/10.2174/1389557522666220309140855

Suryavanshi, S. V., Barve, K., Addepalli, V., Utpat, S. V., & Kulkarni, Y. A. (2021). Triphala Churna-A traditional formulation in Ayurveda mitigates diabetic neuropathy in rats. Frontiers in Pharmacology, 12, Article 662000. https://doi.org/10.3389/fphar.2021.662000

Tian, M.-M., Li, Y.-X., Liu, S., Zhu, C.-H., Lan, X.-B., Du, J., Ma, L., Yang, J.-M., Zheng, P., Yu, J.-Q., & Liu, N. (2021). Glycosides for peripheral neuropathic pain: A potential medicinal components. Molecules, 27(1), Article 255. https://doi.org/10.3390/molecules27010255

Tripathi, A. K., Ray, A. K., & Mishra, S. K. (2022). Molecular and pharmacological aspects of piperine as a potential molecule for disease prevention and management: Evidence from clinical trials. Beni-Suef University Journal of Basic and Applied Sciences, 11(1), 16. https://doi.org/10.1186/s43088-022-00196-1

World Health Organization. (2004). Guidelines on safety monitoring of pharmacovigilance herbal medicines in systems. World Health Organization. https://apps.who.int/iris/bitstream/handle/10665/43034/9241592214

Wu, F., Kerčmar, P., Zhang, C., & Stöckigt, J. (2016). Sarpagan-Ajmalan-type indoles: Biosynthesis, structural biology, and chemo-enzymatic significance. The Alkaloids. Chemistry and Biology, 76, 1–61. https://doi.org/10.1016/bs.alkal.2015.10.001

Zhang, S., Won, Y.-K., Ong, C.-N., & Shen, H.-M. (2005). Anticancer potential of sesquiterpene lactones. Current Medicinal Chemistry. Anti-Cancer Agents, 5(3), 239–249. https://doi.org/10.2174/1568011053765976

Zhang, X., Wang, J., Zhu, L., Wang, X., Meng, F., Xia, L., & Zhang, H. (2022). Advances in stigmasterol on its anti-tumor effect and mechanism of action. Frontiers in Oncology, 12, Article 1101289. https://doi.org/10.3389/fonc.2022.1101289

Zhang, Y., Liu, Y., Li, Q., Wang, X. D., Zheng, X. B., Yang, B. L. *et al.* (2018). 1,8-cineole decreases neuropathic pain via P2X3 receptor in the dorsal root ganglion. Neurochemistry International, 121, 20–25.

Zhao, B., Zhang, Q., Liang, X., Xie, J., & Sun, Q. (2021). Quercetin reduces inflammation in a rat model of diabetic peripheral neuropathy by regulating the TLR4/MyD88/NF-κB signaling pathway. European Journal of Pharmacology, 912, Article 174604. https://doi.org/10.1016/j.ejphar.2021.174604.

Cite this article: Deshpande S, Gandhi M, Deshpande V. Postulation of Therapeutic Potential of *Meha Mudgara Rasa* in Management of Diabetic Neuropathy through High-Performance Thin Layer Chromatography (HPTLC) Analysis. J Young Pharm. 2025;17(3):581-91.