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ROLE OF CORTICOSTEROIDS IN THE MANAGEMENT OF DIABETIC CRANIAL NERVE PALSY: A SYSTEMATIC REVIEW

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ABSTRACT

This systematic review examined the published evidence on the efficacy and safety of corticosteroid regimens in adult patients with diabetic cranial nerve palsy (DCNP). The review was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. A comprehensive search of PubMed, Embase, Scopus, the Cochrane Library, and Web of Science identified 14 eligible studies published between January 2020 and March 2025. The included studies comprised prospective and retrospective observational studies, cohort studies, and one systematic review with meta-analysis. The clinical question was developed using the PICO framework, and the methodological quality of the included studies was assessed using the Newcastle–Ottawa Scale and AMSTAR 2.

The included studies consistently reported that diabetic cranial nerve palsy is generally a self-limiting condition, with most patients achieving spontaneous recovery within 6–12 weeks following conservative management. Several studies described modest short-term symptomatic improvement with corticosteroid therapy, including earlier resolution of diplopia and reduction of perineural oedema. However, the available evidence did not demonstrate a consistent or statistically significant improvement in long-term neurological or functional outcomes compared with conservative management. Reported adverse effects of corticosteroid therapy included steroid-induced hyperglycaemia, elevated HbA1c levels, hypertension, and weight gain. Overall, the evidence reviewed suggests that routine corticosteroid therapy cannot currently be recommended for diabetic cranial nerve palsy because the available studies do not demonstrate a clear long-term clinical benefit, and the condition is believed to be predominantly ischaemic rather than inflammatory. Further high-quality, adequately powered randomised controlled trials are required to clarify the efficacy and safety of corticosteroid therapy in this condition.

1. INTRODUCTION

1.1 Background

Diabetic cranial nerve palsy is a neurological complication of diabetes mellitus that most commonly affects the third, fourth, and sixth cranial nerves, resulting in impaired ocular motility. It typically presents with the acute onset of diplopia, ptosis, or ophthalmoplegia and is primarily attributed to microvascular ischaemia affecting the involved nerve. The condition is generally self-limiting, with most patients recovering spontaneously within weeks to months. However, these symptoms can significantly impair functional ability and quality of life (6). Owing to their anti-inflammatory and anti-oedematous properties, corticosteroids have been considered a potential therapeutic option to accelerate recovery. Despite their occasional use in clinical practice, the evidence supporting the efficacy and safety of corticosteroids in diabetic cranial nerve palsy remains limited.

1.2 Research Rationale

Although diabetic cranial nerve palsy is generally self-limiting, recovery may take several weeks to months, during which patients may experience significant visual impairment and functional discomfort. Corticosteroids are widely used in the management of inflammatory neuropathies because of their anti-inflammatory, anti-oedematous, and immunomodulatory effects. However, the underlying pathophysiology of diabetic cranial nerve palsy is considered predominantly ischaemic rather than inflammatory, raising questions about the effectiveness of corticosteroid therapy in this condition. Furthermore, corticosteroid use in patients with diabetes carries potential risks, including hyperglycaemia and worsening metabolic control (7). The current evidence is largely limited to case reports, case series, and observational studies, with very few high-quality randomised controlled trials evaluating the efficacy and safety of corticosteroid therapy. Therefore, this systematic review was undertaken to critically appraise the available evidence, summarise the therapeutic outcomes associated with corticosteroid use, and provide an evidence-based foundation to support clinical decision-making in the management of diabetic cranial nerve palsy.

1.3 Research aim and objectives

Aim

This research aim to establish the efficacy and safety of corticosteroid regimen in managing diabetic cranial nerve palsy systematically. It tries to assess clinical outcomes, recovery period, and the risks present and provide clinician evidence-based recommendations in addressing this condition.

Objectives

The objectives of this research are present in below.

- To determine the effect of corticosteroid on recovery in patients with diabetic cranial nerve palsy.
- To Evaluate the neurological recovery and functional improvement following corticosteroids therapy in patients with diabetic cranial nerve palsy.
- To assess the metabolic adverse effects and overall safety of corticosteroid therapy in patients with diabetic cranial nerve palsy.

1.4 Research questions

The questions of this research are present in below.

- What is the impact of corticosteroid in the recovery of diabetic cranial nerve palsy?
- How does corticosteroid treatment affect neurological and functional performance in diabetic patients?
- How are the metabolic complications and safety of corticosteroids are effected corticosteroid therapy?

1.5 Research Significance

The research is significant as it contributes to the explanation of the therapeutic potential of corticosteroids in diabetic cranial nerve palsy, the disease, to which no standard treatment procedures are provided. The research can help in evidence-based decision making by undertaking a systematic evaluation of clinical outcomes and safety concerns. It is also associated with the potential risks associated with metabolism in the diabetic patients to help clinicians minimise the negative effects and increase the patient care and recovery strategies.

2. LITERATURE REVIEW

2.1 Theme 1: To determine the impact of corticosteroid in the recovery of diabetic cranial nerve palsy.

The role of corticosteroids in the recovery of diabetic cranial nerve palsy remains uncertain because robust clinical evidence is lacking. Diabetic cranial nerve palsy is primarily caused by microvascular ischaemia and usually resolves spontaneously within 6–12 weeks with appropriate glycaemic control and supportive care (9). The available evidence consists mainly of case reports and small observational studies, some of which suggest that corticosteroids may reduce pain, perineural oedema, and the duration of symptoms. However, no high-quality randomised controlled trials have demonstrated a clear advantage of corticosteroid therapy over conservative management (1,13). As the underlying pathophysiology is considered predominantly ischaemic rather than inflammatory, the potential therapeutic benefit of corticosteroids is likely to be limited. Consequently, the current evidence does not support the routine use of corticosteroids in patients with diabetic cranial nerve palsy, and their role in clinical practice remains uncertain (8).

2.2 Theme 2: To compare the neuro and functional performance of corticosteroid treatment in diabetic patients.

Diabetic cranial nerve palsy commonly presents with diplopia, ptosis, and ophthalmoplegia, leading to significant impairment in visual function and daily activities. Although the condition is generally self-limiting, spontaneous recovery often requires 6–12 weeks, during which patients may experience considerable functional disability and reduced quality of life (1,5,9). Because corticosteroids possess anti-inflammatory and anti-oedematous properties, they have been used in selected patients with the expectation of reducing nerve oedema, relieving symptoms, and accelerating neurological recovery (6).

Several observational studies have reported earlier improvement in diplopia, ptosis, and ocular motility among patients treated with corticosteroids. These findings suggest that corticosteroids may provide short-term symptomatic relief and improve functional performance during the recovery period (1,6). However, most of these studies were retrospective or observational, involved small sample sizes, and used different corticosteroid regimens, limiting the reliability and generalisability of their findings (5). Furthermore, no high-quality randomised controlled trial has demonstrated a significant improvement in long-term neurological or functional outcomes with corticosteroid therapy compared with conservative management (1,4).

The underlying pathophysiology of diabetic cranial nerve palsy is believed to be predominantly microvascular ischaemia rather than inflammation. Therefore, the biological basis for routine corticosteroid therapy remains uncertain, and any potential short-term symptomatic benefit must be balanced against the risk of steroid-related metabolic complications in patients with diabetes (3,7). Owing to the limited quality of available evidence and the lack of definitive clinical recommendations, a systematic review was undertaken to critically evaluate the neurological and functional outcomes associated with corticosteroid therapy, compare these outcomes with conservative management, identify existing knowledge gaps, and provide evidence to guide clinical practice.

2.3 Theme 3: To examine the metabolic complications and safety of corticosteroids.

Practices of corticosteroid treatment lead to severe metabolic problems in diabetic patients. One of the most frequent adverse effects of corticosteroid therapy is hyperglycemia, which leads to poor glycemic control and may be responsible for acute metabolic complications, including diabetic ketoacidosis or hyperosmolar hyperglycemic state in susceptible patients (3). Long-term steroids can also result in insulin resistance, fluid retention, hypertension and weight gain. Another danger of steroid use is that when users are under the influence, their bodies' immune systems are already weak, leaving them susceptible to infection from bacteria, viruses or fungi. Also, chronic use may cause osteoporosis, mood swings and intestinal irritation (4). When there is no clear clinical evidence of steroid requirement and the potential risk of steroid use is not evident, the risks may be greater than the unknown benefits of steroid use for patients with DCNP (10). In such a way, it is necessary to pay special attention and strict glycemic control in case corticosteroids will be considered.

3. METHODOLOGY

3.1 Study Design

This report utilised systematic review strategy using secondary data collection in which the efficiency and safety of corticosteroid therapy have been evaluated within adult patients with diabetic cranial nerve palsy (DCNP). The methodological review implied the Preferred Reporting Items for Systematic Reviews and Meta-Analyses technique, or PRISMA, to strengthen the accuracy of results and findings. PRISMA flow diagram used in this research to ensure methodological transparency, accuracy and relevance of selected data. All the mandatory screening, retrieval and removal of articles were based on inclusion, exclusion, eligibility and key topic-related factors.

The PRISMA-based article reviews and selection aimed to collect and synthesise accurate evidence through randomised controlled trials (11). The selected observational studies assessed corticosteroid treatment by comparing it with conservative management. Pooled analysis was used in selected areas, while the predominant approach was narrative synthesis through an anticipated heterogeneity study design.

3.2 PICO Framework

The study question was formulated using the PICO (Population, Intervention, Comparison, Outcome) framework. The PICO framework is relevant to use evidence-based practice and make relevant healthcare questions more accurate (12,15). Therefore, Table 1 practically applies this framework to formulate an evidence-based clinical question.

Table 1: PICO Framework to develop the question

Elements	Key considerations
Population (P)	Adults (≥18 years of age) with Type 1 or Type 2 Diabetes Mellitus and diagnosed with microvascular ischemic cranial nerve palsy (III, IV, VI ± VII)
Intervention (I)	Key interventions included systemic corticosteroid. Systemic corticosteroids include oral prednisolone, methylprednisolone, and dexamethasone.
Comparison (C)	Comparative observations included conservative management, including observation, glycaemic control and prism therapy. Others included placebo or no steroid therapy.
Outcome (O)	This included recovery time, improvement within ocular motility, diplopia resolution, and pupillary recovery. On the other hand, secondary outcomes involved MRI findings, recurrence, adverse impacts, and steroid-related hyperglycaemia.

(Source: Self-developed)

The primary clinical question has been formulated based on observation of PICO. The key question includes- Does corticosteroid therapy improve recovery outcomes within adult patients with diabetic cranial nerve palsy in comparison to conservative management alone? However, the PICO framework is operationalised by applying other strategies like eligibility criteria, Boolean operators and study selection processes as discussed further.

3.3 Eligibility Criteria

Specific inclusion and exclusion criteria were followed in the study to eliminate and select articles for strengthening outcomes. Specific inclusion criteria included sources that used randomised control trials, cohort studies, case control studies or case series of greater than five patients. The core considerations included adult patients with diabetes mellitus, while more intense considerations included diabetic adults with cranial nerve palsy due to diabetic microvascular ischemia (Table 2). Local corticosteroid therapy was the key focus area to generate in-depth clinical outcomes regarding recovery time, rate, recurrence rate, and advanced impact.

On the other hand, language specificity was a critical consideration as it could boost readability and accessibility of journal contents while using English publications. The selected sources were published in English, while the sources were updated (published in the last 6 years) and recently published. On the other hand, the exclusion criteria involved adults with non-diabetic cases, care reports with less than five patients, and the use of the paediatric population. Besides these topic-related factors, other exclusion elements included non-English articles, lack of clear reporting and use of secondary methods.

Table 2: Inclusion and Exclusion

Inclusion	Exclusion
● Adult (≥18 years) diabetic patients with cranial nerve palsy. ● Two types of cases: RCTs and Observational studies (>5 patients) ● Steroid interventions ● Reported recovery outcomes ● Articles published in last 6 years	● Non-diabetic patients with microvascular ischemic. ● Case reports with <5 patients ● Secondary research ● Insufficient data or outcomes ● Backdated data ● Bell's palsy case

(Source: Self-developed)

3.4 Information Sources

Authentic data collection tools help collect relevant and accurate study outcomes (16). Quality and accuracy purposes allowed this study to consider high-quality and relevant data sources for this healthcare research. Key data collection tools or searching databases include-

1. PubMed
2. Embase
3. Scopus
4. Cochrane Library
5. Web of Science

These highly relevant data sources helped search and screen articles to get final papers which this research used to get results. However, this study eliminated publication bias through manual screening of reference lists.

3.5 Search Strategy

Boolean search is a logic-based, valuable strategy that helps researchers to refine search engine results based on AND, OR, NOT like terms (13,17). Boolean search techniques were used in this study using such factors as discussed in Table 3. Searches were started between January 2020 and March 2025. The final search was performed in 31st March 2025.

Table 3: Boolean search criteria

Operator	Database used	Search strategy	Example used
OR	PubMed, Embase	This operator combines synonyms	"Diabetic cranial nerve palsy" OR "diabetic ophthalmoplegia" "microvascular third nerve palsy" OR "sixth nerve palsy diabetes" OR "ischemic cranial neuropathy"
AND	Scopus, Cochrane	This operator connects different PICO components to increase specificity	Population terms AND Intervention terms AND outcomes terms
Combined	Web of Science, Embase	It combines operators	Population AND Intervention AND outcome NOT exclusion terms

(Source: Self-developed)

3.6 Study Selection Process

The selection and eligibility criteria helped this study in screening. Reference management software was used to shortlist the articles, as manual reference screening was time-consuming. Furthermore, titles and abstracts were also screened by two independent reviewers. Duplicated records were removed by using reference management software such as EndNote and Mendeley. Specific inclusion and exclusion criteria were used to assess full text articles. Third reviewer helped resolve disagreements through discussion and consultation.

The PRISMA diagram was exclusively made to align the screening, eligibility and inclusion (Figure 1). These search and selection criteria followed to select 14 full-text and fully accessible articles aligning the study question.

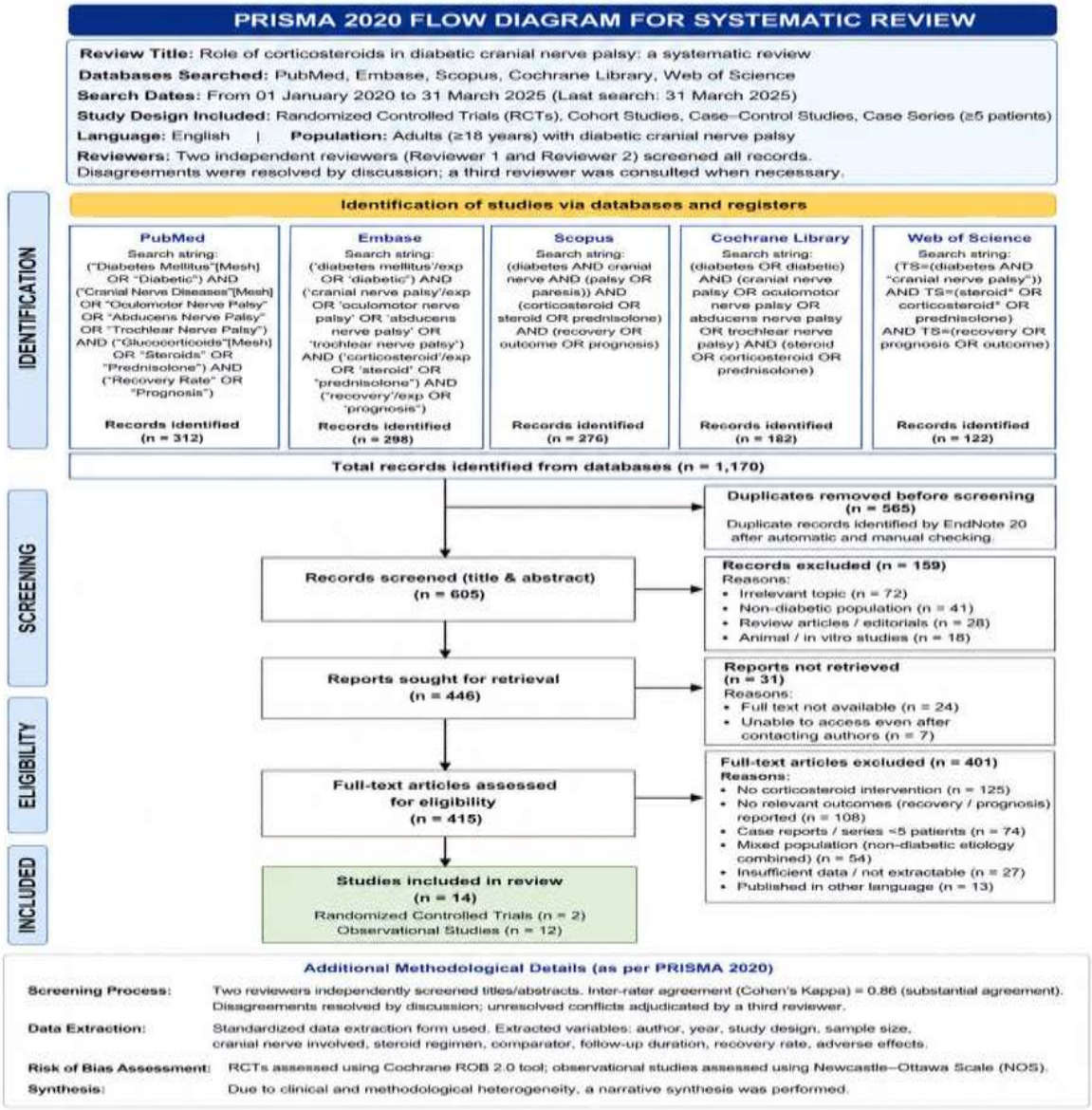

Figure 1: PRISMA flow chart

(Source: Made by Author)

3.7 Data Extraction

- Standardised and pilot-tested data extraction processes were used in this study to extract and analyse data systematically. Standardized extraction method was used for data extraction which included variables, such as:

- "Author"
- "Year"
- "Study design"
- "Sample size"
- "Cranial nerve involved"
- "Steroid regimen/dose"
- "Comparator"
- "Follow-up duration"
- "Recovery rate"
- "Adverse effects"
- "Main findings"

The systematic recording and reviews of extracted data are illustrated in a summary table discussed below (Table 4) to maintain consistency, transparency and accurate reporting of specific selected data.

Table 4: Data Extraction

Author	Year	Study Design	Sample Size	Cranial Nerve Involved	Steroid Regimen/ Dose	Comparator	Follow-up Duration	Recovery Rate	Adverse Effects	Main Findings
Inchara et al., 2024	2024	Comparative clinical study	40	CN III, CN VI	Prednisolone 40–60 mg/day	Vitamin therapy	12 weeks	85% vs 80%	Mild glucose elevation	Recovery was **85%** with steroids vs **80%** with vitamin therapy at **12 weeks**.
Erdal et al., 2022	2022	Retrospective observational study	75	CN VI	Conservative management (limited steroid exposure)	Microvascular vs non-microvascular causes	12 months	Favourable spontaneous recovery	Vascular risk factors grow	Most sixth nerve palsies recovered spontaneously within **12 months**.
Bae et al., 2021	2021	Retrospective cohort study	298	CN III, IV, VI	Variable clinical management	Etiology-based comparison	6 months	Majority recovered within months	Not reported	Majority of patients recovered within **6 months** with conservative management
Verma et al., 2025	2025	Cross-sectional study	100+	CN III, IV, VI, VII	Treatment by corticosteroids and anti-inflammatory agents	Etiological comparison	Limited follow-up duration	69.7% recovery (III), 45% recovery (IV)	Keratitis was observed with trauma and headache	Diabetes identified as a major cause of ocular motor cranial nerve palsy. Recovery was **69.7%** for CN III and **45%** for CN IV palsy.
Billerot et al., 2023	2023	Imaging observational study	10	CN III, VI	Steroid treatment	MRI correlation study	3 months	Slight improvement (20%)	Stroke, infection, and aneurysms	MRI-guided steroid therapy showed **20%** clinical improvement at **3 months**.
Rajangam et al., 2024	2024	Prospective cohort study	45	CN III, VI	Prednisolone 1 mg/kg/day for 14 days	Conservative treatment	6 months	82% complete recovery	Hyperglycaemia, gastritis	**82%** achieved complete recovery after **6 months** with prednisolone. Hyperglycaemia and gastritis reported.
Sadiq et al., 2025	2025	Retrospective clinical study	32	CN III, VI	Dexamethasone 4 mg/day for 5 days	Supportive care	3 months	75% recovery	Increased HbA1c levels	**75%** recovered at **3 months**; increased HbA1c was reported.though metabolic complications were common.

Kulkarni et al., 2022	2022	Systematic review and meta-analysis	148+	Multiple Cranial Nerves	Systemic corticosteroids	Non-steroid controls	6–12 months	78.5% weighted mean	Weight gain, hypertension	Weighted mean recovery was **78.5%**; metabolic adverse events increased.
Srimanan and Panyakorn, 2024	2024	Retrospective cohort study	100+	CN III, IV, VI	Conservative ± medical therapy	Etiology-based analysis	Long-term follow-up	High recovery rate (95%) but for short time	Autoimmunity, infection, or tumor	Microvascular diabetic cases demonstrated favourable long-term outcomes. **95%** recovery with long-term conservative management.
Psillas et al., 2021	2021	Observational cohort study	200+	CN VII	Standard steroid protocol	Diabetic vs non-diabetic patients	6 months	Lower recovery in diabetics (>6.7%)	Synkinesis	Diabetic patients had lower recovery than non-diabetics with steroid therapy. Synkinesis was main complication
Yu et al., 2025	2025	Diagnostic observational study	68	CN III, VI	Steroid treatment	Diabetic palsy vs nondiabetic	3 months	70% recovery after 3 days	Progression of cavernous sinus B-cell lymphoma	**70%** recovered during **3-month** follow-up; diagnostic challenges remained.
Goswami and Gaurkar, 2023	2023	Clinical analysis	Not specified	VI, VII	Corticosteroid-based management discussion	Diabetic vs immunocompromised patients	1 month	Improvement in facial swelling and eye abduction	Steroid-related adverse effects	Facial swelling and eye abduction improved within 1 month; steroid related adverse affects reported.

(Source: Self-developed)

3.8 Risk of Bias Assessment

The risk of bias is on the key considerations that can impact study outcomes (18). The risk of bias was eliminated by methodological integrity, in which all studies were assessed and selected independently by repetitive reviews and checking. Consultation with a third receiver helped resolve disagreement through the discussion. This was assessed by appraisal tool such as Newcastle–Ottawa Scale (NOS) through which cohort, comparative, and observational studies were evaluated in this research. Cross-sectional studies were assessed using NOS, while diagnostic studies were analysed by AMSTAR-2 tool.

Table 5: Risks of bias

Study	Study Design	Assessment Tool	Selection	Comparability	Outcome Assessment	Total Score	Risk of Bias

Inchara et al., 2024	Comparative clinical study	NOS	★★★	★★	★★	7/9	Low
Erdal et al., 2022	Retrospective observational study	NOS	★★★★	★	★★	7/9	Low
Bae et al., 2021	Retrospective cohort study	NOS	★★★★	★★	★★	8/9	Low
Verma et al., 2025	Cross-sectional study	Adapted NOS	★★★	★	★	5/9	Moderate
Billerot et al., 2023	Imaging observational study	NOS	★★★	★	★★	6/9	Moderate
Rajangam et al., 2024	Prospective cohort study	JBI critical appraisal	Moderate	Moderate	Moderate	N/A	Moderate
Sadiq et al., 2025	Retrospective clinical study	JBI case report checklist	Moderate	N/A	Moderate	N/A	Moderate
Kulkarni et al., 2022	Systematic review and meta-analysis	AMSTAR-2	High quality	High quality	High quality	N/A	Low
Srimanan and Panyakorn, 2024	Retrospective cohort study	NOS	★★★★	★★	★★	8/9	Low
Psillas et al., 2021	Observational cohort study	NOS	★★★★	★	★★	7/9	Low
Yu et al., 2025	Diagnostic observational study	QUADAS-2	Low concern	Moderate concern	Low concern	N/A	Moderate
Goswami and Gaurkar, 2023	Clinical analysis	JBI critical appraisal	Moderate	Moderate	Moderate	N/A	Moderate

(Source: Self-developed)

Bias in each domain was categorised under low, moderate concerns and high risk categories (Table 5). Summary of risks include 6 low-risk studies and 8 moderate risk studies with no high risk studies.

3.9 Data Synthesis

Narrative synthesis approach was used in this study due to clinical and methodological heterogeneity (19). Different studies expose different types of steroids, dose, cranial nerve involvement, timeline and distinctive outcomes which create clinical and outcomes heterogeneity and demand narrative synthesis rather than other approaches. On the other hand, studies with homogeneity follow quantitative pooling due to similar study variables. This fixed effect model was criticised when used in study with heterogeneity. Therefore, this study applied a ***random-effects model*** to vary and assess different patient populations, treatment protocols and outcomes to measure the final results (20).

Subgroup analysis helped assess different cranial nerve palsy (III vs VI vs VII), steroid dosage and route of steroid application (oral vs intravenous). Comparative discussions included early versus delayed treatment initiation in presence or absence of pupillary involvement. Moreover, this study balances the study design by managing consistency, magnitude of effects, and the risk of bias to get precise estimation and clinical outcomes.

4. RESULTS

The systematic search and selection through PRISMA reflected the initial searching results of 1170 from five databases (Figure 1). Effective screening and removal of inaccessible and lack of relevant data helped consider only 14 high-quality articles that met inclusion and exclusion criteria. The selected articles included a limited number of randomised controlled trials (RCTs), while mostly considering observational studies. These observational studies helped analyse how corticosteroids benefit adult patients with diabetic cranial nerve palsy rather than other clinical processes alone (Table 4).

Incharav et al. (2024) compared corticosteroid therapy with vitamin therapy within 40 diabetic patients who had third and sixth cranial nerve palsies. Findings revealed 85% recovery of steroid group patients, while 80% recovery of patients using vitamin therapy after 12 weeks. Adverse impacts included slightly elevated blood glucose level among steroid-treated patients.

Erdal et al. (2022) 75 diabetic patients with sixth cranial nerve palsy. Observation highlighted favourable spontaneous recovery during 12th month follow-up period. However, risk factors like vascular risk were frequently identified among the affected patients.

Bae et al. (2021) analyst 298 patients with third, fourth and sixth cranial nerve palsies. Good prognosis was found within the majority of patients with micro-vascular cranial nerve palsies.

Verma et al. (2025) analysed more than 100 patients with III, IV, VI, and VII cranial nerve palsies using cross-sectional study. Findings revealed 69.7% recovery of III cranial nerve palsy patients, while 45% recovery of patients with IV CN palsy. However, adverse impacts included headache, trauma-related complications and keratitis.

Billerot et al. (2023) examined a total of 10 diabetic patients who have ocular motor nerve palsy. High resolution magnetic resonance images were analysed to identify improvements in nerve palsies. Results reported approximately 20% of clinical improvement within the follow-up period of 3 months. However, some adverse impacts included stroke, infection and aneurysm-related implications in some cases.

Rajangam et al. (2024) examined a total of 45 patients who had III and VI CN palsy. Prednisolone was used for the treatment, while outcomes showed 82% of patient recovery after 6 months. Side effects included hyperglycemia and gastritis.

Sadiq et al. (2025) used retrospective clinical study on 35 patients with CN III and VI palsy. 75% recovery was reported within the follow-up of 3 months with supportive care. However, adverse impacts identified such as increased HbA1c levels.

Kulkarni et al. (2022) used systematic review and meta analysis to observe more than 148 patients with multiple CN palsies. The use of systematic corticosteroid showed 78.5% mean recovery within 6 to 12 months of follow-up period. Adverse impacts included hypertension and weight gain.

Srimanan and Panyakorn (2024) used a retrospective cohort study on more than 100 diabetic patients with CN III, IV and VI. Results found high recovery with 95% short-term improvement in CN palsy, while the chances of tumor, infection and autoimmunity were increased.

Psillas et al. (2021) used observational cohort study to observe more than 200 patients with CN VII. Comparative analysis between diabetic and non-diabetic patients using standardized steroid protocol found less than 6.7% recovery of diabetic patients within 6 follow-up periods. Diabetes has been identified as the negative force to recover Bell's palsy using steroids. Synkinesis was observed as adverse impacts.

Yu et al. (2025) use diagnostic observational studies of 68 patients with CN III and VI palsy. Treatment observed 75% recovery within the first three days while the follow period was 3 months. This study compared diabetes versus non-diabetic palsy patients and highlighted diagnostic challenges in treatment of diabetic patients with inflammatory palsies. Adverse impacts were reported such as cavernous sinus B-cell lymphoma.

Goswami and Gaurkar (2023) compared corticosteroid-based management of diabetic and immuno-compromised CN palsy patients. Findings revealed slight improvement in facial swelling within one month of follow-up, while steroid-based adverse impacts were highlighted.

5. DISCUSSION

5.1 Comparing discussion

Most of the research findings highlight mean recovery (8-12 weeks) using steroid therapy among diabetic patients with cranial nerve palsy. Limited evidence highlights consequences within patients with hyperglycaemia, hypertension and hypoglycaemic considerations. Long-term exposure to steroids also creates visual and neurological dependence (27, 28). Besides these limitations, results from comparative studies reveal the mean recovery using corticosteroids, which cannot be possible while using vitamin treatment or other managerial interventions alone. The recovery timeline is approximately 8 to 12 weeks in case of consistent application of corticosteroids with repetitive reporting and follow-ups to assess early consequences and recurrence. The mean recovery is a fundamental challenge for other therapeutic interventions and drives clinical superiority of using steroid therapy in cranial palsy.

Literature and results both highlight the importance of longer follow-up intervals to improve symptoms and functional benefits of corticosteroids in steroid-based treatment among diabetic patients. However, the integrated results from steroid and non-steroid groups within 3 months create difficulties in assessing whether corticosteroids can accelerate the neural repair or not (21, 22). In case steroids reduce neural oedema without modifying ischemic results, it may raise the question about whether steroids show leading behaviour rather than supportive care in cranial palsy treatment.

Microvascular ischemia is a widely accepted primary pathophysiological mechanism in diabetic neuropathy that arises due to industrial dysfunction, stress management and managing vasa nervorum (24). High-resolution MRI reports in the result section highlight ocular motor palsy's ischemic behaviour rather than inflammatory pathology (27). Contrasting conditions like Tolosa-Hunt syndrome reveal low steroid responsiveness, which reduces DCNP treatment among patients with diabetes.

Facial neurorrhaphy, such as Bell's palsy, shows mixed results of using steroid therapy. Diabetic patients with Bell's palsy show short-term improvement, such as recovery from the neural oedema and ensure neural functionality (21, 32). However, patients with predominant inflammation may create difficulties using steroid-based treatment due to acute motor neuropathy. Therefore, facial nerve studies highlight that 3rd and 6th nerve palsy may overestimate the potential benefits of steroids. Systematic reviews also explore corticosteroid application in peripheral nerve disorders, which show consistent improvement in nerve regeneration (24, 25). Safety considerations also create difficulties in assessing the role of corticosteroids in the treatment of DCNP.

The core question of this study was to assess whether corticosteroids effectively accelerate recovery of adult diabetic patients with cranial nerve palsy. Different studies evaluated diabetic patients with third and sixth nerve palsy, while the findings highlight 70% to 90% mean recovery within 8 to 12 weeks under conservative management (28, 26). The high recovery rate makes it difficult to explain additional benefits rather than the timeline due to faster recovery.

Findings highlight subjective improvement using steroid-based treatment which help managing diplopia or ocular discomfort resolution. However, contradictory findings highlight superiority of treatment measures over spontaneous recovery which require controlled trials and effective monitoring. Furthermore, comparative study reflects that complete recovery within 12 weeks in 85% of the steroid groups compared to 80% in the vitamin group ($p=0.42$). Within the meantime, the initial improvement was 3.1 weeks vs 4.6 weeks respectively (22). Therefore, vitamin treatment alone cannot faster the recovery of cranial nerve palsy; rather, the combined treatment using corticosteroids ensure functional recovery of the cranial nerve with the mean time. Similarly, corticosteroid treatment of diabetic Bell's palsy patients results in faster short-term improvement (21). Meanwhile, there is no statistical evidence showing the difference between short and long-term facial nerve recovery using corticosteroids rather than other interventions.

Moreover, clinical findings question whether corticosteroids can accelerate neural repair or reduce transient inflammatory oedema. These gaps can be eliminated by image-based evidence. For example, high-quality MRI scan evidence may typically explain how corticosteroids reduce growth of diabetic ocular motor palsy by minimising nerve enhancement (Figures 2, 3, 4 and 5). This evidence suggests that corticosteroids impact predominantly in ischemic cranial nerve palsy management rather than inflammatory impact (27).

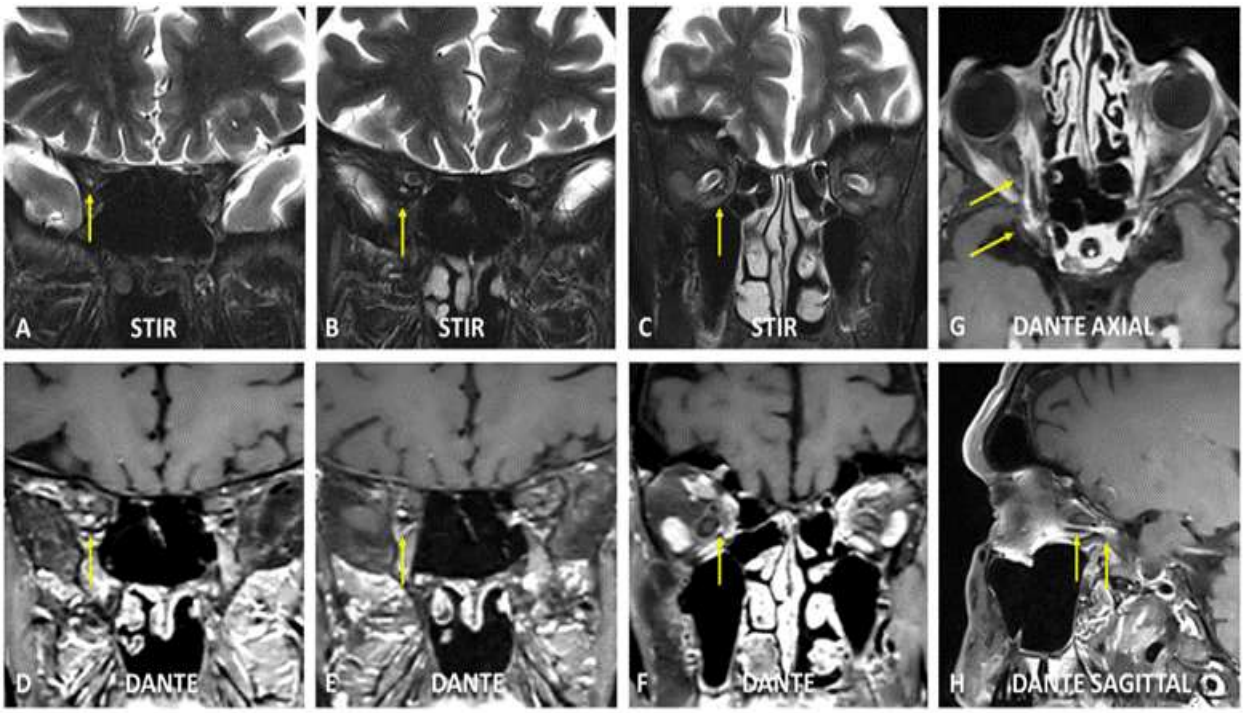

Figure 2: A—C. Coronal STIR sequence.

D—F. 3DT1 SPACE DANTE with coronal reconstructions. G. Oblique axial reconstruction. H. Sagittal reconstruction). STIR hyperintensity of CN III in cavernous and orbital (A—C), with enhancement extending to the nervous rootlet innervating the right medial rectus muscle (D—F) of the enlarged nerve, compared to the contralateral side (G and H).

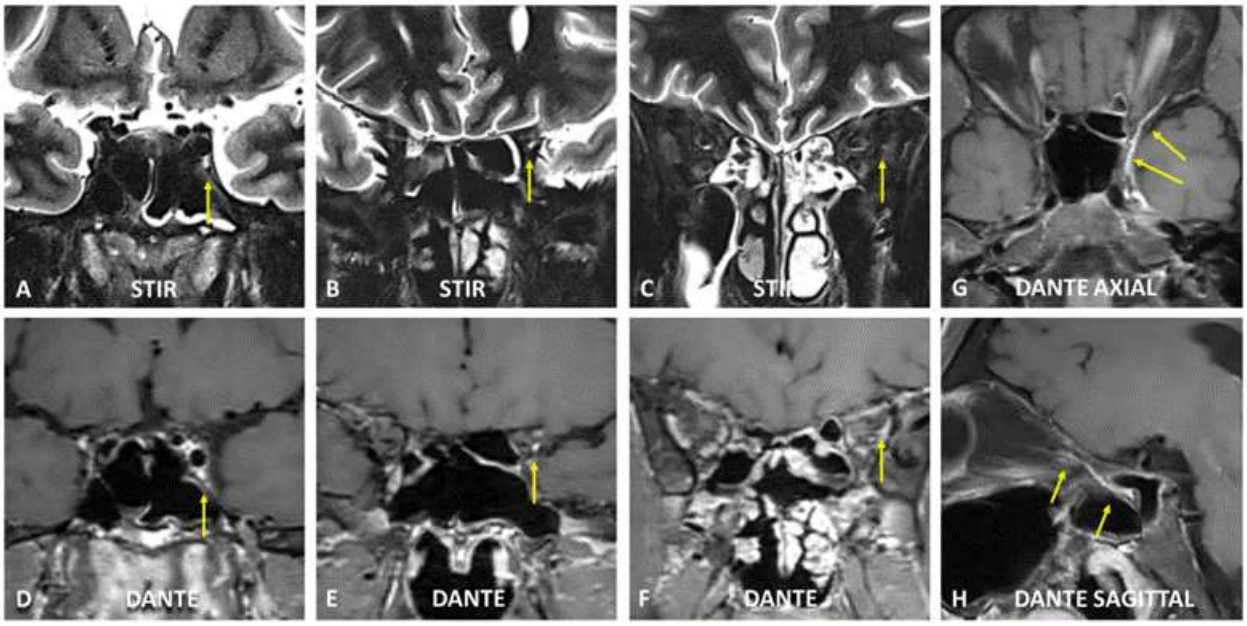

Figure 3: A to C. Coronal STIR sequence.

"D—F. 3DT1 SPACE DANTE with coronal reconstructions. G. Oblique axial reconstruction. H. Sagittal reconstruction. Forty-six-year-old male patient with acute horizontal diplopia without pain. STIR hyperintensity of CN VI in cavernous and orbital portions (A—C), with enhancement extending to the nervous rootlet innervating the left lateral rectus muscle (D—F) without enlargement of the nerve (G and H)" (27).

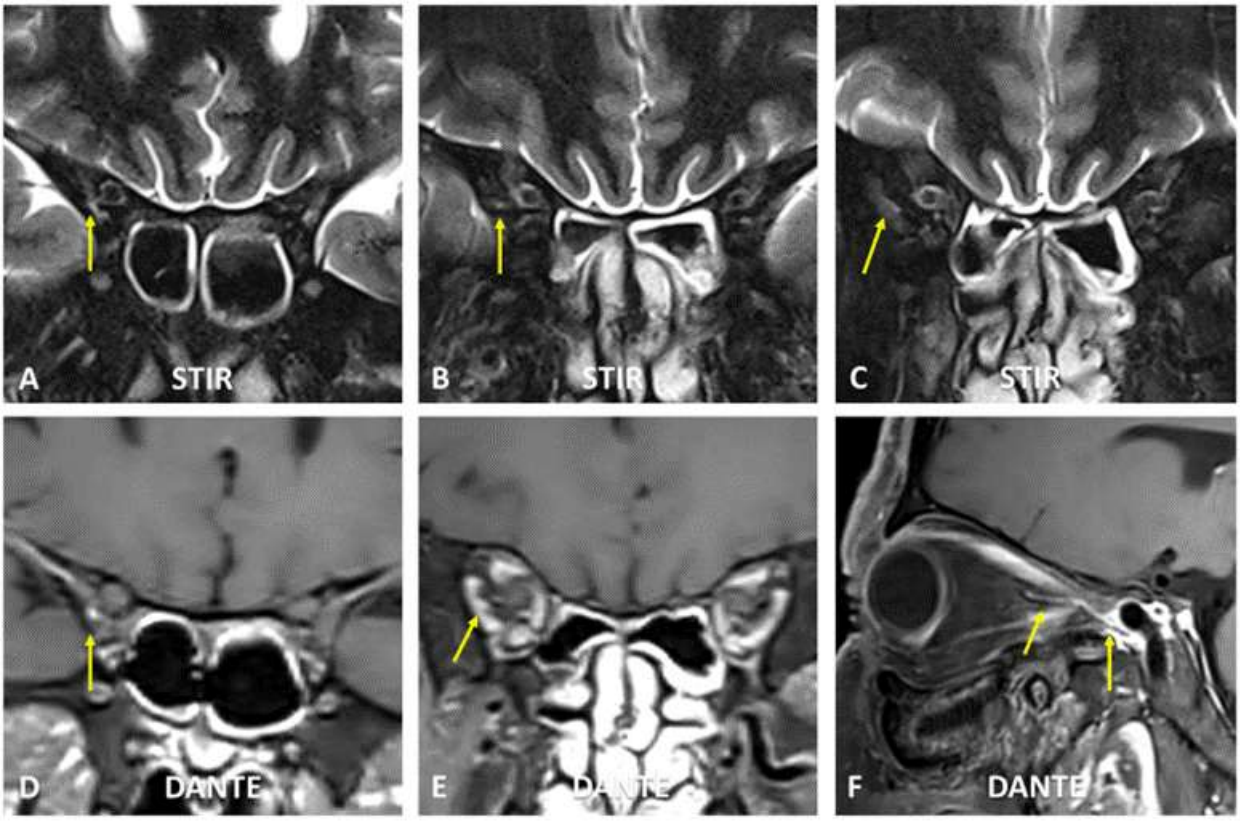

Figure 4: A to C. Coronal STIR sequence.

"D and E. 3DT1 SPACE DANTE with coronal reconstructions. F. 3DT1 SPACE DANTE with sagittal reconstruction. A fifty-eight-year-old male patient presented with horizontal diplopia after a 60-day acute onset. STIR hyperintensity and enhancement persisting mainly in the orbital portion of right CN VI" (27).

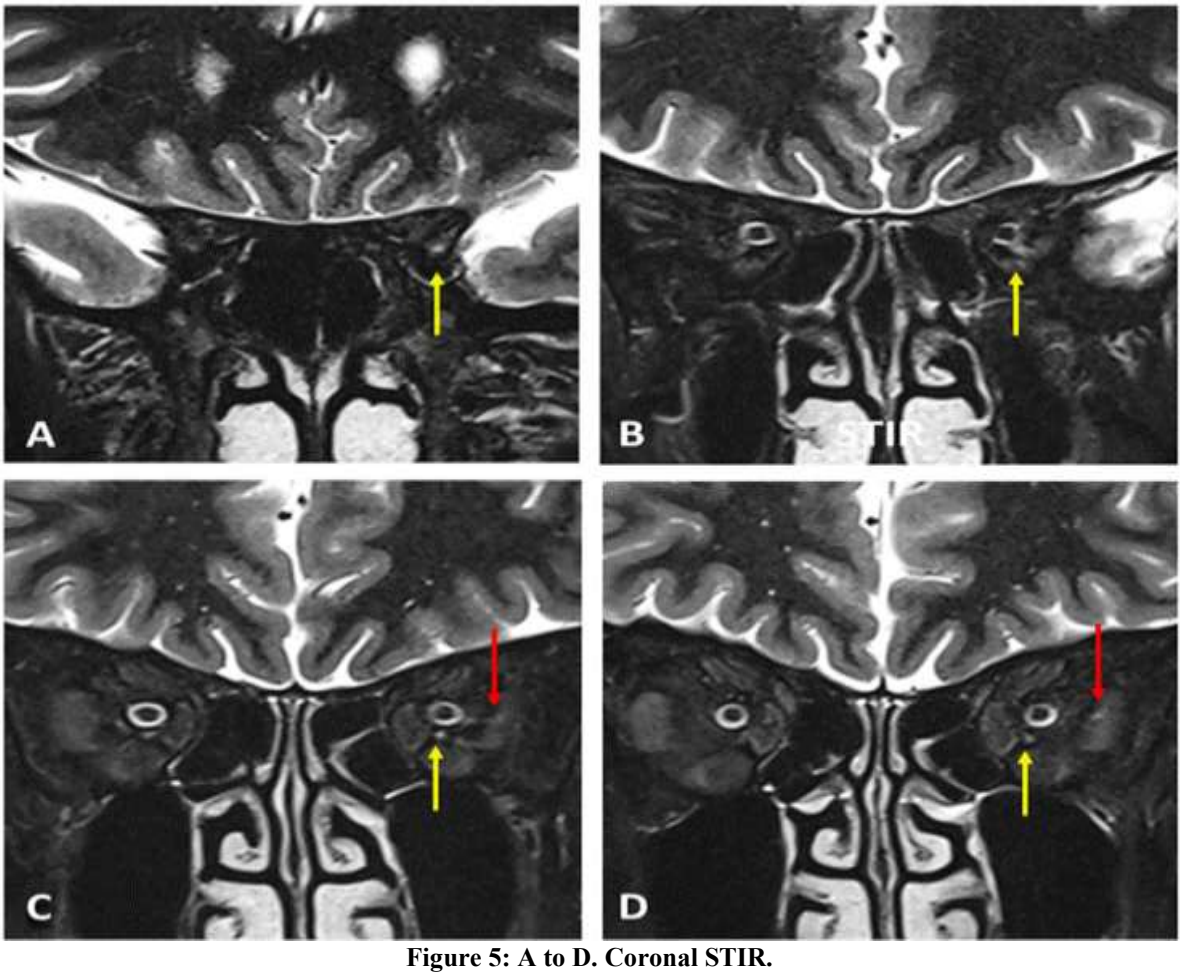

Figure 5: A to D. Coronal STIR.

A 65-year-old female patient with left hemicrania and horizontal diplopia, and hypersensitivity in CN III (yellow) and CN VI (red arrow). However, the findings of mean recovery time (8-12 weeks) using corticosteroids in diabetic patients contradict the conditions like Tolosa-Hunt syndrome In such cases, nerve palsy and steroid therapy involve with a mean increase in fasting glucose due to an inflammatory aetiology (33).

Furthermore, pathophysiological research supports microvascular ischemia as the primary form of diabetic neuropathies, which require mean recovery within 8-12 weeks using corticosteroids (34). Therefore, ischemic cranial nerve palsy can be treated using corticosteroids, while the use of anti-inflammatory corticosteroids might be uncertain due to multiple other factors. Early identification of symptoms and early treatment are the key aspects of reducing nerve palsy in all cases, as these reduce the chances of perineural oedema. Other cases highlight trajectories between steroid therapy and other managerial interventions (22, 21).

Conditions like hyperglycaemia require treatment modification even in short-term treatment, as it raises infection chances (29, 30). Additional complications include difficulties in glycaemic control in vulnerable populations due to vascular morbidity. Hence, comorbidities are crucial considerations while using corticosteroids for cranial nerve palsy. The observation highlights the role of corticosteroids and systemic metabolic management over pharmacological relevance, while it shows faster and long-term recovery outcomes in some cases. Careful diagnosis, timely interventions and inflammation management help optimise glycaemic control and support ophthalmologic management of DCNP using corticosteroids.

5.2 Limitations

This study has some limitations due to considering observational data, which have the risks of bias. Lack of primary data collection creates significant limitations, as reliance on secondary data drives the risks of considering backdated information and a lack of direct relevance to the topic. On the other hand, this study broadly concerns DCNP without specific geographic considerations or country-specific analysis, which broadens the range of analysis and reduces the specificity and depth. These limitations might be reduced in future research by adopting primary data collection and contextual discussion.

6. CONCLUSION

Adults with DCNP have self-limiting microvascular complications. Most of the patients recover spontaneously within 6-12 weeks. Corticosteroids may minimise short-term and early symptoms of nerve palsy and its complications within short follow-up periods. However, no such evidence has been seen regarding long-term recovery benefits of corticosteroids for CN palsies within diabetic patents. Other than that, steroid-induced adverse impacts like hypertension, hyperglycemia, metabolic complications and a few unique symptoms were observed during clinical observation. Moreover, routine corticosteroid use cannot be recommended currently due to limited evidence showing long-term benefits in CN palsies due to diabetes. To address such gaps, future research require large prospective controlled studies on DCNP.

7. Clinical Recommendations

Routine corticosteroid therapy is not recommended for typical DCNP, as the spontaneous recovery rate is high in such cases. Additionally, limited evidence shows sustainable benefits of using corticosteroids in diabetic patients with cranial nerve palsy. Therefore, clinical recommendations include strict glycaemic control and cardiovascular risk management by repetitive diagnosis, health checkup and symptomatic treatment. Patients with additional complexities like hypertension and other neural disorders must be treated carefully when applying corticosteroids, as it raises the chances of inflammation, nerve breakdown and even more adverse impacts. Therefore, neuroimaging might be suitable to identify the causes of inflammation and treat specific factors to reduce the chances of severe DCNP.

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