

Adjunct Use of Pranic Healing Colours in Neuroprotection of SH-SY5Y Parkinson's Disease Cell Models

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ABSTRACT

Background: Parkinson's Disease (PD) involves dopaminergic neurodegeneration associated with mitochondrial dysfunction, oxidative stress, and apoptosis. **Objectives:** To evaluate the effects of Pranic Healing (PH) colour exposures on dopamine-induced cytotoxicity, Mitochondrial Membrane Potential (MMP), apoptosis, and oxidative stress in SH-SY5Y neuroblastoma cells. **Materials and Methods:** SH-SY5Y cells were exposed to rotenone to induce neurotoxicity and treated with dopamine followed by different PH colour therapies. Cell viability (MTT), MMP (Rhodamine-123), apoptosis (flow cytometry), and reactive oxygen species (ROS) were assessed. Data were analysed using inferential statistics followed by appropriate *post hoc* test. **Results:** All PH colour treatments combined with Levodopa significantly reduced cytotoxicity versus disease control. Colour Light Whitish Green-Light Whitish Violet showed the strongest cyto-protection (24.27% cytotoxicity). Colours Ordinary Violet and White markedly improved MMP beyond control levels, while Colours Light Whitish Violet and Light Whitish Green-Light Whitish Violet significantly reduced ROS, comparable to pharmacological control. **Conclusion:** PH colour exposure enhanced neuronal viability, mitochondrial function, and redox balance in a Parkinsonian cell model, suggesting potential complementary neuroprotective benefits.

Keywords: Biofield, Complementary Therapy, Neuroprotection, Prana, Yoga.

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INTRODUCTION

Parkinson's Disease (PD) represents a common and progressive neurodegenerative disorder, primarily affecting mobility in the elderly and distinguished by the selective depletion of dopaminergic neurons within the Substantia Nigra Pars Compacta (SNpc). Patients often exhibit motor dysfunction (tremor, rigidity, slowness, and postural instability), in addition to non-motor symptoms like autonomic irregularities, psychological disturbances (frequently depression), and cognitive impairment. Although environmental influences are well-documented, recent progress points to genetic predisposition as a major factor in the likelihood of developing a disease. Existing treatments for PD concentrate on managing symptoms; they don't prevent the deterioration of dopamine-producing nerve cells, and using levodopa for a long time often results in drug resistance and unpleasant side effects.¹

The pathogenesis of PD remains incompletely understood, but abnormal cellular processes including Lewy body formation, calcium dyshomeostasis, glutamate toxicity, chronic inflammation, proteasome failure, and apoptosis are all implicated. Mitochondrial dysfunction and related oxidative stress are now recognized as pivotal elements in the neurodegeneration associated with PD. In the investigation of PD, the most common *in vitro* model utilizes immortalized neuronal cell lines, such as SH-SY5Y neuroblastoma cells, which have neuron-like properties and are often used in studying disease mechanisms and potential treatments. Studies in epidemiology and animals have linked neurotoxic pesticides like rotenone to PD risk, due to their lipophilicity and their capacity to penetrate cell membranes and the blood-brain barrier without the involvement of dopamine transporters. Rotenone, a potent inhibitor of mitochondrial complex I, causes decreased ATP synthesis, increased generation of Reactive Oxygen Species (ROS), and cell death through oxidative stress, which is similar to the neuronal damage seen in PD.¹

The past few years have shown a notable increase in the integration of Complementary and Alternative Medicine (CAM) into biomedical practices. Pranic Healing (PH), Reiki, therapeutic touch, and Qigong are examples of CAM modalities classified



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as biofield therapies that aim to affect the body's energy fields and encourage healing across physiological and psychological domains.² The biological and clinical effects of such approaches on protein structure, antibiotic activity, DNA conformation, cellular viability, immune modulation, and wound healing are now well-documented in a growing number of studies, using both *in vitro* and *in vivo* models. Pranic Healing, an energy-based therapy, has been shown to promote the healing process by influencing the 'bioplasmic' energy body and subsequently affecting the physical body.³ Studies suggest PH can improve diverse physiological conditions, accelerate wound healing,⁴ reduce depression⁵ and COPD,⁶ improve LUTS in elderly males,⁷ among others.

Pranic Healing protocols use the projection of various colors onto the subject, aiming to regulate the biofield and accelerate the healing process.³ PH colours have shown effectiveness for various conditions. Application of light red and electric violet colours in PH interventions has been associated with a significant decrease in depression symptoms and improvements in emotional well-being.⁵ Light whitish green, orange, and red have been associated with improved respiratory function and quality of life in patients with chronic obstructive pulmonary disease;⁶ similarly, specialised colour applications have accelerated wound repair,⁴ decreased infection rates, and enhanced healing outcomes in studies on diabetic foot ulcers.⁸ The application of PH colour techniques has demonstrated potential in non-clinical settings, including enhancing agricultural yield⁹ and reducing anxiety in animal models like zebrafish.¹⁰ These results highlight the potential of PH colour techniques to treat various health conditions, specifically as complements to traditional medical interventions.

Although evidence is accumulating, there is a lack of research directly examining the neuroprotective potential of biofield therapies, such as Pranic Healing, within cellular models of neurodegeneration. Integrating CAM modalities like PH into cell culture systems, this study explores new therapeutic approaches to lessen neurotoxic injury and increase comprehension of PD management. This research seeks to evaluate the neuroprotective impact of Pranic Healing against rotenone-induced cell death in SH-SY5Y human neuroblastoma cell cultures, a well-established *in vitro* model for PD.

MATERIALS AND METHODS

Cell culture and reagents

Human SH-SY5Y neuroblastoma cells were procured from the National Centre for Cell Science (NCCS), Pune, India. The Methyl Thiazolyldiphenyl Tetrazolium bromide (MTT) and Phosphate-Buffered Saline (PBS) were sourced from HiMedia Laboratories Pvt. Ltd., Mumbai, India. Levodopa and Rotenone were procured from Sigma Aldrich. Cells were cultured in Dulbecco's Modified Eagle's Medium (DMEM), supplemented

with 10% fetal bovine serum (FBS) and 1% antibiotic/antimycotic. Cultures were maintained at 37°C in a humidified atmosphere of 5% CO₂ and 95% air, and the culture medium was replaced every 48 hr. Rotenone was prepared in 0.05% Dimethyl Sulfoxide (DMSO) for each experiment. Experiments were conducted in triplicate to ensure statistical robustness and reproducibility. This study was conducted at the Department of Pharmaceutical Biotechnology, Manipal University, Manipal.

Neurotoxicity assay

About 3×10^4 SH-SY5Y cells were seeded per well in a 96-well culture plate. The toxicity of rotenone was evaluated by incubating cells in the medium with diverse rotenone concentrations (5, 10, 50, 100, and 200 nM) for 24 hr. To determine the neuroprotective capacity of Colour Prana, SH-SY5Y cells were pre-treated with Colour Prana for 2 hr and subsequently incubated with rotenone (effective dose) for 24 hr. The cells' viability was evaluated by a standard MTT assay. Based on the results obtained from the cell viability assay, the effective rotenone dose was used for further studies.¹¹

The advanced Pranic Healing protocol³ was performed by an experienced healer, involving invocation and scanning before, during, and after treatment, followed by sweeping, projection of coloured prana to the wells, stabilisation, complemented with Levodopa. The colours Light Whitish Violet (LWV), Electric Violet (EV), Ordinary Violet (OV), White (W), and Light Whitish Green-Light and Whitish Violet (LWG-LWV) were involved in healing with Levodopa, in addition to a Pranic Healing control group.

Observations of the plate were recorded at 24, 48, and 72-hr intervals after the PH treatment. The cell culture received an addition of MTT solution (2 mg/mL) after 72 hr, followed by a 3-hr incubation at 37°C and the subsequent introduction of Dimethyl Sulfoxide (DMSO). Viable cells were stained by the MTT solution, and the resulting formazan is solubilized by DMSO. Measurements of the plate's absorbance were taken at a wavelength of 540 nM. Neurotoxicity percentage [% growth inhibition: $100 - (\text{Mean OD of individual peptide-treated group} / \text{mean OD of control group} \times 100)$] and cell viability percentage [$100 - (\% \text{ cytotoxicity})$] were calculated using the acquired data.¹²

Measurement of Mitochondrial Membrane Potential (MMP)

PD is characterized by mitochondrial dysfunction, a phenomenon not limited to striatal neurons.¹ Progressive apoptosis of dopaminergic neurons in the substantia nigra brings about the PD. As neurons require a substantially higher energy supply, their mitochondria play a crucial role in neuronal survival.¹³ This correlation highlights the importance of mitochondrial health in PD pathology and suggests possible therapeutic approaches centered on mitochondrial stabilization and repair. Mitochondrial

membrane potential variations were measured with the aid of Rhodamine-123 (Rh-123), a mitochondrial-specific, cationic fluorescent dye. Subsequent to the 2-hr Color prana treatment and the 24-hr rotenone incubation, as detailed previously, the cells (1×10^5 cells/well in 6-well plates) were incubated in fresh medium (100 μ L) supplemented with 1 μ L of Rh-123 (5 mmol/L) for 30 min at 37°C. The test cells were collected and washed twice with PBS, before analyzed using a blue filter (450-490 nm). Mitochondria exhibiting polarization will display orange-red fluorescence, whereas those that are depolarized will display green fluorescence. Fluorescent intensity was measured at 535 nm using a spectrofluorometer.¹⁴

Measurement of intracellular Reactive Oxygen Species (ROS)

To evaluate the levels of endogenous ROS production in control and experimental cells, the non-fluorescent probe 2,7-Diacetyl Dichlorofluorescein (DCFH-DA), which is capable of penetrating the intracellular matrix of cells were used. ROS oxidizes DCFH-DA to form fluorescent Dichlorofluorescein (DCF). Following pretreatment with Color prana, cells (1×10^5 cells/well in 6-well plates) were incubated with rotenone (100 nM) for 24 hr. Following this, the cells incubated with 100 μ L of DCFH-DA for 30 min at 37°C and washed twice with PBS to remove excess probe. Subsequently, cells were suspended in glucose-enriched PBS and transferred to a fluoro slide for visualization via fluorescence microscopy. Measurements of fluorescence were performed with a spectrofluorometer, with excitation and emission filters set to 485 ± 10 nm and 530 ± 12.5 nm, respectively, while images were obtained via fluorescence microscopy. After pH treatment, the plate was incubated at 37°C with 5% CO₂. Photographs were taken on days 0 (0 hr), 24 hr, 48 hr and 72 hr.¹⁵

Statistical analysis

Data are presented as Mean $\pm$ SEM; statistical analyses were conducted using One-Way ANOVA, the Kruskal-Wallis test, followed by Dunnett's test and Dunn's *post hoc* test for multiple comparisons. The 95% confidence level was employed to ascertain statistical significance.

RESULTS

Neurotoxicity

The neurotoxicity profiles of dopamine-treated colour samples differed significantly ($F=13.30$, $p \leq 0.001$) from those of the disease control group, according to data analysis. The highest neurotoxicity was observed in the Disease Control (57.36%), which suggests significant damage to cells under Parkinsonian conditions. Neurotoxicity was reduced by 30.84% following the administration of the Drug Control (Levodopa). The administration of Levodopa alongside Pranic Healing color applications demonstrated a reduction in neurotoxicity to varying extents: Drug + Light Whitish Violet (29.61%), Drug + Electric Violet (33.02%), Drug + Ordinary Violet (26.37%), Drug + White (27.10%), and Drug + Light Whitish Green _ Light Whitish Violet (24.27%). Neurotoxicity (30.45%) exhibited an impressive modification in the application of PH colors without the presence of Levodopa. Levodopa, PH alone, and Levodopa with color-based PH differed significantly from the Disease Control ($p < 0.05$). The lowest neurocytotoxicity (24.27%) was observed under the Drug + Light Whitish Green + Light Whitish Violet condition, which indicates that this combined intervention was the most effective in reducing neurocytotoxicity in relation to the disease state (Figure 1).

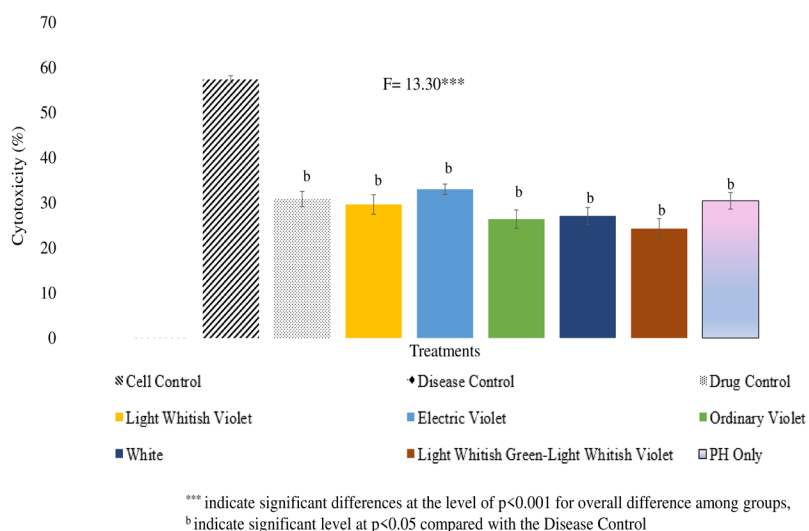


Figure 1: Neurotoxicity of Pranic Healing colours.

Measurement of Mitochondrial Membrane Potential (MMP)

Mitochondrial dysfunction is a prominent feature of Parkinson's disease, significantly impacting striatal dopaminergic neurons. The sustained loss of mitochondrial integrity precipitates the progressive apoptosis that underpins the disease. Because neurons have high energy demands, their mitochondrial health is vital for maintaining cellular viability. Mitochondrial Membrane Potential (MMP) serves as a sensitive marker of cellular health, with elevated MMP values reflecting improved neuronal function and survival.^{16,17} The Disease Control demonstrated a substantial loss of mitochondrial potential (31.80), indicating severe mitochondrial depolarization under Parkinsonian conditions. Treatment with Levodopa (Drug Control) restored MMP to a considerable extent (314.81), suggesting a strong protective effect on mitochondrial integrity. Levodopa combined with Pranic Healing colour applications produced variable but notable improvements in MMP: Drug + Light Whitish Violet (85.55), Drug + Electric Violet (59.09), Drug + Ordinary Violet (306.66), Drug + White (315.22), and Drug + Light Whitish Green + Light Whitish Violet (82.20). The PH-Only condition showed moderate improvement (63.92), reflecting a partial mitochondrial protective effect independent of Levodopa. Levodopa + White showed (315.22) the highest MMP among all treatment conditions (Figure 2).

Visual fluorescence analysis supported the quantitative findings on mitochondrial membrane potential. Compared with the Disease Control group, which exhibited weak and uneven green fluorescence indicative of mitochondrial depolarization, both Drug + Ordinary Violet and Drug + White conditions showed stronger and more uniformly distributed green signals,

reflecting substantial restoration of mitochondrial function. These improvements were consistent with the observed increases in mitochondrial membrane potential, demonstrating that the combined drug-colour interventions effectively counteracted Parkinson's disease-related mitochondrial damage. Restoration of mitochondrial integrity suggests enhanced cellular bioenergetics, improved maintenance of electrochemical gradients, and reduced susceptibility to apoptotic signaling. Collectively, these outcomes indicate that adjunctive Pranic Healing colour exposure, particularly when combined with Levodopa, confers significant mitochondrial protection and exhibits promising neuroprotective potential in the SH-SY5Y Parkinson's disease cellular model (Figure 3).

Measurement of Intercellular Reactive Oxygen Species (ROS)

Reactive Oxygen Species (ROS) levels were quantified using the DCFH-DA assay, where cellular oxidation of the probe results in the formation of fluorescent Dichlorofluorescein (DCF). The intensity of fluorescence is directly proportional to the amount of ROS present in the cells—higher fluorescence reflects increased oxidative stress. In this study, the Disease Control (DC) group exhibited a markedly elevated ROS production compared to the Cell Control (CC) group, as evidenced by both the mean values and the substantial spread (large SD) observed in the graph. This increase highlights pronounced oxidative stress¹¹ associated with the disease state (Figure 4).

Intracellular ROS levels showed pronounced variation across the experimental groups. The Cell Control exhibited a low ROS level (320.33), confirming normal oxidative status under physiological conditions. As expected, the Disease Control displayed a markedly elevated ROS level (2054.70), indicating intense

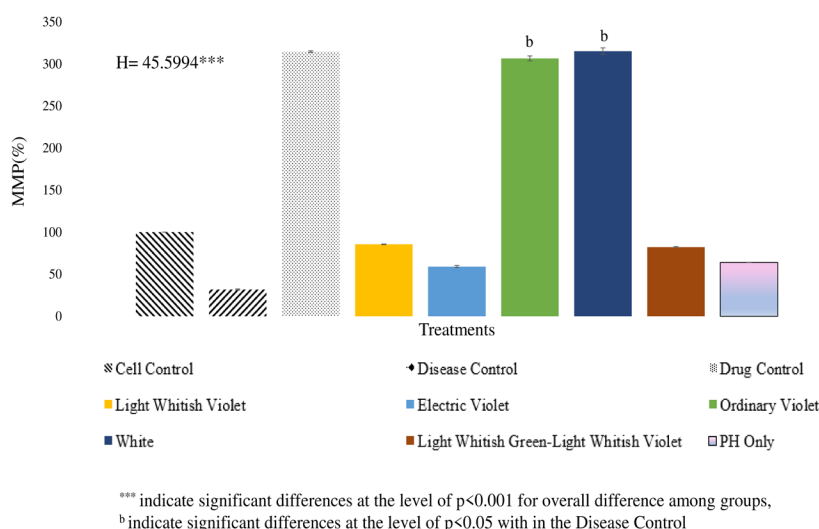


Figure 2: MMP of Pranic Healing colours.

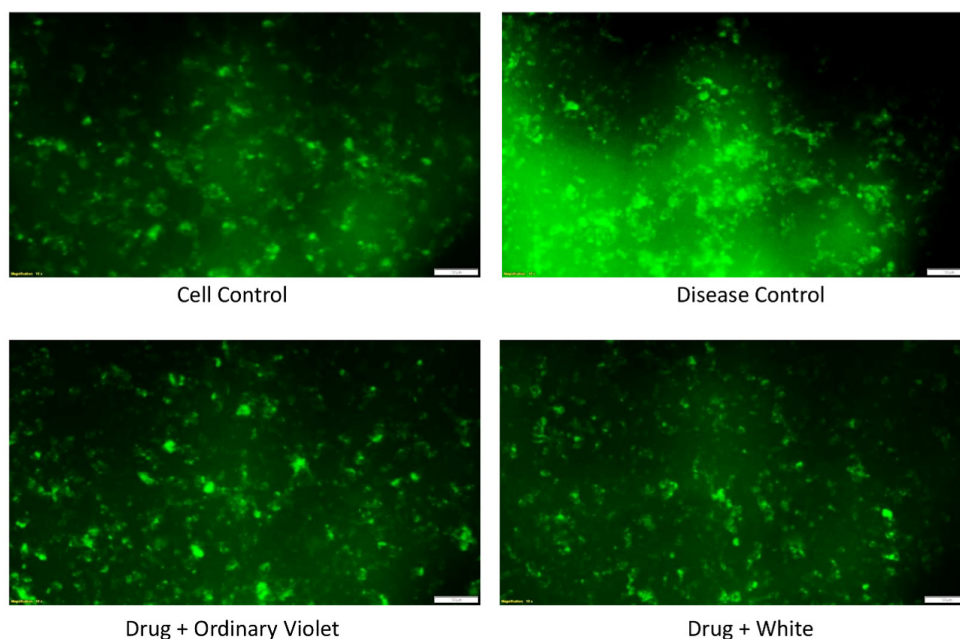


Figure 3: Fluorescent photographs of MMP.

oxidative stress and mitochondrial dysfunction characteristic of Parkinsonian pathology. The administration of Levodopa (Drug Control) effectively lowered ROS levels to 644.00, thus exhibiting a significant antioxidative protective effect. Levodopa combined with different Pranic Healing colour exposures further modulated ROS levels: Drug + Light Whitish Violet (617.50), Drug + Electric Violet (720.33), Drug + Ordinary Violet (747.50), Drug + White (848.67), and Drug + Light Whitish Green + Light Whitish Violet (606.83). Among these, the Drug + Light Whitish Green + Light Whitish Violet treatment demonstrated the lowest ROS level (606.83), showing the strongest reduction in oxidative stress among the colour-based interventions. In contrast, the PH-Only group exhibited markedly elevated ROS levels (1711.30), indicating that Pranic Healing alone was not sufficient to counter Parkinsonian oxidative stress without Levodopa support. These findings indicate that Levodopa, especially when administered alongside particular Pranic Healing colour frequencies, substantially decreases intracellular ROS levels compared to the diseased state, with the combination of Light Whitish Green and Light Whitish Violet demonstrating the most significant antioxidant impact.

DISCUSSION

Cell culture investigations of pranic healing, mainly using HeLa and HaCaT cell lines, suggest its non-cytotoxic characteristics and possible advantages in radiation protection and wound healing. In experiments conducted by Joie P. Jones,¹⁸ the application of pranic healing before, after, or both in conjunction with gamma radiation exposure enhanced HeLa cell survival rates from approximately 50% (radiation exposure only) to 70-90%. These effects were observed irrespective of distance and shielding, and

were validated across 70 trials by individual and group healers. *In vitro* examination of HaCaT keratinocytes, Jois⁴ observed that treatment with colored prana (such as light whitish red/violet, electric violet, and multi-color mixes) resulted in cell viability exceeding 88% using the MTT assay. Moreover, multi-color combinations achieved up to 96.69% wound closure within 48 hr and 100% closure within 72 hr in scratch assays, exceeding the performance of single-color treatments and comparable to insulin controls. The data underscore the biofield-mediated effects of pranic healing on cellular survival and migration.

This study assessed the neuroprotective impacts of levodopa (a dopamine precursor) treated with and without Pranic Healing (PH) colors, in the context of rotenone-induced neurotoxicity in SH-SY-5Y cells, assessing Neurotoxicity (MTT assay), Mitochondrial Membrane Potential (MMP), and intracellular oxidative stress (ROS levels). Neuroprotection was consistently enhanced, with differential results, in dopamine samples exposed to specific pH-indicated colorations. Light Whitish Green-Light Whitish Violet showed the greatest improvements in viability, and it substantially lowered cytotoxicity compared with both the disease and drug control groups. Ordinary Violet and White provided a moderate degree of protection, while Electric violet and Pranic Healing alone showed relatively modest advantages. The observed improvements were strongly correlated with declines in intracellular ROS, especially in Light Whitish Green-Light Whitish Violet, which suggests effective mitigation of oxidative stress. The parallel decrease in cytotoxicity and ROS supports the interpretation that antioxidant activity is a core mechanism underlying improved cell survival. Given that excess ROS production leads to mitochondrial damage and dopaminergic

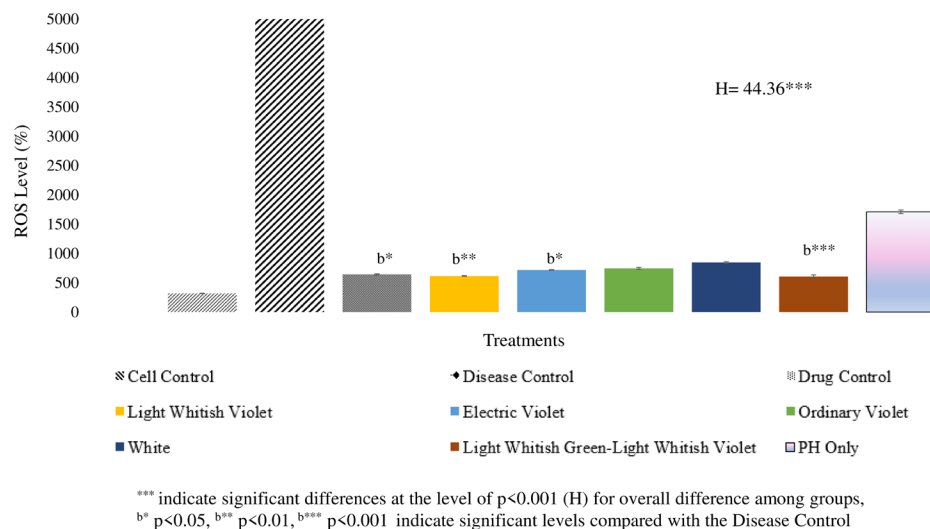


Figure 4: ROS (%) of Pranic Healing colours.

cell death in PD,¹⁹ the observed decrease in oxidative burden represents a valuable indicator of therapeutic potential.

Mitochondrial assessments further reinforced these findings. In PD models, disease controls exhibited substantial MMP collapse, a widely-accepted initial inducer of apoptosis. MMP was most effectively restored by Ordinary Violet and White, sometimes exceeding control values, which implies significant mitochondrial membrane stabilization. The enhancement of MMP was moderate with Light Whitish Green-Light Whitish Violet, corresponding to its high viability outcomes. In comparison, Electric violet showed deficient mitochondrial recovery, which correlated with its reduced viability and greater apoptotic burden. Pranic Healing alone partially restored MMP function, which indicates a supplementary neuroprotective effect. The combined improvements in MTT viability, ROS reduction, and MMP stabilization show that PH colour-charged dopamine has a varied neuroprotective impact. Synergistic benefits appear to be derived from combined or multispectral colour exposures, according to the strongest effects observed in Light Whitish Green-Light Whitish Violet, Ordinary Violet, White treatments. The results correspond to previous findings showing that PH color applications contribute to increased cellular repair and integrity. In accordance with evidence, biofield-based interventions can affect redox homeostasis, immune activity, and mitochondrial dynamics.²⁰ The findings suggest that PH-mediated colour modulation could interact with dopaminergic pathways via subtle electromagnetic or biofield effects, stabilizing mitochondrial function, enhancing antioxidant capacity, and diminishing apoptotic signalling. The observed effectiveness of green-violet and orange-violet combinations suggests that multispectral pranic energy may activate multiple protective cascades concurrently.

This investigation collectively furnishes the initial evidence in a rotenone-induced PD cell model, demonstrating that dopamine exposed to specific PH colours can significantly enhance neuroprotection by improving cell viability, mitigating oxidative stress, and stabilizing mitochondrial membrane potential. Even though these results are limited to *in vitro* conditions, the consistency of effects over various independent cellular endpoints suggests the translational potential of PH color modulation as a complementary neuroprotective strategy. Subsequent research should investigate the molecular mechanisms of mitochondrial proteins, antioxidant regulators, and apoptotic pathways, along with expanding the assessment to *in vivo* Parkinson's disease models to ascertain therapeutic significance. Further mechanistic studies and *in vivo* validation are warranted to elucidate the underlying biochemical pathways and to assess translational relevance.

CONCLUSION

This preliminary study suggests that levodopa, following exposure to specific Pranic Healing (PH) colours, may exert enhanced neuroprotective effects against rotenone-induced toxicity in SH-SY5Y cells. Improvements in cell viability, oxidative stress (ROS), and mitochondrial membrane potential (MMP) indicate potential antioxidant and mitochondrial-protective mechanisms. These findings warrant further mechanistic and *in vivo* investigations.

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ABBREVIATIONS

PD: Parkinson's Disease; **PH:** Pranik Healing; **MMP:** Mitochondrial Membrane Potential; **ROS:** Reactive Oxygen Species; **CAM:** Complementary and Alternative Medicine; **MTT:** Methyl Thiazolyldiphenyl Tetrazolium bromide; **LWV:** Light Whitish Violet; **EV:** Electric Violet; **OV:** Ordinary Violet; **W:** White; **LWG-LWV:** Light Whitish Green-Light and Whitish Violet; **NCCS:** National Centre for Cell Science; **PBS:** Phosphate-Buffered Saline; **DMSO:** Dimethyl Sulfoxide; **DMEM:** Dulbecco's Modified Eagle's Medium; **FBS:** Fetal Bovine Serum; **OD:** Optical Density; **Rh-123:** Rhodamine-123; **DCFH-DA:** 2,7-diacetyl dichlorofluorescein; **DCF:** Dichlorofluorescein; **SEM:** Standard Error of the Mean; **ANOVA:** Analysis of Variance; **COPD:** Chronic Obstructive Pulmonary Disease; **LUTS:** Lower Urinary Tract Symptoms.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

FUNDING

World Pranik Healing Foundation, India funded this study.

ETHICAL APPROVAL

The study received approval from the Institution Ethics Committee - World Pranik Healing Foundation, India.

SUMMARY

This study investigated the neuroprotective potential of dopamine treated with specific PH colours against rotenone-induced toxicity in SH-SY-5Y cells, an *in vitro* model of PD. Rotenone exposure caused significant cytotoxicity, oxidative stress, and Mitochondrial Membrane Potential (MMP) collapse. Levodopa alone provided moderate protection. Dopamine charged with Light Whitish Green-Light Whitish Violet, Ordinary Violet, and White showed markedly enhanced cell viability, reduced reactive oxygen species, and substantial restoration of MMP. Ordinary Violet and White provided moderate benefits, while Electric violet and PH alone had limited effects. The convergence of increased viability, decreased oxidative stress, and stabilized mitochondrial function implies that PH color modulation activates antioxidant and mitochondrial-protective pathways. These results present the initial indication that PH color-charged dopamine may offer multifaceted neuroprotection, emphasizing its potential as a supplementary approach that justifies further mechanistic and *in vivo* investigation.

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