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Case Report

Synergistic Therapeutic Effects of Ayurvedic Formulations and Nanomedicine in Chronic Obstructive Pulmonary Disease (COPD): A Case Study

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ABSTRACT

Chronic Obstructive Pulmonary Disease (COPD) represents a globally significant progressive respiratory disorder marked by persistent airflow limitation and debilitating respiratory symptoms. Conventional treatments often provide only symptomatic relief without altering disease progression. This case report explores an integrative approach combining classical *Ayurvedic* formulations with nanomedicine. A 69-year-old male patient with moderate COPD, presenting with chronic cough, dyspnea, appetite loss and abdominal distension, the case was managed at the *Panchakarma* OPD, Mahatma Gandhi *Ayurved* Hospital and Research Centre, Wardha, India, under the supervision of Dr. Punam Sawarkar. Despite previous conventional medication, his symptoms persisted. The therapeutic intervention includes classical ayurvedic formulations alongside Sukshma Vasa globules, a nanomedicine formulation. Following a 45-day treatment course, the patient showed significant improvement: cough and dyspnea reduced from severe/mild to mild/none, appetite improved, abdominal distension decreased and C-reactive protein levels normalized. No adverse effects were reported. This case underscores the promising potential of integrating traditional *Ayurveda* with nanomedicine to deliver safe and effective multi-target management for COPD, providing significant relief and improving patient well-being, warranting further clinical explorations.

Keywords: *Ayurveda*, *Sukshma Vasa* Globules, Nanomedicine.

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INTRODUCTION

Chronic Obstructive Pulmonary Disease (COPD) ranked as the fifth leading cause of death in high-income countries, contributing to 3.8% of all deaths. In low and middle-income countries, it was the sixth leading cause, responsible for 4.9% of total mortality (Mannino & Buist, 2007). In India, COPD is the second most prevalent lung disease after pulmonary tuberculosis, with a prevalence ranging from 6.5% to 7.7% (McKay *et al.*, 2012). Chronic Obstructive Pulmonary Disease (COPD) is characterized by inflammation and structural changes in the lower airways and lung tissue, along with the activation of inflammatory and immune responses. Current treatments often fail to halt disease progression or address many key features of COPD, which may be due to the absence of reliable biomarkers needed to identify the diverse clinical and molecular variations of the disease (Uwagboe *et al.*, 2022). Diagnosing COPD requires a thorough approach that includes evaluating symptoms, risk factors and conducting spirometry testing. The prevalence of COPD is often underestimated because many symptoms, like cough and dyspnea, are overlooked by patients until they become more severe and cannot be confirmed through objective lung function tests (Daniel *et al.*, 2021). This report presents a unique clinical case demonstrating a synergistic therapeutic approach for managing COPD by integrating classical *Ayurvedic* formulations with advanced nanomedicine. The rationale for this integrated strategy rests upon the premise that nanomedicine can significantly increase treatment effectiveness by improving the delivery and bioavailability of medicinal compounds at the cellular level, particularly beneficial for respiratory disorders.

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CASE DESCRIPTION

Patient information

A 69-year-old male patient presented to the *Panchakarma* Outpatient Department (OPD) at the Mahatma Gandhi *Ayurved* Hospital and Research Centre, Wardha, India with complaints

of an intermittent dry and wet cough and a persistent loss of appetite, symptoms that had been present for an extensive period of eight months. More recently, over the preceding month, the patient had developed associated acute complaints, including abdominal distension, palpitations and dyspnea occurring intermittently (on and off). Further complaints associated with the acute phase included generalized restlessness and disturbed sleep, also persisting for one month.

Past medical history

The patient had Ischemic Heart Disease (IHD) for 10 years. However, at the time of presentation, the patient was asymptomatic regarding IHD and was not taking any medications specifically related to that condition.

Relevant past interventions and their outcomes

The patient took doxiphylline, azithromycin, prednisolone and nebulization of ipratropium bromide and levosalbutamol. It is crucial to note that the patient reported that these conventional treatments failed to provide meaningful or sustained relief. The persistent failure of standard symptomatic relief measures strongly necessitated the exploration of an alternative, integrated treatment protocol.

Clinical findings

Upon initial clinical examination, the patient's vital signs were observed to be within normal established limits. Despite normal vital signs, the severity of the clinical manifestations was considerable. Based on standardized assessments, the patient's cough was graded as Severe (Irwin *et al.*, 2018). Abdominal distension and palpitations were classified as Moderate. The dyspnea was rated as Grade 1 (Mild) according to the American Thoracic Society (ATS) Scale. The overall impact of the condition on the patient's health status was evaluated using the COPD Assessment Test (CAT), which indicated Stage 2 (Moderate) COPD severity.

Diagnostic methodology

The confirmation of the final diagnosis of COPD required a meticulous approach utilizing objective clinical and imaging modalities, including spirometry, High-Resolution Computed Tomography (HRCT) and routine blood investigations.

Spirometry results were critical in objectively confirming the diagnosis and staging the disease, showing a predicted Forced Expiratory Volume in 1 sec (FEV_1) of 68%, a measurement consistent with Stage 2 (Moderate) COPD. Furthermore, laboratory assessment revealed an elevated C-Reactive Protein (CRP) level of 27.5 mg/dL. This elevated level served as an objective biomarker, indicating significant, underlying systemic inflammation, which is a key pathological component of COPD.

The HRCT imaging provided additional structural context, revealing small patchy consolidations, peribroncho-vascular nodular thickening and ground-glass attenuation present in the bilateral lower lobes, inferior lingula and middle lobe. These specific features were suggestive of an infective etiology contributing to the patient's current presentation. The imaging also noted a few enlarged lower paratracheal and right hilar lymph nodes, while confirming the absence of pleural effusion or pleural thickening on either side.

Before the objective confirmation using spirometry and HRCT, bronchitis or emphysema remained alternative possible diagnoses. The combined results established the final diagnosis as COPD.

The case was diagnosed and clerked by Dr. Punam Sawarkar, Professor and Head, Dept. of *Panchakarma*, MGACH & RC, who supervised diagnosis and treatment planning.

Diagnostic challenges

The initial presentation shared features with bronchitis and emphysema, which were ruled out post-spirometry and HRCT.

Timeline of Intervention and Outcomes

It emphasizes the sequence from symptom onset through intervention phases to final outcomes. This approach allows for a transparent assessment of therapeutic correlation and efficacy. Timeline of Clinical Presentation with Intervention and Outcomes explained in Table 1.

Therapeutic intervention

The therapeutic protocol was individualized and comprised a synergistic combination of classical internal *Ayurvedic* medications and a nanomedicine-based formulation. The strategic inclusion of diverse formulations aimed not only at the primary respiratory ailment but also at underlying systemic and digestive imbalances. Internal *Ayurvedic* medications, including *Sukshma Vasa* globules as a nanomedicine, *Dashamoola Katuthrayam Kashaya* for 45 days and *Hingwashtak Churna* and *Gandharva Haritaki Churna* for 1 month, were prescribed.

Administration of therapeutic intervention

Sukshma Vasa globules 5 globules thrice a day, *Dashamoola Katuthrayam Kashaya* 15 mL twice daily after food with warm water for 45 days. *Hingwashtak Churna* 5 gm before meal with warm water and *Gandharva Haritaki Churna* 10 gm at night after food with warm water given for 1 month. The therapeutic intervention remained rigorously consistent throughout the entire stipulated course of treatment, providing a stable basis for outcome evaluation.

Table 1: Timeline of Clinical Presentation, Intervention and Outcomes.

Date/Period	Event/Phase	Key Clinical Status	Diagnostic/Assessment Data
8 Months Prior (approx.)	Initial Symptom Onset (Chronic)	Intermittent dry/wet cough, appetite loss. History of IHD (10 years prior, now asymptomatic).	N/A
1 Month Prior (approx.)	Acute Exacerbation & Baseline Visit	Abdominal distension, palpitations, dyspnea (on/off), disturbed sleep. Failure of previous conventional treatment.	Initial presentation: ATS Grade 1 Dyspnea; CAT Stage 2 (Moderate). CRP: 27.5 mg/dL (Elevated).
Time 0 (Day 1)	Diagnosis Confirmed & Intervention Start	COPD Stage 2 confirmed. Initiation of personalized Ayurvedic protocol + Nanomedicine.	FEV_1 68%, HRCT findings noted (consolidation, nodular thickening).
Day 1 - Day 30	Treatment Phase 1 (1 Month)	Core pulmonary agents continued. Focused digestive support: *Hingwashtak Churna* and *Gandharva Haritaki Churna* administered.	Monitoring of digestive function, adherence and tolerability (strict adherence noted).
Day 30 - Day 45	Treatment Phase 2 (Continued Core Agents)	*Sukshma Vasa* Globules and *Dashamoola Katuthrayam Kashaya* continued for sustained pulmonary action.	Monitoring of respiratory function and overall well-being.
Post-Intervention (Follow-up)	Outcome Assessment	Significant symptomatic improvement, including resolution of digestive and respiratory distress. Everyday activities improved.	ATS Grade 0 (None); CAT Stage 1 (Mild). CRP: 4.32 mg/dL (Normal).

Follow-up and outcomes

The post-intervention evaluation confirmed a marked and sustained improvement across both objective and clinician- and patient-assessed outcomes.

Clinician- and patient-assessed outcomes

The patient's cough significantly improved, reducing from Severe to Mild. Appetite improved and abdominal distension and palpitations became milder. The American Thoracic Society (ATS) scale decreased from 1 (Mild) to 0 (None) and the COPD Assessment Test (CAT) score improved to Stage 1(Mild) following treatment.

Follow-up diagnostic and other test results

Following the intervention, the patient's everyday activities were evaluated through clinical follow-up and elevated C-Reactive Protein (CRP) became in the normal range (4.32mg/dL).

Intervention adherence and tolerability

The patient reported no adverse effects from the medication and adhered strictly to the treatment plan. Follow-up assessments confirmed good tolerability.

Adverse and unanticipated events

No adverse events occurred during the course of treatment.

DISCUSSION

Nanomedicine is designed to increase the effectiveness of treatment by improving medicine delivery to the body's cells. *Vasa* (*Adhatoda vasica*) is a well-known herb used to treat respiratory disorders and fevers; almost all *Ayurvedic* seers agree that it is important for respiratory ailments (Claeson *et al.*, 2000). *Sukshma Vasa* Globules is potent bronchodilator and mucus-clearing properties, targeting the respiratory symptoms of COPD effectively through enhanced delivery at the cellular level due to its nano size and micro-sized therapeutic particles that have immense potential in reducing both the frequency and severity of the cough, whether dry or wet and help clear the sticky mucus, leading to better respiratory function and less breathing difficulty. *Dashamoola Katuthrayam Kashaya* is *tridosha shamak* that shows anti-oxidant and anti-inflammatory effects, helps to reduce parenchymal inflammation and relax the muscle airways, also reduces abdominal distension and eases the discomfort from palpitations (Parekar *et al.*, 2015). *Hingwashtak churna* possesses *deepana* (digestive stimulation) and *pachana* (metabolism) properties therefore used in indigestion, flatulence and other conditions involving compromised digestive tract metabolism (Shirwaikar *et al.*, 2006). *Gandharva haritaki churna* promotes regular and easy stool removal without vitiating *vata*, which supports healthy bowel habits (Nair, Holla and Yoganarasimhan, 1988). Integrating nanomedicine into classical *ayurvedic* formulations can enhance their effectiveness, ensuring that the medicinal compounds are delivered more efficiently and significantly impact the management of COPD.

CONCLUSION

This case demonstrates the potential benefits of combining classical *Ayurvedic* formulations with nanomedicine in managing Chronic Obstructive Pulmonary Disease (COPD). *Sukshma Vasa* Globules significantly reduced cough frequency and severity, improving respiratory function and reducing mucus build-up. The patient's overall well-being improved with no adverse effects, suggesting that this collaborative approach is effective and safe for managing COPD symptoms. This approach may offer a promising alternative or adjunct to conventional treatments for COPD. Clinical studies with large sample sizes can be planned to embark on this conclusion.

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ABBREVIATIONS

COPD: Chronic Obstructive Pulmonary Disease; **OPD:** Outpatient Department; **IHD:** Ischemic Heart Disease; **ATS:** American Thoracic Society; **CAT:** COPD Assessment Test; **HRCT:** High-Resolution Computed Tomography; **FEV_1:** Forced Expiratory Volume in 1 sec; **CRP:** C-Reactive Protein; **MGACH & RC:** Mahatma Gandhi Ayurved College Hospital and Research Centre; **PG:** Post Graduate; **RH:** Running Head; **N/A:** Not Available.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

PATIENT PERSPECTIVE

"The *Ayurvedic* medicine, along with the nanomedicine, significantly reduced my symptoms, including the persistent cough, abdominal discomfort and difficulty breathing. I felt more energetic and my appetite get improved."

INFORMED CONSENT

The patient has consented to report the case with clinical information in the journal.

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None.

AUTHOR'S CONTRIBUTIONS

Every author evaluated the case report's final draft and helped with the patient's clinical management.

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