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Evaluation Of Health-Related Quality Of Life (QOL) Among Chronic Obstructive Pulmonary Disease Patients At A Tertiary Care Facility In Hyderabad City

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Abstract:
*The current study aimed to determine the health-related quality of life in Chronic Obstructive Pulmonary Disease (COPD) patients. The Quality of life (QOL) in 240 COPD patients was assessed by using the CAT (COPD Assessment Test) score know the impact of COPD on daily activities in life. Using SPSS software, the unpaired t test and Chi Square tests were used to compile and analyse the data. The CAT questionnaire showed that the results of therapy were based on COPD patients' symptoms. According to the results of the total therapeutic outcome measurement using CAT, approximately 70–75% of patients with COPD in the current study had a medium impact on daily life, as measured by the CAT score. Elderly patients aged between 61-70 years were reported to have CAT scores of (10-19) with a medium impact of COPD symptoms. With comorbidities such as Hypertension and diabetes, COPD patients showed a medium impact of COPD score with significant p values (***p = 0.0014 & **p = 0.0662), which showed to seek assistance of a pulmonologist. As smoking is a risk factor for COPD, CAT score was noted in smokers and non-smokers. It was identified that in both groups A & B, only 22 smokers were reported to have CAT score < 10 whereas 32 non-smokers possessed with same score with low impact of COPD symptoms and values were proven to be significant (***p <0.001, ***p <0.0217). Out of 120 patients in group B receiving triple therapy, 35 had a lesser impact of COPD as shown by their CAT score, but only 21 patients in group A had the same CAT score. The study demonstrated that triple-drug therapy was effective over the dual-drug therapy in terms of assessment of COPD by means of CAT score.*

Key Words: *Chronic obstructive pulmonary disease, Quality of life, CAT score, triple therapy, double therapy*

1. INTRODUCTION

Persistent respiratory symptoms and limited lung airflow are hallmarks of chronic obstructive pulmonary disease (COPD), characterized by coughing, dyspnoea, and the formation of phlegm, which gradually obstructs the airway and causes morbidity or death.[1,2] According to WHO data, COPD is predicted to be the third leading cause of death worldwide in 2021, with 64 million fatalities and significant pain experienced by individuals worldwide. The development of COPD involves intricate pathogenic mechanisms mainly focused on airway inflammation, oxidative stress, mitochondrial dysfunction, aging, and iron ion metabolism[2]. The normal course of COPD is marked by symptom aggravation and a decline in quality of life. The perceived quality of a person's everyday life, or an evaluation of their well-being—or lack thereof—is generally referred to as their quality of life (QoL or QOL). This covers every facet of the person's life—emotional, social, and physical. In the medical field, health-related quality of life, or HRQoL, is an evaluation of illness, disability, or dysfunction impacts a person's well-being over time. A key metric for assessing the effects of chronic illness is quality of life, or QOL. QOL in patients with COPD has been measured using both general and disease-specific tools[3].

Guidelines from the Global Initiative for Chronic Obstructive Lung Disease (GOLD) have established treatment objectives for patients with COPD. These objectives include enhancing exercise tolerance and emotional function (health-related quality of life) as well as crucial clinical objectives like halting the progression of the disease and reducing symptoms. COPD and other acute and chronic respiratory conditions are commonly linked to anxiety and depression. Depression is correlated with the severity of COPD and the level of functioning impairment, but anxiety may manifest earlier. The prognosis for

COPD is greatly impacted by both disorders. Unfortunately, people with COPD do not always receive the proper treatment since mental illnesses are not routinely assessed and identified in these patients. This raises healthcare and societal costs and has a detrimental impact on the patient's quality of life and the progression of the respiratory illness[4].

A self-reported questionnaire called the COPD Assessment Test (CAT) score is used to gauge the effect of COPD on a person's health and well-being. With scores ranging from 0 to 40, higher scores often indicate a stronger burden of COPD. The CAT score can be used to anticipate exacerbations, evaluate a patient's current state of symptoms, and direct treatment choices[4].

The FEV1 value of the pulmonary function test findings is still necessary to diagnose and measure the severity of COPD, but the COPD assessment test (CAT) is currently primarily used as a straightforward instrument to evaluate the impact of COPD, the patient's health condition, and therapy outcomes[5]. According to meta-analysis research, CAT has demonstrated its validity, responsiveness, and reliability as a tool for predicting exacerbations of COPD and assessing patients' health. The degree of drug success is intimately linked to and can positively correlate with the patient's health status[5]. Similar to the dyspnoea scale and lung function test, CAT is responsive to measuring therapeutic outcomes. It is a potentially helpful tool for evaluating how well treatment is working for exacerbations of COPD.

The Global Initiative of Chronic Obstructive Lung Disease (GOLD), which includes eight items pertaining to respiratory disorders—cough, phlegm, chest tightness, breathlessness, activity limitation at home, confidence in leaving home, sleep, and energy—is used to measure the therapeutic outcomes of patients with COPD using the CAT questionnaire [6,7]. The purpose of this study is to use the CAT questionnaire to evaluate the therapeutic outcomes at a tertiary care facility in Hyderabad. This work adds to earlier research that uses CAT to assess therapy effectiveness based on the data obtained in COPD patients.

The following eight questions are part of the CAT, each rated on a scale from 0 to 5, where 0 indicates no impact and 5 indicates a severe impact on daily life[8].

1. Cough: I never cough (0) – I cough all the time (5)
2. Phlegm (Mucus) in Chest: I have no phlegm (0) – My chest is completely full of phlegm (5)
3. Chest Tightness: My chest does not feel tight (0) – My chest feels very tight (5)
4. Breathlessness on Walking Up a Hill or Stairs: I am not breathless (0) – I am very breathless (5)
5. Activity Limitation at Home: I am not limited (0) – I am very limited (5)
6. Confidence in Leaving Home: I am confident (0) – I am not at all confident (5)
7. Sleep Quality: I sleep soundly (0) – I do not sleep well because of my condition (5)
8. Energy Levels: I have lots of energy (0) – I have no energy at all (5)

Interpreting the CAT Score:

- **Low Impact (0-9):** Implies that the effects of COPD on day-to-day living are really minor. People in this range might be seen as healthy or as having little symptoms.
- **Medium Impact (10-20):** Shows that COPD has a discernible effect on day-to-day activities and health. Interventions such as pulmonary rehabilitation or extra medication may be necessary for this range.
- **High Impact (21-30):** Implies that COPD has a substantial impact and may call for more intense care, including referrals to pulmonary experts.
- **Very High Impact (31-40):** Shows that the effects of COPD whether significant and may call for specialist treatment and measures.

The present research prospected the assessment of COPD with the aid of CAT score in COPD patients in a tertiary care hospital.

2. METHODOLOGY

Study area, period and design:

The study, which was carried out in a Tertiary care hospital, Hyderabad was observational and retrospective. It took place between January and June of 2023, a period of six months.

Determination of sample size:
A number of 240 participants with Chronic Obstructive Pulmonary Disease (COPD) were included in the trial; they were split equally into two groups of 120 participants each. Patients in Group A (n = 120) received dual therapy for COPD, while patients in Group B (n = 120) received triple therapy.

Study criteria

Inclusion criteria
Male and female patients aged 18 and older with a diagnosis of COPD who had been prescribed either dual or triple medication therapy throughout a predetermined time frame were included in the trial.

Exclusion criteria:
The study excluded patients with other respiratory conditions, paediatric, pregnant and breast-feeding mothers.

This study examined the relationship between the severity of COPD and the quality of life (QOL) of those who had the condition. This research was done observationally with a cross-sectional study design to assess the therapy outcomes of patients with COPD using the CAT questionnaire. Research consent in the form of Ethical Clearance was obtained from the Ethics Committee of Medicover Hospitals bearing reference number of MH/IEC/2025/March/10 in 2025.

Statistical Analysis:
IBM SPSS Statistic for Windows, version 24 (IBM Corp., Armonk, N.Y., USA) was used to calculate the frequency, percentage, mean, standard deviation, and probability value after the gathered data was loaded into a Microsoft Excel worksheet. The data was analysed using the Chi Square and Unpaired Tests. A statistically significant p-value was defined as less than 0.001.

Ethics approval and consent to participate:
Medicover Hospitals provided ethical approval (No. EC 21073-18). The recruitment of participants was voluntary. Every participant was fully informed about the study methodology, the survey's goal, and any possible dangers on the day of data collection. Before the interview began, consent forms were given to the participants to sign. The study's procedures were carried out in compliance with the applicable rules and regulations as well as the 2000 revision of the 1975 Declaration of Helsinki[9].

3. RESULTS

A total of 240 outpatients participated in this study, with a higher proportion of men than women. The COPD patients in this study were mostly smokers who had the disease for longer than four years.

Table 1a: CAT score in subjects of Group A suffering with COPD

Gender	Group A n (%)	CAT Score			
		(<10)	(10-19)	(20-30)	(>30)
Male	76 (63.33)	12 (15.7)	62 (81.5)	2 (2.2)	0
Female	44 (36.67)	16 (36.4)	28 (63.63)	0	0
		df = 3; $^{ns}p = 0.0962$; alpha <0.05; Chi-square = 6.339			

The data was subjected to statistical analysis using suitable tests. $^{ns}p = 0.0962$; ns=non-significant.

Table 1b: CAT score in subjects of Group B suffering with COPD

Gender	Group B n (%)	CAT Score			
		(<10)	(10-19)	(20-30)	(>30)
Male	85 (70.83)	23 (27)	60 (70.5)	2 (2.5)	0
Female	35 (29.17)	11 (31.4)	24 (68.6)	0	0
		df = 3; $^{ns}p = 0.9040$; alpha <0.05; Chi-square = 0.5668			

The data was subjected to statistical analysis using suitable tests. $^{ns}p = 0.9040$; ns=non-significant

In the Tables 1a and 1b, the CAT score was determined from the total number of patients in both groups – A & B. The number of patients was 120 in each group, when the CAT score was determined it was

observed that a total of 62 patients (Group A & B) experienced a low impact of COPD in their daily lives. However, a total number of 174 patients had a medium impact and might need extra medication as a part of the intervention. A number of 4 patients in total had a high impact who needed intense care from specialists in pulmonology. In the statistical analysis, it was noted that there was no significant difference ($p = 0.0962$; $p = 0.9040$) between the scores in both groups.

Table 2a: CAT score in gender wise distribution of subjects in Group A suffering with COPD

The data was subjected to statistical analysis using suitable tests. $^{ns}p = 0.884$; ns=non-significant

Age Groups (years)	Group A n (%)	CAT Score			
		(<10)	(10-19)	(20-30)	(>30)
41 to 50	30 (25%)	5 (25%)	24 (26%)	1 (50%)	0
51 to 60	34 (28.33%)	5 (25%)	28 (28%)	1 (50%)	0
61 to 70	42 (35%)	6 (40%)	36 (36%)	0	0
71 to 80	8 (6.66%)	1 (5%)	7 (6%)	0	0
81 to 90	6 (5%)	1 (5%)	5 (4%)	0	0
		df = 8; $^{ns}p = 0.884$; alpha <0.05; Chi-square = 3.678			

Table 2b: CAT score in gender wise distribution of subjects in Group B suffering with COPD

Age Groups (years)	Group B n (%)	CAT Score			
		(<10)	(10-19)	(20-30)	(>30)
41 to 50	32 (26.67%)	10 (24 %)	21 (26 %)	1 (50 %)	0
51 to 60	38 (31.67%)	15 (22 %)	22 (28 %)	1 (50 %)	0
61 to 70	40 (33.33%)	17 (42.5 %)	23 (57.5 %)	0	0
71 to 80	6 (5%)	2 (40 %)	4 (60 %)	0	0
81 to 90	4 (3.33%)	1 (25 %)	3 (75 %)	0	0
		df = 8; $^{ns}p = 0.552$; alpha <0.05; Chi-square = 6.857			

The data was subjected to statistical analysis using suitable tests. $^{ns}p = 0.552$; ns=non-significant

Tables 2a and 2b explored the CAT score in gender wise distribution of subjects in Group A and B suffering from COPD. In group A, patients between 41-60 years of age were 10 in number with <10 CAT score while, 52 patients were experienced with (10-19) score, exhibited no significant difference statistically ($p = 0.884$). In the same way, group B showed 25 patients showed the low impact of COPD, whereas 43 patients were reported to have the medium impact of COPD as evidenced with the CAT score, and the p value was found to be 0.884 without any significant difference.

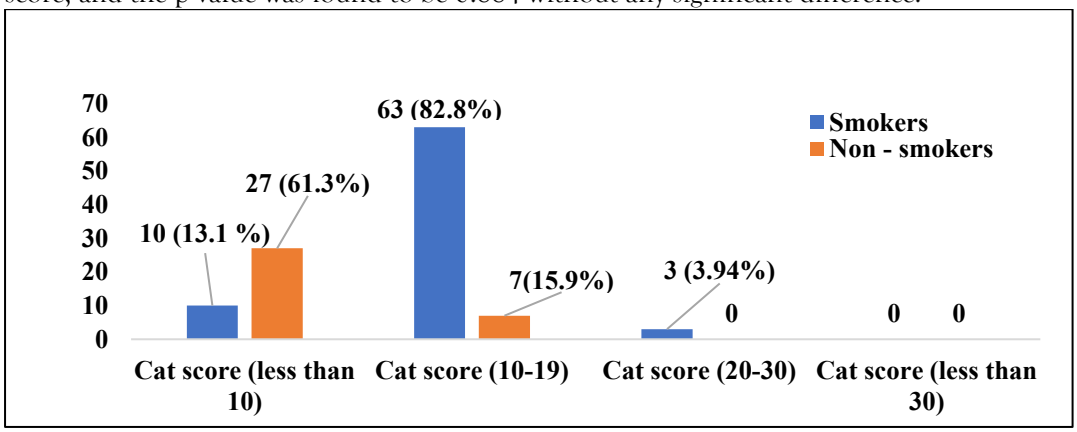

Figure 1: CAT Score in male subjects (Group A) basing on percentage of smokers and non-smokers

The data was subjected to statistical analysis using suitable tests. df = 6; ***p < 0.001; alpha <0.05; Chi-square = 58.29

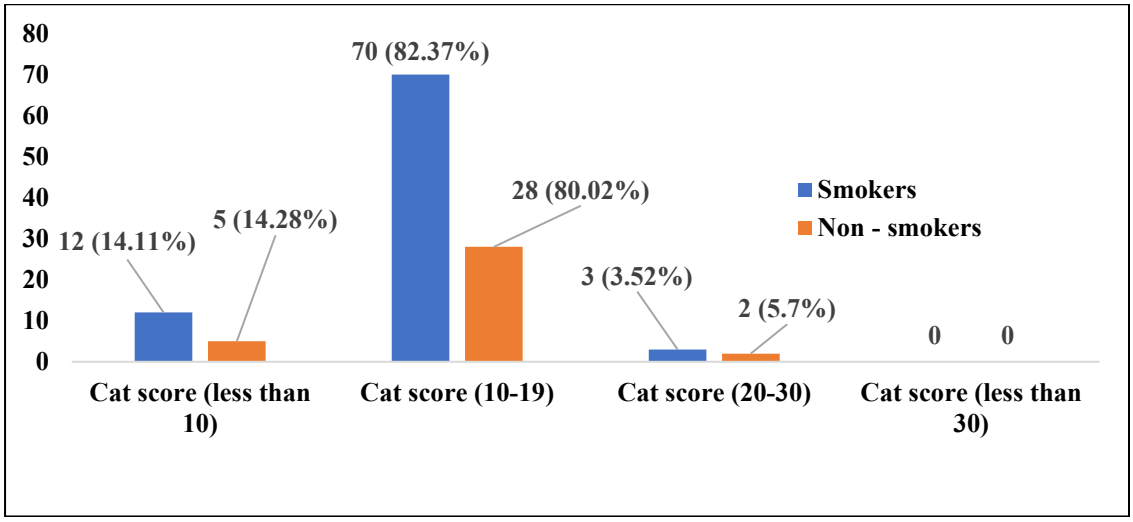

Figure 2: CAT Score in male subjects (Group B) basing on percentage of smokers and non-smokers

The data was subjected to statistical analysis using suitable tests. df = 6; ***p < 0.0217; alpha <0.05; Chi-square = 14.82

In the current research, Figures 1 & 2 explored the impact of COPD in smokers and non-smokers using of CAT scores in both groups A & B. The effect of smoking was shown in the 133 smokers with medium impact (10-19) of disease in both the groups while the non-smokers were only 35 with the same impact (10-19). The COPD impact was <10 in 22 smokers while the same was 32 in non-smokers. All the values were found to be statistically significant in both groups A and B (***p < 0.001 and ***p < 0.0217).

Table 3a: CAT score in Group A subjects based on comorbidities in COPD

The data was subjected to statistical analysis using suitable tests. ***p = 0.0014 showed significance.

Comorbidities	Group A n (%)	CAT score			
		(<10)	(10-19)	(20-30)	(>30)
Hypertension	84 (70)	20 (23.8)	62 (73.8)	2 (2.4)	0
Heart disease	48 (40)	12 (25)	36 (75)	0	0
Diabetes	72 (60)	14 (19.5)	58 (80.5)	0	0
Pneumonia	30 (25)	6 (20)	22 (73.33)	2 (6.67)	0
GIT related disorders	12 (10)	10 (83.33)	2 (16.67)	0	0
		df = 8; ***p = 0.0014; alpha <0.05; Chi-square = 25.19			

Table 3b: CAT score in Group B subjects based on comorbidities in COPD

Comorbidities	Group A n (%)	Cat score			
		(<10)	(10-19)	(20-30)	(>30)
Hypertension	92 (76.7)	26 (28.2)	64 (69.5)	2 (2.3)	0
Heart disease	54 (45)	13 (24)	41(76)	0	0
Diabetes	68 (56.6)	14 (20.5)	54 (79.5)	0	0
Pneumonia	36 (30)	12 (33.3)	22 (66.7)	2	0
GIT related disorders	16 (13.3)	10 (62.5)	6 (37.5)	0	0

		df = 8; p = **0.0662; alpha <0.05; Chi-square = 14.5

The data was subjected to statistical analysis using suitable tests. ***p = **0.0662 showed significance.

In the present study, when the commodities in groups A and B were assessed by CAT score (Table 3a & 3b), it was found that in both the groups, the hypertensive patients followed by diabetic patients were found to have a medium impact based on the CAT score (10-19), with 126 in number. Other diseases like heart disease, pneumonia and GIT related disorders were found to have the next place in assessing the severity of COPD impact on human life by CAT scores. P values were proven (***p = 0.0014 & **p = 0.0662) to be statistically significant.

Table 4: CAT score in Group A & B subjects based on type of therapy for COPD

Double therapy (Group A) Male - 76 Female - 44 Total - 120				**Triple therapy (Group B)** Male - 85 Female - 35 Total - 120			
CAT Score				**CAT Score**			
(<10)	**(10-19)**	**(20-30)**	**(>30)**	**(<10)**	**(10-19)**	**(20-30)**	**(>30)**
21 (17.5)	97 (80.3)	2 (2.2)	0	35 (29.1)	83(69.1)	2 (1.8)	0
df = 2; ***p = 0.0108; alpha <0.05; Chi-square = 4.589							

The data was subjected to statistical analysis using suitable tests. ***p = 0.0108 showed significance.
In the present study, groups A and B were given two types of therapies (Table 4) – Double therapy for Group A patients and Triple therapy in Group B respectively. The impact of COPD was determined by a CAT score assessment. In group A, patients who were treated with double therapy were subjected to CAT score assessment and was found that 21 patients had a low impact of COPD followed by 97 patients with medium impact. In triple therapy patients, 35 scored <10 CAT score followed by 83 patients with (10-19), which exhibited an improvement in the quality of life of the patients suffering from COPD as compared to the double therapy, also proved by the statistically significant p value (0.0108).

4. DISCUSSION

Airflow restriction that is not entirely reversible is a hallmark of chronic obstructive pulmonary disease (COPD). Improving the quality of life (QOL) is a primary focal area for care of this incurable condition. The QOL of COPD patients and the variables influencing it are evaluated in this study.[10]
For individuals with COPD, quality of life (QOL) is the primary issue. Patients' quality of life is influenced by number of factors, such as the pathophysiology of COPD based on their characteristics, socioeconomic status, and family support. In addition to the symptoms and restricted access to healthcare caused by the pathophysiology of COPD, the majority of patients also experience poor quality of life. More significantly, the majority of the research has been carried out in a hospital environment. This might be fine in rich countries where people are aware and seek medical attention, but it becomes crucial in developing nations like India where people seek medical attention in bad ways.[11,12] Patients with COPD who exhibit few or no symptoms in the early stages may not seek treatment in hospitals and may be overlooked there, which could ultimately lead to a worse quality of life. In recent years, primary care has increasingly replaced hospitals in the treatment of people with COPD.[13]
Lung function tests, which are typically unavailable, cannot be used to evaluate the exacerbation state and severity level of COPD patients in a few of the studies conducted so far.[14] As a result, CAT results will be a good substitute for lung function testing, particularly for those who cannot afford it.[15] Subjectivity data regarding respondents' symptoms is used to quantify the severity level in this study using GOLD. This

study's strength is the application of a straightforward measurement tool that has been thoroughly validated and particularly evaluates illness symptoms based on the research criteria. Because there aren't many questions, respondents are more likely to concentrate on completing the questionnaire in order to prevent bias.[16] Additionally, CAT can clearly show how the health state of COPD patients has changed after around four weeks of drug therapy.

A verified and standardized questionnaire called CAT is used to track the results of therapy. Through question items such as cough, phlegm, chest tightness, dyspnoea when climbing stairs or hills, activity limits at home, confidence leaving the house, sleep, and energy, CAT results demonstrate the improvement in patient's health state.[17,18]

A known risk factor for the development of COPD is advanced age. In the present study, patients with COPD with age between 61-70 years had a CAT score (10-19) with a medium impact of disease. This might be because of mitochondrial dysfunction, loss of proteostasis, telomere attrition, epigenetic changes, genomic instability, and dysregulated nutrient sensing[19]. Smoking is known to be the primary cause of chronic obstructive pulmonary disease (COPD), which is quickly turning into a global public health emergency. Quitting smoking is the best treatment for COPD that is currently available. [20] In the present study, smokers were occupied with a CAT score (10-19) which showed that the impact of COPD was medium in almost 55% of the total patients from groups A & B and the statistics were proved to be significant.

Despite being separate illnesses, hypertension and COPD are closely related, especially because COPD can result in pulmonary hypertension, or elevated blood pressure in the lungs. Patients with COPD are also more likely to experience cardiovascular problems, such as hypertension.[21] The present study explored the comorbid conditions related to COPD and it was found that more than 50% of the patients whose CAT score was (10-19) were associated with hypertension first. Similarly, the second comorbidity was diabetes (45%), followed by heart diseases, pneumonia and GIT related diseases.

To enhance lung function and lessen exacerbations, inhaled triple therapy for COPD uses an inhaled corticosteroid (ICS), a long-acting beta-agonist (LABA), and a long-acting muscarinic antagonist (LAMA). A common first step in treatment is dual therapy, which combines two of them, usually a LABA and a LAMA. For patients, triple therapy is typically explored.[22] In the present study, the patients were grouped A and B based on the treatment with double and triple therapy. Group B patients who were on triple therapy were 120 in number, out of which 35 had with lower impact of COPD as noticeable with a CAT score, 10 while only 21 patients had with same CAT score in group A. In the present study, the triple therapy improved the quality of life in a patient and the impact of COPD in daily life was mild and day-to-day activities were not disturbed. It was predicted that CAT would distinguish patients according to the severity of their illness, have a strong relationship with clinical and health status indicators (reliability), and be able to identify changes in quality of life over time as a result of the disease (responsiveness).

5. CONCLUSION:

The responders to this study appear to have less impact on COPD according to the indices evaluated, as evident from the CAT scores. For patients undergoing dual inhaler therapy who experience recurrent exacerbations of their COPD, current practice recommends triple therapy. The present observational study emphasized the effectiveness of triple therapy over double therapy by means of CAT score in both groups. The GOLD recommendations, however, are hesitant to suggest triple therapy because additional research is required to support its safety and effectiveness in comparison to dual therapy of ICS/LABA or LABA/LAMA. Additionally, there is growing evidence that this type of therapy may potentially be linked to lower death rates; however, larger and longer-term studies are need to fully investigate this. We think that triple therapy's advantages for COPD outcomes in this high-risk population likely exceed its disadvantages, despite indications that it may potentially be linked to an increased risk of pneumonia.

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Author contributions:

S.A. made the conceptual design and analysis, writing of the article and final approval of the article was made by K.P.D.

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