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"Influence Of Exposure To Petrol And Diesel Vapours On Respiratory Health In Petrol Pump Workers Of Nashik – A Pilot Study."

[1]Dr. Simran Sanjay Rele, [2] Dr. Vaibhav Mahajan,

[1]Intern, Motiwala College of Physiotherapy Nashik, [2] Principal/Professor, Motiwala College of Physiotherapy Nashik

[1] Motiwala College of Physiotherapy Nashik, Maharashtra,India

Abstract **Background & Purpose:** Occupational exposure to petrol and diesel vapours rich in volatile organic compounds (BTEX) poses a significant risk to respiratory health among petrol pump workers, particularly in urban settings with high vehicular emissions. The study aimed to evaluate the impact of chronic fuel vapour exposure on respiratory function in petrol pump workers using simple bedside measures—Single Breath Count (SBC) and Breath Holding Time (BHT). **Methodology:** This observational pilot study included 25 petrol pump workers (21–50 years) with ≥2 years of exposure and >6 working hours/day. Respiratory function was assessed using SBC and BHT, with the best of three trials recorded. Statistical analysis included descriptive measures and Spearman's correlation to examine associations between occupational variables and respiratory outcomes. **Results:** Mean BHT (30.29 ± 12.85 seconds) was markedly below normative values, with 84% of participants demonstrating reduced respiratory endurance. Mean SBC (16.52 ± 4.39 counts) was also below expected thresholds in 76% of subjects. A significant negative correlation was observed between BHT and perceived exertion ($\rho = -0.570$, $p < 0.01$), while work experience showed a moderate positive correlation with BHT ($\rho = 0.446$, $p < 0.05$). **Conclusion:** Chronic occupational exposure to petrol and diesel vapours is associated with measurable subclinical impairment in respiratory function. SBC and BHT serve as practical, low-cost screening tools for early detection in resource-limited settings. Implementation of routine screening and occupational safety measures is strongly recommended.

Keywords:

Petrol Pump Workers, BTEX Exposure, Respiratory Function, Single Breath Count, Breath Holding Time, Occupational Health

I. INTRODUCTION

About 1.3 billion urban residents in the whole world are exposed to air pollution level above the recommended levels almost every day. Air quality in the developed countries has generally improved in the past two decades, but in many un-developed countries, the air quality has further worsened. Epidemiological studies have shown that a sudden rise in air pollution has been directly associated with immediate rise in morbidity and mortality rates.

Noxious and harmful substances can be directly inhaled into the respiratory tract in either molecular form (gases and vapours) or particulate form, through airborne delivery. Substances with high solubility are primarily dissolved in the secretions lining the upper respiratory tract, while those with lower solubility can penetrate deeper into the lungs, reaching the gas-exchanging tissues where they can cause life-threatening effects.[1]

Air pollution from vehicles is an inevitable aspect of urban life in cities like Nashik. Petrol pump workers are continuously exposed to a range of substances found in petrol. Workers exposed to petrol and diesel fumes exhibit various clinical signs and symptoms, which may be linked to benzene toxicity. Prolonged exposure can lead to direct or indirect harmful effects on respiratory function.[2]

Fast urbanization has resulted in a tremendous rise in the number of transportation vehicles, thereby causing increased in the demand of petrol and diesel. This increase in need of petrol and diesel has caused a steady rise in the number of petrol pumps in the county. The increasing number of vehicles has intensely increased the level of air pollution in the surrounding areas.[3]

Diesel exhaust contains various components, including carbon monoxide, nitrogen oxides, sulphur oxides, hydrocarbons, unburned carbon particles (soot), and water. It is believed that emissions from diesel engines contribute to over 50% of ambient particulate matter with a mass median aerodynamic diameter smaller than 10 micrometres (PM10), significantly adding to overall air pollution.[1]

Petrol is a complex blend of hydrocarbons, with 95% consisting of aliphatic and acyclic compounds, and less than 2% made up of aromatic compounds. These petroleum products, including petrol and diesel, contain various organic compounds such as benzene, toluene, ethylbenzene, and xylene (BTEX compounds). Benzene, in particular, is a key active compound in petrol and is primarily responsible for the physiological dysfunctions observed in the respiratory, haematological, and thyroid systems of petrol pump workers. These workers are exposed to BTEX compounds through various routes, including inhalation, ingestion, and dermal contact, with inhalation being the primary mode of exposure. Prolonged exposure to petroleum vapours can lead to bronchoconstriction.[4]

Petrol pump workers (filling attendants) are continually exposed to both organic and inorganic substances found in petrol. Exposure to volatile fuel compounds and vehicle exhaust from road traffic increases the risk of chronic lung diseases and cancer. The presence of tobacco uses and smoking further exacerbates these risks. On average, these workers are exposed for more than 10 hours a day.[5] A multitude of epidemiological studies have shown declines in lung function and various health issues linked to prolonged exposure to air pollution.[6]Numerous tools are available to assess the lung functions of petrol pump workers, Spirometry is one of them. It is an essential and benchmark tool for evaluating an individual's lung function. It measures the amount of air an individual inhales and exhales within a specific period of time.[7]

Spirometry is instrumental in diagnosing both obstructive and restrictive airway diseases. It quantifies the extent of impairment or severity, assesses prognosis and surgical risks, evaluates health status before entering a rehabilitation program, monitors the effects of different environmental exposures, and examines the impact of drugs and treatments on lung function.[8] However, spirometry requires costly

equipment and a skilled technician to operate it, which may not be available in emergency departments or during large-scale screenings and mass casualty situations. Therefore, simpler, more cost-effective alternatives to spirometry have been developed for use in these scenarios. These alternative bedside assessment tools are cost-effective, easy to teach and learn, simple to administer, and produce consistent results.[9] They include the Peak expiratory flow rate, breath holding time test and single breath count among many others. Peak expiratory flow rate (PEFR) is the maximal expiratory flow that is performed after a maximal inhalation. It is sustained for at least 10 milliseconds of exhalation and is measured using a simple, portable hand-held flow gauge device called the peak flow meter. Since PEFR, require any tool with a mouthpiece which could be of concern due to contamination of equipment and be a possible source of spread of infection amongst individuals we have excluded PEFR from this study.[10]

A study was done to confirm that the Single breath count (SBC) is a reasonable alternative to PEFR. Like PEFR, SBC doesn't rely on any special breathing techniques or equipment, it could potentially be more reliable than PEFR for certain patients.[11]

SBC may be a reproducible, rapid, easy to perform and easy to interpret substitute to PEFR especially in low resource settings for certain conditions hence SBC was chosen for this study.[12]

Breath holding time refers to the duration a person can voluntarily hold their breath. During this period, the body's tissues continue to use oxygen and produce carbon dioxide. As a result, the arterial oxygen pressure (pO2) decreases while the carbon dioxide pressure (pCO2) increases. These changes stimulate the respiratory system, and eventually, the urge to breathe becomes overwhelming, forcing the person to resume breathing. Normal Breath holding time (BHT) is 45-55 seconds.[13]

This study is done to access the lung functions of the petrol pump workers using Single breath count test (SBCT) and Breath holding test (BHT) and to understand the impact of petrol and diesel vapours on lung function, it is essential to first examine the anatomy of the respiratory system. The human respiratory tract is divided into two main zones: Conducting Zone: Includes the nose, pharynx, larynx, trachea, bronchi, and bronchioles. This zone is responsible for filtering, warming, and humidifying the air before it reaches the lungs. Respiratory Zone: Comprises the alveolar ducts, alveolar sacs, and alveoli. This is where gas exchange occurs—oxygen enters the bloodstream, and carbon dioxide is expelled.

The alveoli are lined with a thin layer of epithelial cells and surrounded by capillaries. They are highly sensitive to airborne pollutants due to their direct exposure to inhaled substances and their role in gas exchange.

When petrol pump workers inhale fumes, the toxic compounds bypass the upper respiratory defences and penetrate deep into the lungs. The pathological changes that occur include:

Inflammation of Airways: VOCs like benzene and toluene trigger inflammatory responses in the bronchial epithelium, leading to swelling, increased mucus production, and narrowing of airways.

Oxidative Stress: Diesel exhaust particles contain reactive oxygen species (ROS) that induce oxidative damage to lung tissues, impairing cellular function and promoting fibrosis.

Bronchoconstriction: Benzene exposure has been shown to cause constriction of bronchial muscles, reducing airflow and contributing to obstructive patterns in pulmonary function tests.

Alveolar Damage: Prolonged exposure to particulate matter (PM10) from diesel exhaust can damage alveolar walls, reducing the surface area available for gas exchange and leading to restrictive lung disease.

Impaired Ciliary Function: The cilia lining the respiratory tract become less effective at clearing mucus and pathogens, increasing susceptibility to infections.

These changes can manifest clinically as chronic cough, wheezing, breathlessness, and reduced exercise

tolerance. Over time, they may progress to chronic obstructive pulmonary disease (COPD), asthma, or even pulmonary fibrosis.

Petrol pump workers typically work shifts exceeding 10 hours a day, often without adequate protective equipment. Their exposure is not limited to fuel vapours alone; they also inhale exhaust from vehicles, which contains carbon monoxide, nitrogen oxides, sulphur oxides, and unburned hydrocarbons. The cumulative effect of these exposures leads to a measurable decline in lung function, as demonstrated by multiple epidemiological studies.

Studies conducted across various regions in India have consistently shown that petrol pump workers exhibit significantly lower values in pulmonary function tests (PFTs) compared to age-matched controls. Parameters such as Forced Vital Capacity (FVC), Forced Expiratory Volume in 1 second (FEV1), and Peak Expiratory Flow Rate (PEFR) are often reduced, indicating both obstructive and restrictive patterns of lung impairment.

While spirometry remains the gold standard for assessing lung function, it requires expensive equipment and trained personnel. In resource-limited settings, simpler bedside tools such as the Single Breath Count Test (SBCT) and Breath Holding Test (BHT) offer practical alternatives.

Single Breath Count Test (SBCT): This test involves taking a deep breath and counting aloud at a fixed rhythm until the breath runs out. It reflects the subject's ability to sustain phonation and indirectly assesses pulmonary capacity.

Breath Holding Test (BHT): Measures the duration a person can voluntarily hold their breath after maximal inspiration. It provides insights into the oxygen reserve and respiratory drive.

These tests are particularly useful in field studies and emergency settings where spirometry is not feasible. They are easy to administer, cost-effective, and provide reproducible results.

Relevance of Single Breath Count and Breath Holding Tests.

The Single Breath Count Test (SBCT) and Breath Holding Test (BHT) offer practical alternatives to spirometry.

These tests are: Non-invasive, Easy to administer, require minimal equipment, Suitable for mass screening and Effective in detecting early respiratory compromise

SBCT reflects the ability to sustain phonation and indirectly assesses pulmonary capacity. BHT measures the duration of voluntary breath-holding, which correlates with oxygen reserve and respiratory drive. Both tests have shown promise in previous studies as reliable indicators of lung function, especially in emergency and low-resource settings.

AIMS & OBJECTIVES

Aim:

The aim of the study is to Assess Influence of exposure to Petrol and Diesel vapours on Respiratory health in Petrol Pump Workers of Nashik.

Objective:

To assess the lung function in petrol pump workers using Single breath count and Breath hold test – A Pilot Study.

Primary Objective

To assess the impact of occupational exposure to petrol and diesel vapours on the respiratory health of petrol pump workers in Nashik using non-invasive lung function tests—namely, the Single Breath Count Test (SBCT) and Breath Holding Test (BHT).

Secondary Objectives

1. To evaluate the relationship between duration of work experience and respiratory function parameters (SBCT and BHT).
2. To analyse the association between rate of perceived exertion (RPE) and lung function outcomes.
3. To determine whether gender, age, and shift duration influence respiratory performance among petrol pump workers.
4. To explore the feasibility and reliability of SBCT and BHT as screening tools for early detection of respiratory compromise in occupational settings

MATERIALS AND METHODOLOGY

This observational study was conducted over a period of six months among petrol pump workers in Nashik, with a purposive sampling technique yielding a sample size of 25 participants. The gender distribution was random, ensuring representation across the workforce. The primary research question focused on identifying changes in respiratory parameters, specifically the values of the Single Breath Count and Breath Holding Test, in individuals exposed to petrol fumes. To carry out these assessments, a range of materials and instruments were employed, including a BP apparatus for monitoring blood pressure, a pulse oximeter for oxygen saturation, a nose clip to standardize breathing during tests, a stopwatch for precise timing, and the Metronome Beats® iOS application to regulate rhythm during the procedures. These tools facilitated the systematic administration of the two respiratory tests—Single Breath Count and Breath Holding Test—ensuring accuracy and consistency in data collection across the study population.

PROCEDURE

Ethical clearance for the study was obtained from the Institutional Ethical Committee, followed by formal site permission from the manager of the selected petrol pumps in Nashik. Participants were briefed thoroughly about the study's purpose, potential risks, and benefits, with information provided in the local language to ensure clarity. Written informed consent was secured prior to participation. Eligible participants were recruited using purposive sampling after applying inclusion and exclusion criteria. Before testing, both the Single Breath Count Test (SBCT) and Breath Holding Test (BHT) were explained and demonstrated, with participants placed in a comfortable position to minimize variability.

For the SBCT, participants stood upright, inhaled deeply, and counted serial numbers aloud at a normal speaking pace, synchronized with the Metronome Beats® iOS application (v6.8.1) set at two counts per second. Three readings were recorded, with the best value selected for analysis, and a washout period of 1–2 minutes was provided between trials to prevent fatigue. In the BHT, participants exhaled fully, inhaled maximally, and held their breath while occluding the nose with a clip. The duration of breath-holding was measured using a stopwatch, and values were compared against normative SBCT and BHT standards. All differences were systematically documented for subsequent analysis.

DATA ANALYSIS

Data analysis was performed using Jamovi software (version XX). Descriptive statistics (mean, SD, median, minimum, maximum) were calculated for demographic and respiratory variables, including age, work experience, rate of perceived exertion (RPE), breath holding time (BHT), and single breath count (SBC). Normality was assessed using the Shapiro–Wilk test, which showed age, work experience, and BHT as normally distributed ($p > 0.05$), while SBC and RPE deviated significantly ($p < 0.05$). Accordingly, parametric tests were applied to normally distributed variables and non-parametric tests to others. Inferential analysis used Spearman's rank correlation to examine associations. A moderate positive correlation was found between work experience and BHT ($\rho = 0.446$, $p = 0.025$), while RPE showed a significant negative correlation with BHT ($\rho = -0.570$, $p = 0.003$). No significant correlations were observed between work experience and SBC or between RPE and SBC. Results were summarized in tables and graphs (Tables 1–5), with significance set at $\alpha = 0.0$

RESULT

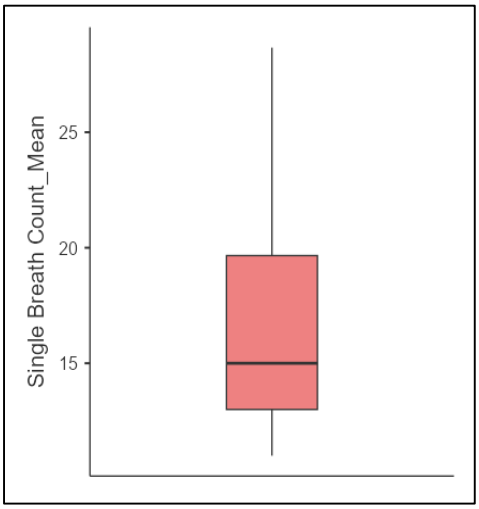
Table no 1. Descriptive Statistics of Participants (N=25)

Variable	Mean ± SD	Median	Minimum	Maximum
Age (years)	39.32 ± 10.00	41	21	53
Duration of Work Experience (years)	12.9 ± 8.42	10	2	30
Hours of Shift (per day)	8.0 ± 0.0	8	8	8
Rate of Perceived Exertion	1.12 ± 0.73	1	0	2
Breath Holding Time (sec)	30.29 ± 12.85	24.4	12.7	58.7
Single Breath Count (counts)	16.52 ± 4.39	15	11	28.7

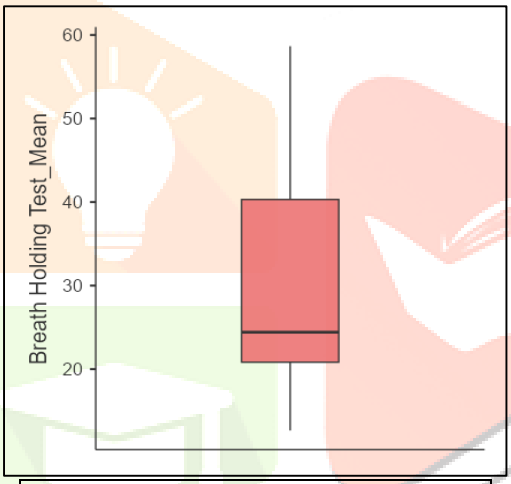
Table no1 summarizes the descriptive characteristics of the study participants (N = 25). The mean age of the participants was 39.32 ± 10.00 years, with a median of 41 years and an age range between 21 and 53 years, indicating that the sample primarily consisted of middle-aged individuals. The participants reported a mean work experience of 12.9 ± 8.42 years (range: 2–30 years), suggesting a heterogeneous group with both novice and highly experienced workers. All participants were engaged in 8-hour work shifts per day (SD = 0), reflecting a uniform occupational schedule across the sample. The mean Rate of Perceived Exertion (RPE) was 1.12 ± 0.73 on a 0–2 scale, which denotes a generally low level of perceived physical exertion during work activities.

The mean Breath Holding Time (BHT) was 30.29 ± 12.85 seconds, with a minimum of 12.7 seconds and a maximum of 58.7 seconds, demonstrating a wide inter-individual variability in respiratory endurance. The mean Single Breath Count (SBC) was 16.52 ± 4.39 counts, ranging from 11 to 28.7 counts, which indicates moderate variability in breath control among participants. Overall, these findings suggest that the study group comprised middle-aged workers with moderate occupational experience, consistent work

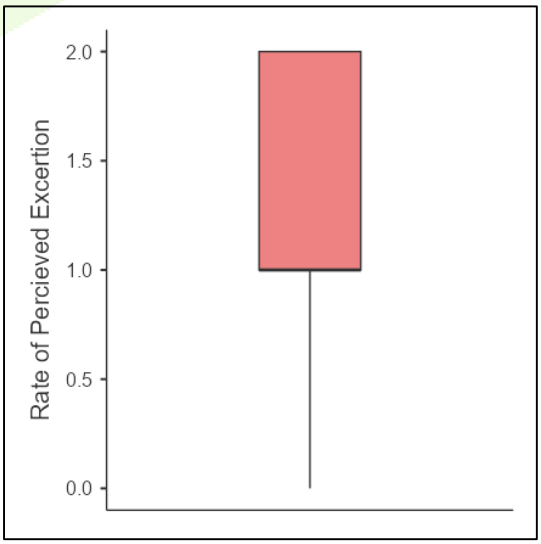
durations, and generally low exertion levels, alongside varied respiratory performance capacities.



Graph no-1 Represents SBC Mean



Graph no – 2 Represents BHT Mean



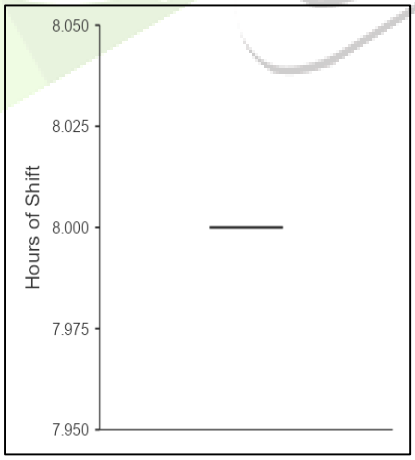
Graph no – 3 Represents RPE

Table 2. Shapiro–Wilk Normality Test

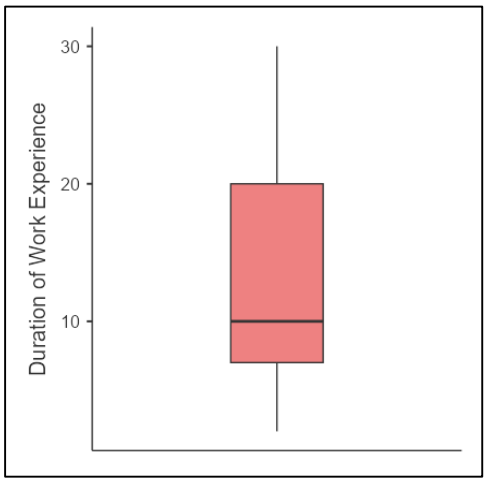
Variable	W	p-value
Age	0.92	0.052
Duration of Work Experience	0.924	0.064
Hours of Shift	–	–
Rate of Perceived Exertion	0.809	<0.001*
Breath Holding Time	0.925	0.067
Single Breath Count	0.906	0.025*

Table 2 presents the results of the Shapiro–Wilk test conducted to assess the normality of data distribution for all study variables. The p-values for Age ($p = 0.052$), Duration of Work Experience ($p = 0.064$), and Breath Holding Time ($p = 0.067$) were greater than 0.05, indicating that these variables followed a normal distribution. In contrast, the Rate of Perceived Exertion ($p < 0.001$) and Single Breath Count ($p = 0.025$) showed significant deviations from normality ($p < 0.05$), suggesting that these variables were not normally distributed. The Hours of Shift variable was not subjected to the normality test as all participants reported the same working hours, resulting in no variability.

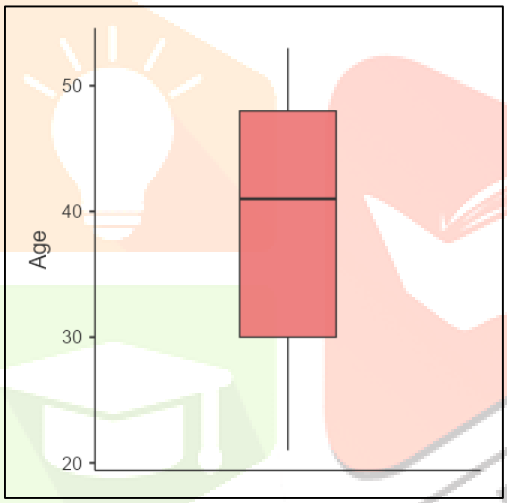
Overall, these findings indicate that while most variables exhibited approximately normal distribution, Rate of Perceived Exertion and Single Breath Count did not meet the assumption of normality. Therefore, non-parametric statistical tests may be more appropriate for analyzing these specific variables.



Graph no – 4 Represents Hours of Shift



Graph no – 5 Represents Duration of Work

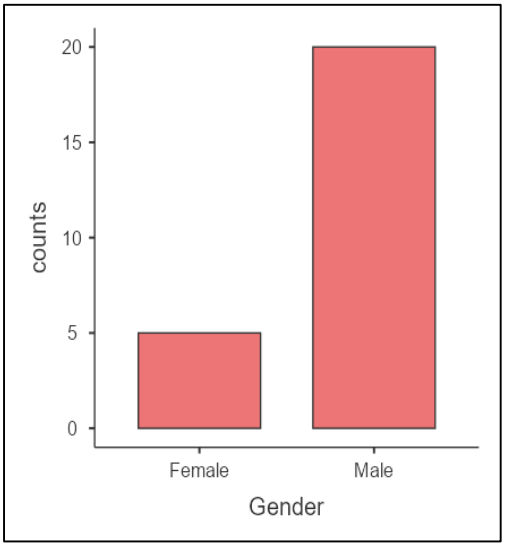


Graph no – 6 Represents Age

Table 3. Gender Distribution of Participants

Gender	Frequency	Percentage
Male	20	80%
Female	5	20%

Table 3 illustrates the gender distribution of the study participants. Out of a total of 25 participants, 20 (80%) were male and 5 (20%) were female, indicating that the majority of the study population comprised male participants. This shows a clear male predominance in the sample, suggesting that the occupation or population under study may be more male-dominated in nature.

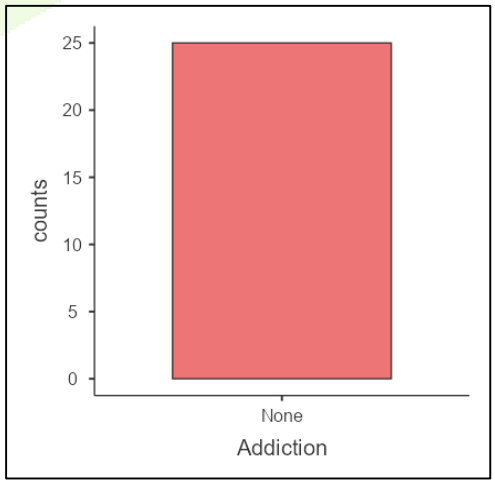


Graph no – 7 Represents Age

Table 4. Addiction Status of Participants

Addiction	Frequency	Percentage
None	25	100%

Table 4 represents the addiction status of participants in the study. The data reveals that all 25 participants (100%) reported having no form of addiction. This indicates that the entire study population was free from any substance or behavioral addictions such as smoking, alcohol consumption, or drug use. Hence, the influence of addictive habits on the study variables can be considered negligible, ensuring that the findings are not confounded by addiction-related factors.



Graph no – 8 Represents Addiction

Table 5. Correlation Between Work Variables, Lung Function, and Perceived Exertion

Variables	**Spearman's ρ**	**p-value**
Work Experience – Breath Holding	0.446*	0.025
Work Experience – SBC	0.148	0.48
Breath Holding – SBC	0.27	0.192
RPE – Breath Holding	-0.570**	0.003
RPE – SBC	-0.044	0.833

Table 5 illustrates the correlation between work variables, lung function, and perceived exertion among the participants using Spearman's rho correlation coefficient. The results indicate a moderate positive correlation between work experience and breath-holding time ($\rho = 0.446$, $p = 0.025$), which is statistically significant. This suggests that individuals with greater work experience demonstrated better breath-holding capacity. A weak positive correlation was found between work experience and slow vital capacity (SBC) ($\rho = 0.148$, $p = 0.48$), though it was not statistically significant. Similarly, breath-holding and SBC showed a weak positive correlation ($\rho = 0.27$, $p = 0.192$), also not significant. However, there was a moderate negative correlation between rate of perceived exertion (RPE) and breath-holding ($\rho = -0.570$, $p = 0.003$), which was statistically significant, indicating that participants with higher breath-holding capacity experienced lower perceived exertion levels. No significant correlation was found between RPE and SBC ($\rho = -0.044$, $p = 0.833$). Overall, the results suggest that work experience and breath-holding ability are positively associated, while higher breath-holding capacity is linked with lower exertion perception, highlighting the relationship between respiratory endurance and perceived physical effort.
Note. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

DISCUSSION

This pilot study utilized non-invasive screening tools—the Single Breath Count Test (SBC) and the Breath Holding Test (BHT)—to assess subclinical respiratory impairment among a cohort of 25 non-smoking petrol pump workers in Nashik, who demonstrated significant mean work tenure of 12.9±8.42 years. The primary descriptive finding confirms the alternate hypothesis: chronic occupational exposure leads to measurable functional decline, evidenced by a significantly low mean BHT of 30.29±12.85 seconds, falling well below the accepted normative range of 45–55 seconds, with 84% of participants exhibiting sub-normal values. This deficit is physiologically consistent with the inhalation of toxic fuel vapours, including Volatile Organic Compounds (VOCs) and PM10. Benzene and toluene trigger chronic inflammation in the bronchial epithelium, leading to airway narrowing (an obstructive component), while diesel PM10 induces oxidative stress and alveolar damage, which restricts lung volume (a restrictive component). The observed reduction in functional capacity measured by BHT reflects the combined effect of this mixed, underlying pathology.

Statistical analysis provides strong functional validation for these deficits, demonstrating a significant negative correlation between BHT and the Rate of Perceived Exertion (RPE) ($\rho = -0.570, p = 0.003$). This robust inverse relationship confirms that the diminished respiratory reserve, measured objectively by

BHT, directly translates into a tangible increase in the worker's subjective feeling of effort during work tasks, suggesting a compromised quality of life. This functional compromise observed in the Nashik cohort is strongly corroborated by established regional epidemiological evidence. Spirometric studies conducted on similar petrol pump populations across India consistently report significant reductions in Forced Vital Capacity (FVC) and Forced Expiratory Flow (FEF25−75%), indicating a predominantly restrictive pattern of lung disease that worsens with increasing duration of occupational exposure.

The methodological choice of using BHT and SBC, while necessary for a cost-effective pilot screening in a resource-limited occupational setting, represents a key limitation, as these surrogate measures lack the diagnostic specificity to clinically classify the type and severity of impairment (obstructive vs. restrictive). However, their utility as rapid screening tools remains high. These findings necessitate immediate public health and policy interventions: BHT and SBC should be incorporated as mandatory, low-cost primary screening tests during annual check-ups to triage high-risk workers for definitive spirometry. Furthermore, given the cumulative risk demonstrated by the high mean work tenure (12.9 years), the mandatory enforcement of appropriate Personal Protective Equipment (PPE) designed to filter VOCs and fine particulate matter is essential. To generate robust, causal evidence, future research must transition from this cross-sectional pilot to a larger, longitudinal cohort study that integrates gold-standard spirometry, environmental dose monitoring, and a matched control group.

SUMMARY

This pilot study assessed respiratory health in 25 petrol pump workers using Breath Holding Time (BHT) and Single Breath Count (SBC), examining links to work experience and perceived exertion (RPE). Results showed a significant positive correlation between work experience and BHT, suggesting possible physiological adaptation, while RPE was negatively correlated with BHT, indicating reduced respiratory endurance with higher exertion. BHT and SBC were moderately correlated, though SBC showed no significant associations with other variables. These findings highlight the utility of simple, non-invasive tests for monitoring respiratory health in occupational settings and support the need for targeted interventions.

LIMITATIONS AND RECOMMENDATIONS

This pilot study provides preliminary insights into the respiratory health of petrol pump workers chronically exposed to fuel vapours, but several limitations must be acknowledged. The small sample size (n = 25) restricts generalizability and statistical power, while the cross-sectional design prevents causal inference and long-term tracking. The absence of a control group and lack of adjustment for confounders such as environmental pollution, nutrition, and genetic factors reduce internal validity. Reliance on effort-dependent tests (BHT and SBC) without spirometry limits diagnostic precision, and the absence of biochemical or exposure monitoring data further weakens conclusions. Self-reported measures may introduce bias, and the gender imbalance (only 20% female) restricts gender-specific analysis.

Despite these limitations, the findings demonstrated significant subclinical respiratory impairment. The mean Breath Holding Time (BHT) was substantially below the normative range of 45–55 seconds, with 84% of participants showing reduced respiratory endurance. This decline is attributed to chronic inhalation of toxic volatile organic compounds (VOCs) and particulate matter (PM10), which can induce bronchial inflammation, bronchoconstriction, and alveolar damage, consistent with mixed restrictive and

obstructive lung injury. The strong negative correlation between BHT and Rate of Perceived Exertion further validates the functional deficit, while the correlation with work experience suggests a possible "Healthy Worker Effect" masking progressive damage. These results align with spirometry-based studies in similar populations, which consistently report restrictive lung impairment worsening with exposure duration.

Based on these findings, BHT and SBC are recommended as mandatory, low-cost screening tools for annual occupational health check-ups, serving as triage measures for definitive spirometry. Immediate enforcement of protective measures, including Personal Protective Equipment (PPE) and administrative controls, is urgently required to safeguard this high-risk workforce from irreversible lung damage. Future studies should adopt longitudinal designs, incorporate spirometry and exposure monitoring, and ensure balanced gender representation to strengthen evidence and guide occupational health strategies.

CONCLUSION

This pilot study suggests that long-term exposure to petrol and diesel vapours may affect respiratory health in petrol pump workers. Using Breath Holding Time (BHT) and Single Breath Count (SBC), it was found that BHT increased with work experience but decreased with higher perceived exertion. SBC showed no strong correlations. Many workers had below-normal values, indicating early respiratory issues. The study supports using BHT and SBC for simple health screening and recommends further research with larger samples and spirometry.

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