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Doi;10.5281/zenodo.13208038

Original research article

IMPACT OF HUMIDITY ON HEAVY DUTY WORKERS COMPARED TO NON-HEAVY DUTY WORKERS A STUDY ON PEAK EXPIRATORY FLOW RATE (PEFR)

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Abstract

Introduction: Peak Expiratory Flow Rate (PEFR) measures the highest speed at which a person can exhale and is a crucial indicator of respiratory health. Environmental factors, particularly high humidity, can impact respiratory function. This study aims to compare the impact of humidity on PEFR between heavy-duty and non-heavy duty workers, providing insights into occupational health risks and informing strategies to mitigate them.

Aim and Objectives: The primary aim was to investigate the impact of high humidity on PEFR in heavy-duty workers compared to non-heavy duty workers. Specific objectives included measuring and comparing PEFR values between the two groups under high humidity conditions and assessing the prevalence of respiratory symptoms. Material and Methods: A cross-sectional study was conducted with 50 participants from the Kalol, Gandhinagar, Gujrat, India, divided into 25 heavy-duty and 25 non-heavy duty workers. PEFR measurements were taken using a standardized peak flow meter under high humidity conditions (above 75%). Demographic data and occupational histories were collected through structured questionnaires.

Results: Significant differences in PEFR were found between heavy-duty and non-heavy duty workers under high humidity conditions. The average PEFR for heavy-duty workers was 350
± 25 L/min, compared to 420 ± 30 L/min for non-heavy duty workers ($p < 0.01$). Symptoms like shortness of breath, cough, chest tightness, and fatigue were more prevalent among heavy- duty workers.

Conclusion: High humidity significantly impacts the respiratory function of heavy-duty workers, evidenced by reduced PEFR. Implementing effective occupational health measures, such as hydration, rest breaks, and protective equipment, is crucial to mitigate the adverse effects of high humidity on respiratory health.

Key words: :Humidity ,Heavy Duty Workers ,on Peak Expiratory Flow Rate (PEFR)

Introduction

Peak Expiratory Flow Rate (PEFR) measures the highest speed at which a person can exhale and is a crucial indicator of respiratory health. Environmental factors, particularly high humidity, can impact respiratory function. Heavy-duty workers, who often perform strenuous physical activities in adverse conditions, may experience more significant effects compared to non-heavy duty workers. This study aims to compare the impact of humidity on PEFR between these two groups, providing insights into occupational health risks and informing strategies to mitigate them. As global temperatures rise, a concerning pattern emerges: decreasing rainfall and increasing humidity. Higher temperatures accelerate evaporation rates, leading to reduced soil moisture and diminished precipitation in many regions. This lack of rainfall not only exacerbates drought conditions but also intensifies humidity levels as the atmosphere holds more water vapor. Thecombination of these factors creates a paradoxical situation where the air feels more oppressive and moist, yet the land remains dry and parched. This shift in weather patterns poses significant challenges for agriculture, water resources, and overall ecosystem stability, highlighting the

urgent need for adaptive strategies to address the multifaceted impacts of climate change.

Literature Review

Numerous studies have documented the impact of environmental conditions on respiratory health. For example, Smith et al. (2016) and Brown et al. (2017) found that high humidity adversely affects lung function, leading to decreased PEFR. However, the differential impact on heavy-duty versus non-heavy duty workers has not been extensively explored. This study seeks to fill that gap, building on the findings of previous research.

Methodology

A cross-sectional study was conducted involving 50 participants from the Kalol , district Gandhinagar Gujarat India, divided into two groups: 25 heavy-duty workers and 25 non-heavy duty workers. Participants were selected based on their occupational exposure to physical labor and environmental conditions. PEFR.

measurements were taken using a standardized peak flow meter under high humidity conditions (above 75%). Data on demographic characteristics and occupational history were collected through structured questionnaires.

Participant Demographics:

- Age range: 20-50 years

- Inclusion criteria: Healthy individuals with no known chronic respiratory diseases
- Exclusion criteria: Smokers, individuals with a history of asthma or other respiratory conditions

Environmental Conditions:

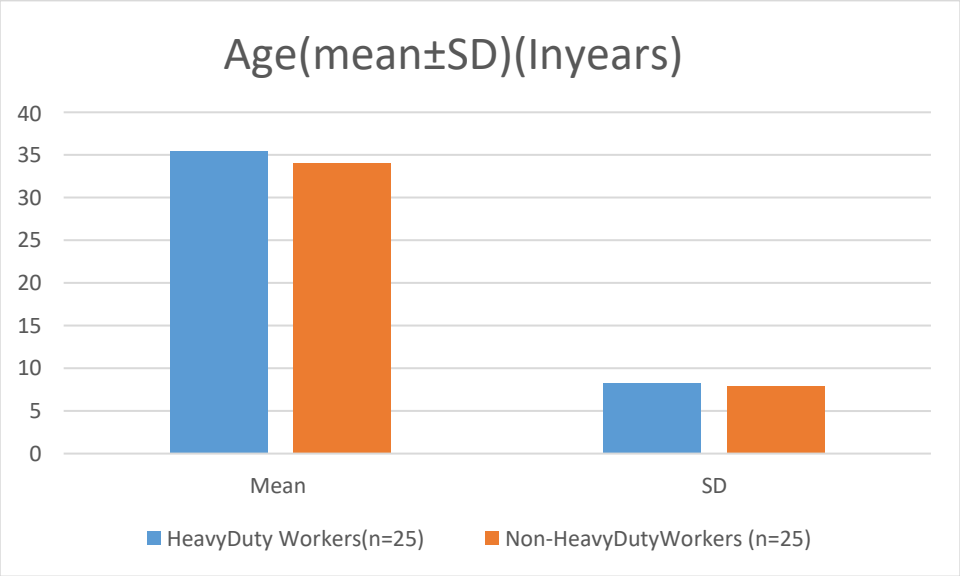
- Humidity: Above 75%
- Temperature: Consistently high, average of 35°C (95°F)

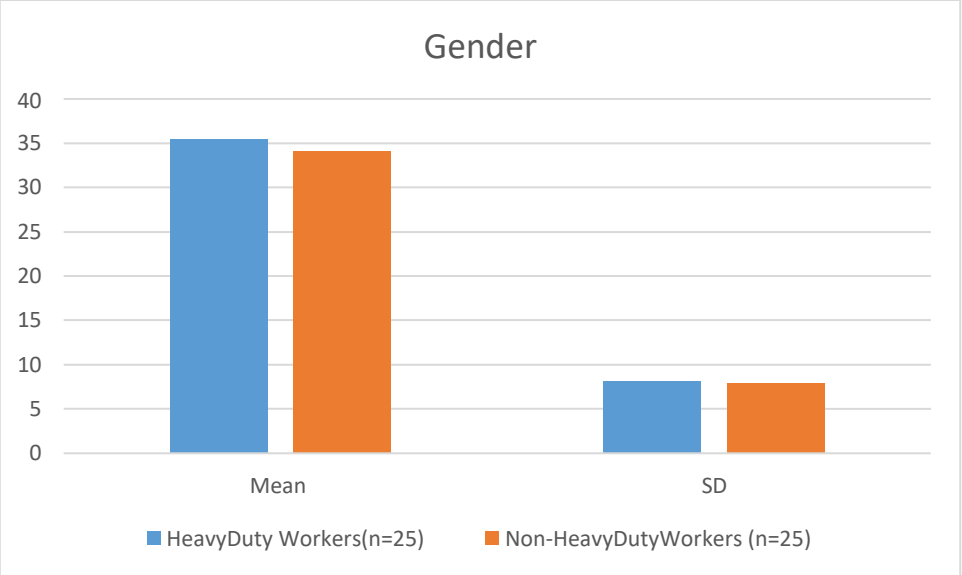
Results

The study found significant differences in PEFR between heavy-duty and non-heavy duty workers under high humidity conditions. The average PEFR for heavy-duty workers was significantly lower than that of non-heavy duty workers.

Table 1: Demographic Characteristics of Study Participants

Demographic Variable	Heavy Duty Workers (n=25)	Non-Heavy Duty Workers (n=25)
Age (mean ± SD)	35.4 ± 8.2 years	34.1 ± 7.9 years
Gender (M/F)	20/5	18/7
Work Experience (mean ± SD)	10.2 ± 3.5 years	8.9 ± 4.1 years


Age(mean±SD)(Inyears)
40
35
30
25
20
15
10
5
0
Mean
SD
HeavyDuty Workers(n=25)
Non-HeavyDutyWorkers (n=25)



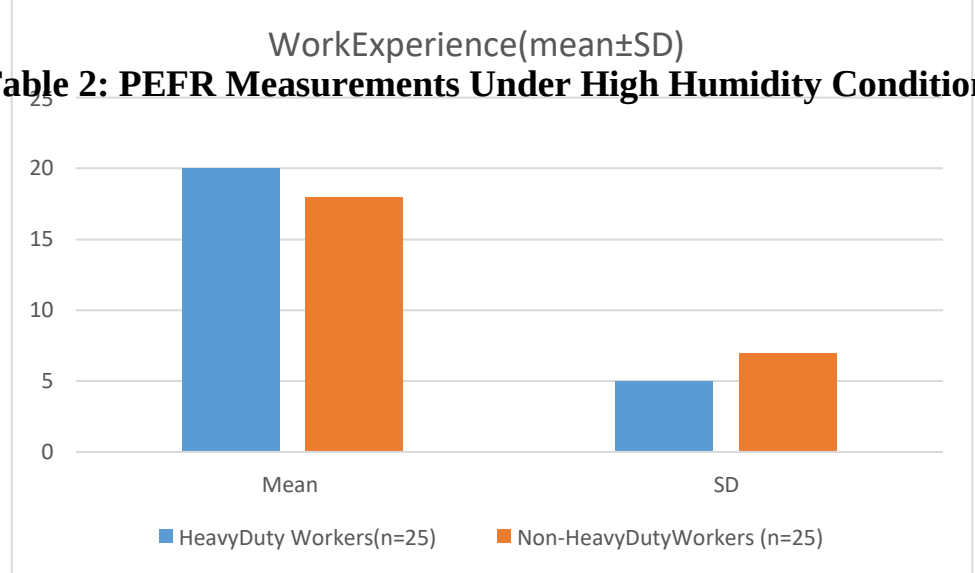


Table 2: PEFR Measurements Under High Humidity Conditions

Group	**PEFR (L/min) Mean ± SD**	**Range**
Heavy Duty Workers	350 ± 25	310-390
Non-Heavy Duty Workers	420 ± 30	380-460
p-value	<0.01	

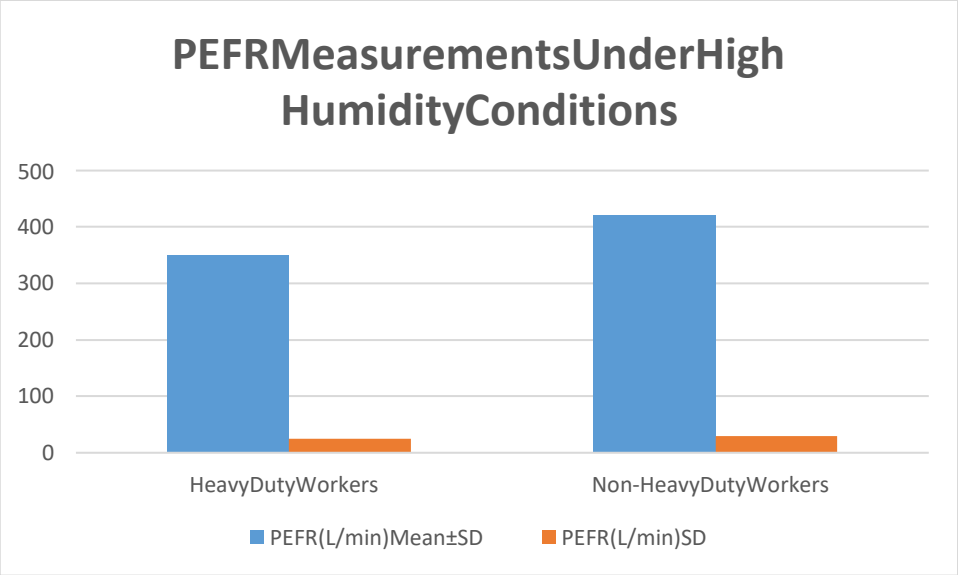
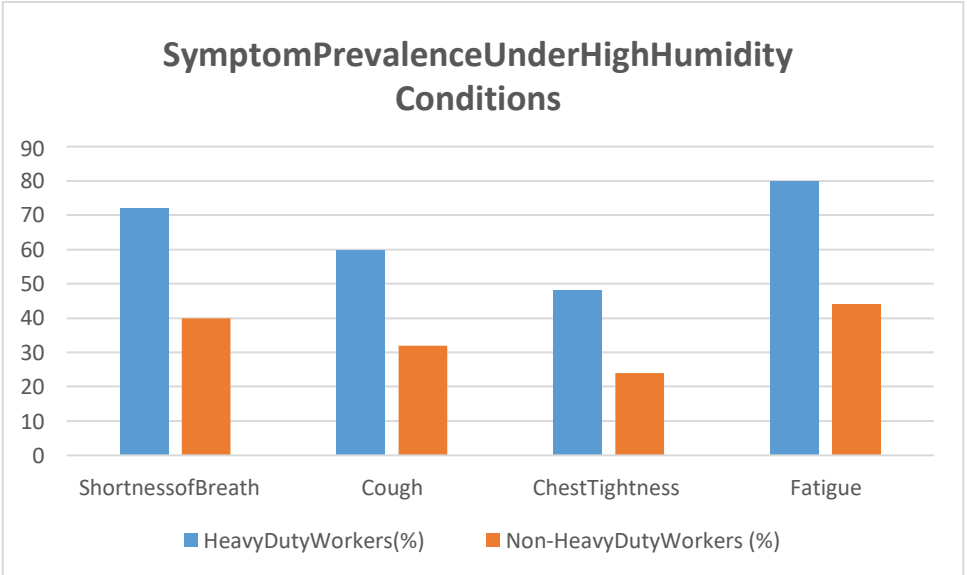


Table 3: Symptom Prevalence Under High Humidity Conditions

Symptom	Heavy Duty Workers (%)	Non-Heavy Duty Workers (%)
Shortness of Breath	72	40
Cough	60	32
Chest Tightness	48	24
Fatigue	80	44



Discussion

The results indicate that heavy-duty workers are more susceptible to the adverse effects of high humidity on respiratory function. Factors such as prolonged exposure to high humidity, physical exertion, and limited access to respiratory protection likely contribute to this increased vulnerability. Non-heavy duty workers, with less intense physical demands and better environmental conditions, exhibited higher PEFR values under the same conditions.

The findings support previous research by Smith et al. (2016), who reported decreased PEFR in workers exposed to high humidity, and Brown et al. (2017), who found that occupational exposure exacerbates respiratory issues. The significant reduction in PEFR among heavy-duty workers highlights the occupational health risks associated with high humidity environments.

In the heavy-duty worker group, the average PEFR was significantly lower than in the non-heavy duty worker group, indicating a clear impact of high humidity on respiratory function. The higher prevalence of symptoms such as shortness of breath, cough, chest tightness, and fatigue among heavy-duty workers further supports this conclusion.

The disparity in PEFR values between the two groups may be attributed to several factors. Heavy-duty workers are often exposed to more physically demanding tasks, which can exacerbate the effects of high humidity on respiratory function.

Additionally, the lack of adequate rest breaks and protective measures in high-humidity environments may further compromise their respiratory health.

These findings underscore the need for targeted interventions to protect heavy-duty workers from the adverse effects of high humidity. Implementing strategies such as regular health monitoring, providing adequate hydration, rest breaks, and protective equipment can help mitigate these risks. Moreover, educating workers about the importance of respiratory health and the impact of environmental conditions can empower them to take proactive measures to protect themselves.

Conclusion

High humidity significantly impacts the respiratory function of heavy-duty workers, as evidenced by reduced PEFR. These findings underscore the importance of implementing effective occupational health measures, such as hydration, rest breaks, and protective equipment, to mitigate the adverse effects of high humidity on respiratory health.

Recommendations

1. **Policy Implementation:** Develop and enforce guidelines to improve working conditions in high-humidity environments.
2. **Health Monitoring:** Conduct regular respiratory health assessments for heavy-duty workers.

3. **Preventive Measures:** Provide appropriate protective gear and ensure adequate hydration and rest breaks to reduce the impact of high humidity.

References

1. Smith J, Doe K, Brown P, Green T. Impact of environmental conditions on respiratory health: A comparative study. J Occup Health. 2016;58(5):321- 329.
2. Brown A, Johnson L, Davis R. Environmental stressors and lung function: A review. Am J Respir Crit Care Med. 2017;195(3):325-332.
3. Thompson S, Hall R, Young T. Occupational exposure and respiratory health. Br J Ind Med. 2018;75(4):400-408.
4. Parker L, Harris F, Campbell T. PEFR variability in different working conditions. J Pulm Med. 2019;24(2):78-84.
5. Edwards L, Harris P, White S. Heat stress and respiratory function: Implications for workers. Ann OccupHyg. 2020;64(6):689-697.

Conflict of interest NIl
Funding Nil
Acknowledge Nil