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Original Article

Respiratory Morbidity among Indian Tea Industry Workers

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Abstract

Background: Indian tea industry workers are exposed to various exposures at their workplace.

Objective: To investigate the respiratory health of Indian tea industry workers.

Methods: We administered a respiratory questionnaire to and measured lung function in workers of 34 tea gardens and 46 tea factories. We used correlation matrices to test the association between their respiratory symptoms and lung functions.

Results: The garden workers complained of shortness of breath 3 times higher than the factory workers. However, nasal allergy was more predominant among the factory workers compared to garden workers (69.6% *vs* 41.2%, p=0.02). The factory workers had higher total (median 107.3% *vs* 92.9%, p=0.05, as measured by R at 5 Hz) and peripheral airway resistance (143.8% *vs* 61.1%, p=0.005, as measured by R at 5–20 Hz) than the garden workers. Respiratory symptoms were inversely associated with airway obstruction as measured by the ratio between forced expiratory volume in 1 second (FEV_1) and forced vital capacity (FVC) and positively correlated with increased overall airway reactance among the workers.

Conclusion: Respiratory symptoms and increased allergen susceptibility of Indian tea industry workers due to occupational exposures warrant routine systematic surveillance of their workplace air quality and health monitoring.

Keywords: Morbidity; Epidemiology; Occupational exposure; Spirometry; Tea; Industry; Manpower; Impulse oscillometry

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Introduction

Tea is a popular beverage all over the world. India is among the top producers of tea. Tea manufacturing processes comprise a series of stages including withering, panning, rolling, ball-rolling, drying, sifting, blending, and packing. Workers engaged in tea industries are mainly categorized as the garden workers, who are responsible for plantation of tea plants and plucking of tea leaves, and another group who engages in the processing department. The garden workers remain exposed to a wide variety of air-borne allergens including pollen grains, pesticides, microbes and microbial products such as endotoxins and glucans while processing of tea leaves in the production units emits respirable dusts in the breathing zone of the workers engaged in the processes.[1] The dust particles may contain a wide range of allergens and sensitizing agents that may cause various hypersensitivity reactions and respiratory ailments in the workers.

It has been reported that tea industry

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workers involved in blending and packaging are prone to develop occupational asthma.[2-6] Castellani and Chalmers (1919) coined the term "tea factory cough" as a common health impairment among the workers occupationally exposed to tea dust.[7] Some studies also reported acute and chronic respiratory symptoms like cough, chest tightness, and rhinorrhea among tea workers during their work.[2,8-10] In a case report by Ebihara (1975), two tea garden workers were found to have allergic diseases.[3] In another report, tea garden workers were found to have high prevalence of respiratory diseases.[11] Exposure to tea dust is a common risk factor in this industry as the workers rarely use any protective measures to cover their noses and mouths; studies have identified respirable tea dust to be associated with airway obstruction.[12-14] It was also reported that tea industry workers who had atopy, exhibited sharp fall of ventilatory capacity and also rapid fall of airway conductance after bronchoprovocation test.[15,16]

Nevertheless, most of the published reports are from developed countries where health of the workers is taken care along with regular monitoring of the workplace environment. Although, health services are provided to the workers engaged in tea industries in India, monitoring of workplace air quality is mostly overlooked. Therefore, misdiagnosis or delayed diagnosis of work-related asthma or other pulmonary complications is not unlikely in tea industry workers. We conducted this study to investigate the respiratory condition of tea industry workers in India.

Materials and Methods

Study Design and Study Population

We obtained access to two tea gardens located at Kurseong at an approximate altitude of 1500 m in northern part of West Bengal, India. These farms had a plantation area of approximately 650 acres with one tea-leaf processing plant and a workforce of around 110 employees; women were mostly involved in plucking tea leafs from the tea gardens whereas men were mostly employed in the processing/production units.

With an intention to recruit all the workers, we included all who provided consent to participate in this study and complete the survey. We further set the inclusion criteria as ability to perform an acceptable spirometry, not having any active medical condition and/or not receiving antibiotics. After all exclusions, we finally recruited 80 (~73% of the population) workers in the study. We further categorized the participants into garden workers (n=34) and factory workers (n=46) based on their area of work. The study was conducted according to the Declaration of Helsinki and was approved by the Clinical Research Ethics Committee of Allergy and Asthma Research Centre (CREC-AARC), Kolkata; all the participants provided informed written consent before participating in the study.

Respiratory Questionnaire

We administered an English-back Bengali-translated structured respiratory questionnaire to inquire about respiratory health, occupational exposure, and lifestyle factors of the participants. The questionnaire was a modified version of the European Community Respiratory Health Survey-II (ECRHS-II) that has been used in prior studies.[17-19] Subjective respiratory complaints in the previous 12 months questioned were (1) acute or chronic wheezing or whistling of the chest, (2) tightness in chest, (3) breathing trouble, (4) acute or chronic cough, and (5) nasal allergy.

Pulmonary Function Test

Pulmonary function tests were performed using a dual-mode Jaeger MasterScreen™

For more information on lung functional impairments after occupational exposure to asphalt fumes see http://www.theijoem.com/ijoem/index.php/ijoem/article/view/473

PFT system equipped for spirometry and impulse oscillometry (Jaeger Co, Wurzburg, Germany). The instrument was calibrated with a 3-L fixed-volume calibration syringe before each day testing. Spirometry was performed in accordance with the guidelines of the American Thoracic Society for forced vital capacity (FVC), forced expiratory volume in 1 sec (FEV_1) and FEV_1/FVC.[20] We used the predicted equations for spirometry developed by Quanjer, *et al.*[21] FEV_1/FVC <70% was considered "airway obstruction." We conducted a minimum of three and maximum of eight spirometric maneuvers for each participant to evaluate the acceptability and repeatability of each spirogram, according to ATS/ERS statement.[20]

Impulse oscillometry (IOS) was performed to assess respiratory impedance according to the standard guidelines.[22] The participants were asked to wear nose clips and hold their cheeks gently to minimize shunt compliance of the cheeks and breathe in tidal volume. Multi-frequency impulses were sent to the airways through mouth for a period of 40 sec; the three reproducible efforts were recorded excluding all possible artifacts such as coughing, breath holding or swallowing. Airway resistance was measured using sound frequencies ranging from 5–20 Hz. Pressure waves at frequencies >15 Hz generally fade before reaching peripheral airways, while those at frequencies <10–15 Hz can penetrate much further into the lung periphery.[23] We used resistance at 5 Hz (R_5), 20 Hz (R_{20}), frequency dependence (R_{5-20}) as indicators of total, large, and small airway resistance, respectively; reactance at 5 Hz (X_5) was used as an index of the reactance of the overall respiratory system.[23-26] We also measured resonant frequency (F_{res}) and integrated area of low-frequency X (AX) as a sensitive measure of small airways obstruction.[24-26]

Allergy Skin Test

Participants were tested with five common allergens, which could be persistent with the workplace: house dust mite (*Dermatophagoides pteronyssinus*), mixed grass pollen, *Cladosporium sp*, cat and dog, along with glycerol-saline and histamine controls (Bayer, Elkert, Ind). Droplets of allergens as well as positive and negative controls were applied to the flexor surface of the forearm; the reactions were recorded after 15 min. A wheal with a diameter of at least 3 mm was considered "positive." Atopy was defined as one or more positive skin test results.

Statistical Analysis

SPSS® for Windows® ver 20 (IBM Corp, Armonk, NY, USA) was used for data analysis. The mean of two continuous normally distributed variables were compared by *Student's t* test for independent data. Frequencies of categorical variables were compared by χ^2 or Fisher's exact test, whenever appropriate. For group-wise comparison of the pulmonary function parameters, Mann-Whitney U test was used. A p value <0.05 was considered statistically significant.

Results

Demographic features of the study partici-

TAKE-HOME MESSAGE

- Indian tea industry workers are constantly exposed to a variety of workplace allergens and sensitizers.
- Long-term exposure to these agents may cause airway problems.
- Although the tea workers did not have any acute lung function impairment, a clinically significant association between respiratory symptoms and involvement of the obstructive components of the peripheral airways was observed.

Table 1: Demographics of the study participants. Values are either n (%) or mean (SD).

Variable	Garden workers (n=34)	Factory workers (n=46)	p value
Male sex (%)	9 (27%)	33 (72%)	<0.001
Mean age (SD), yrs	46.4 (10.7)	44.3 (11.9)	0.43
Mean height (SD), yrs	1.47 (0.07)	1.55 (0.08)	<0.001
Smoking, n (%)	4 (12%)	11 (24%)	0.28
Atopy, n (%)	24 (71%)	38 (83%)	0.32
Parental asthma, n (%)	9 (27%)	14 (30%)	0.89

pants are presented in Table 1. Women were predominantly ($p<0.05$) more involved in garden work (73%) than factory work (28%). Although the mean height of the factory workers was moderately higher than the garden workers, this difference was adjusted while estimating percentage predicted values of pulmonary function parameters. Other covariates did not differ significantly between the two groups of workers.

Frequency of respiratory symptoms stratified by job categories are presented in Figure 1. The garden workers reported a threefold higher prevalence of breathing trouble (26.5% *vs* 8.7%, $p=0.02$) than the factory workers. Although the prevalence of wheeze among the garden workers was observed as much as double the factory workers (35.3% *vs* 15.2%), the difference was not significant. Compared to the garden workers, the prevalence of nasal allergy was significantly ($p=0.02$) higher in the factory workers (41.2% *vs* 69.6%). Other respiratory symptoms did not differ significantly between the studied groups.

There was no significant difference in spirometric lung function parameters between the garden and the factory workers (Table 2). Overall airway resistance (R_5 %predicted) was higher among the factory workers than the garden workers (107.3% *vs* 92.9%). Although there was no significant difference in the central airway resistance between the studied groups, factory workers exhibited very high resistance in their peripheral airways in comparison with the garden workers (143.8% *vs* 61.1%, $p=0.005$). Factory workers also had a significantly higher median resonant frequency than the garden workers. The median area of reactance, however, was higher among the garden workers.

Workers who reported wheezing, shortness of breath and acute or chronic cough had reduced FEV_1 (mean rank difference in %predicted 26.4, 37.4, and 14.9, respectively; all $p<0.05$) compared to those who did not have these respiratory symptoms (Table 3). Other respiratory symptoms,

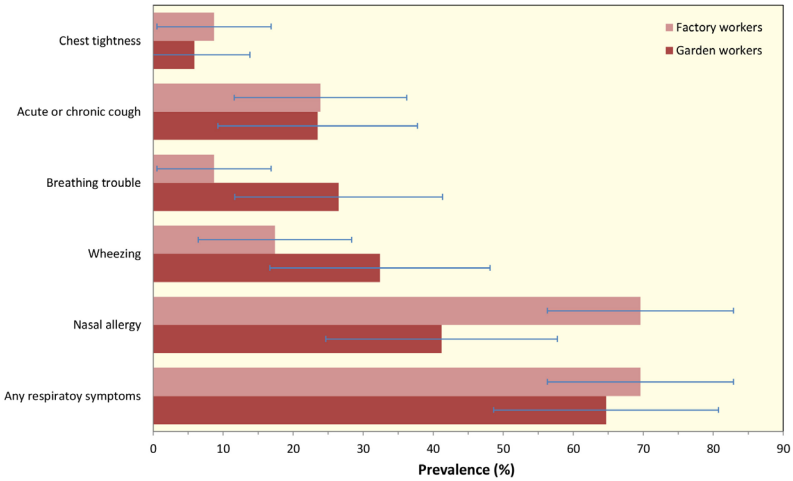

Figure 1: Prevalence of respiratory symptoms among the garden and factory workers. Error bars represent 95% CI.

Table 2: Comparative evaluation of pulmonary function parameters between the studied groups. Data are presented as median (IQR).

Parameter	All tea-workers (n=80)		p value*
	Garden workers (n=34)	Factory workers (n=46)	
FVC (%predicted)	94.5 (91.3 to 98.0)	94.0 (91.0 to 105.8)	0.45
FEV_1 (%predicted)	89.5 (78.0 to 96.8)	91.0 (85.0 to 99.0)	0.19
FEV_1/FVC	0.84 (0.76 to 0.95)	0.84 (0.81 to 0.91)	0.76
R_5 (%predicted)	92.9 (78.8 to 115.2)	107.3 (87.8 to 126.4)	0.05
R_{20} (%predicted)	92.3 (86.9 to 108.2)	98.5 (85.2 to 115.9)	0.46
$R_{5–20}$ (%predicted)	61.1 (37.3 to 149.2)	143.8 (81.3 to 233.3)	0.005
X_5 (kPa/L/s)	-0.10 (-0.13 to -0.04)	-0.06 (-0.08 to -0.04)	0.31
F_{res} (1/s)	11.25 (8.12 to 18.7)	17.87 (12.7 to 22.5)	0.001
AX (kPa/L)	0.81 (0.45 to 2.26)	0.34 (0.26 to 0.76)	<0.001

*Pair-wise comparison based on Mann-Whitney U test.
FVC: forced vital capacity; FEV_1: forced expiratory volume at 1 second; R_5: resistance at 5 Hz; R_{20}: resistance at 20 Hz; $R_{5–20}$: frequency dependence; X_5: total airway reactance at 5 Hz; AX: area of reactance; F_{res}: resonant frequency

however, were not observed to modulate the lung function of the workers (data not shown). Although wheezing, shortness of breath and chronic/acute cough were found to have association with impaired spirometric lung function, no change was observed in airway resistance (Table 3).

Discussion

In this report we observed a very high (67.5%) prevalence of work-related respiratory symptoms among Indian tea industry workers who were constantly exposed to a range of air-borne contaminants including aeroallergens and organic and inorganic particulate matters. Although their lung capacities were within the normal range, the increased propensity of resistance observed in the peripheral airways underscored a significant clinical importance in the diagnosis of respiratory impairments among the workers.

Exposure to tea dust is a major risk factor for occupational asthma among the tea workers.[5,27] Tea fluffs have been identified as a potential asthmagen, which induce bronchoprovocation and also cause allergen sensitivity among tea workers.[27] In this study, almost 78% of the tea workers had hypersensitivity to the allergens commonly present, either in the plantation areas or in the indoor air. This observation was concomitant with other findings where investigators observed higher prevalence of sensitization among herbal tea workers, although the relation between sensitization and respiratory symptoms has not been very clear.[8,10,13,15] Another study reported a higher prevalence of chronic bronchitis and asthma in tea workers compared to what was expected in general population.[28] Our findings of the reduced lung capacities among the symptomatic workers also underscored a causal association between work-related exacerbations and respira-

Table 3: Difference in pulmonary function parameters between the workers who had or did not have respiratory symptoms. Values are the mean rank difference between those who did not have and workers who had the respiratory symptoms. Values in the parentheses are significant levels (p values).

Respiratory symptoms	FVC (%pred)	FEV_1 (%pred)	FEV_1/FVC	R_5 (%pred)	R_{20} (%pred)	$R_{5–20}$ (%pred)	X_5 (kPa/L/s)
Wheezing	7.60 (0.21)	26.4 (<0.01)	17.0 (0.002)	-6.70 (0.28)	2.50 (0.69)	-4.30 (0.47)	9.13 (0.07)
Shortness of breath	22.9 (0.001)	37.4 (<0.01)	18.5 (0.009)	-5.70 (0.42)	4.80 (0.50)	-3.80 (0.59)	16.4 (0.02)
Acute/chronic cough	9.70 (0.11)	14.9 (0.02)	15.5 (0.01)	-6.80 (0.27)	-0.10 (0.99)	-9.60 (0.12)	6.60 (0.17)

tory impairments. Although some reports described reduction of FEV_1 of the tea workers at the end of the shift,[12,29] we did not observe any consistent reduction in the lung function of the workers.

We observed a higher prevalence of peripheral airway obstruction among the factory workers compared to the garden workers, not detectable by spirometry. This indicates an underlying mechanism of occupational exposure-associated changes in the peripheral airways that is subtle and may not be readily detected in advance with spirometry. Allergen-associated respiratory disease among tea workers has been found to be associated with increased levels of IgE,[30] which may explain our findings of many patients with respiratory symptoms and atopy among the tea workers. Higher respiratory symptoms among the garden workers indicated exposure to air-borne allergens such as pollen grains and other fungal contaminations at the tea garden. Several occupational studies indicating air-borne fungal contamination in organic material processing areas,[31,32] also exemplify a probable cause of elevated respiratory symptoms of the factory workers because of the exposure to various fungal spores and other microbes present in tea fluffs.

The study has some limitations. Firstly, we could not assess air-borne particulate matters inside the tea processing plant nor could measure air quality of the tea gardens where the workers were exposed to various sources of allergens such as pollen grains, microbes, endotoxins, and glucans. Moreover, we could not characterize the exposures, which could provide substantial information about bio-aerosol exposures over time. Another limitation of this study could be its cross-sectional design that does not provide information about varying respiratory symptoms of the workers over time; however, this is a preliminary report of a longitudinal study and we aim to analyze the changes of respiratory conditions of the workers over time at the end of the study.

Although we observed changes in the airway resistance and reactance patterns among the tea workers, those changes do not effectively reflect an exposure-related decrement in airway resistance or the pulmonary function variables. We could not perform radiographic examination of the participants, which could provide valuable additional data, *eg*, air trapping, bronchial wall thickening or other structural abnormalities. Although increased peripheral airway resistance could be an early marker of airway disease that would later progress, the cross-sectional nature of the current study hampers assessment of outcomes. Lack of a control group in this study may be criticized; however, a control group, which could match the workers in terms

of the socio-economic status, habitation and professional quality could not easily be found. Managerial staffs were not considered control group due to mismatched socio-economic status and physiques.

In conclusion, this study provides an overview of the respiratory health condition of the tea industry workers of India. Although the tea workers did not have any acute lung function impairment or other serious respiratory ailments, we observed clinically significant association between respiratory symptoms and involvement of the obstructive components of the peripheral airways, which essentially accentuates possible impact of exposure to tea fluffs and other suspended particulate matters on respiratory health. Although spirometric lung function seems to be normal, long-term occupational exposure to various air-borne allergens and sensitizers in the workplaces could be a risk for development of lung diseases and thus systematic monitoring of the workplace environment and regular health surveillance program for tea industry workers are warranted.

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Conflicts of Interest: Dr. Saibal Moitra is a member of the Board of Directors and also is a shareholder of NC Das Immunomedicare Private Ltd, Kolkata. He receives honoraria as a consultant from Charnock Hospital Private Ltd, Kolkata, India. He also has received honoraria from AstraZeneca, Lupin, Aventis and German Remedies for lectures. However, none of his affiliations or sponsors had any role in the conduction of this research or dissemination of its intellectual contents. Other authors declare that they do not have any potential conflicts of interest.

References

1. Shieh TS, Chung JJ, Wang CJ, *et al*. Pulmonary function, respiratory symptoms, and dust exposures among workers engaged in early manufacturing processes of tea: a cohort study. *BMC Public Health* 2012;**12**:121. doi: 10.1186/1471-2458-12-121.
2. Uragoda CG. Tea maker's asthma. *Br J Ind Med* 1970;**27**:181-2.
3. Ebihara I. Study on the inhalative allergy of ciliae of leaves: inhalative allergy of the ciliae of tea leaves. *J Sci Lab (Rodo Kagaku)* 1975;**51**:661-5.
4. Ridkers PM. Toxic effects of herbal tea. *Arch Environ Health* 1987;**42**:133-6.
5. Roberts JA, Thomson NC. Tea-dust induced asthma. *Eur Respir J* 1988;**1**:769-70.
6. Cartier A, Malo JL. Occupational asthma due to tea dust. *Thorax* 1990;**45**:203-6.
7. Castellani A, Chalmers A. *A Manual of Tropical Medicine*. 3rd ed. London, Baillière, Tindall and Cox, **1919**.
8. Zuskin E, Skuric Z. Respiratory function in tea workers. *Br J Ind Med* 1984;**41**:88-93.
9. Hill B, Waldron HA. Respiratory symptoms and respiratory function in workers exposed to tea fluff. *Ann Occup Hyg* 1996;**40**:491-7.
10. Abramson MJ, Sim MR, Fritschi L, *et al*. Respiratory disorders and allergies in tea packer. *Occup Med* 2001;**51**:259-65.
11. Mackay DM. Disease patterns in tea garden in Bangladesh. *J Occup Med* 1977;**19**:469-72.
12. Al-Zuhair YS, Whitaker CJ, Cinkotai FF. Ventilatory function in workers exposed to tea and wood dust. *Br J Ind Med* 1981;**38**:339-45.
13. Zuskin E, Kanceljak B, Schacter EN, Mustajbegovic J. Respiratory function and immunologic status in workers processing dried fruits and teas. *Ann Allergy Asthma Immunol* 1996;**77**:417-22.

14. Jayawardana PL, Udupihille M. Ventilatory function of factory workers exposed to tea dust. *Occup Med* 1997;**47**:105-9.

15. Zuskin E, Kanceljak B, Skuric Z, Ivankovic D. Immunological and respiratory changes in tea workers. *Int Arch Occup Environ Health* 1985;**56**:57-65.

16. Zuskin E, Kanceljak B, Witek TJ Jr, Schachter EN. Acute effects of herbal tea dust extracts on lung function. *Chest* 1989;**96**:1327-31.

17. Moitra S, Blanc PD, Sahu S. Adverse respiratory effects associated with cadmium exposure in small-scale jewellery workshops in India. *Thorax* 2013;**68**:565-70.

18. Moitra S, Blanc PD, Brashier BB. Airflow obstruction among street vendors who refill cigarette lighters with liquefied petroleum gas. *Int J Tuberc Lung Dis* 2014;**18**:1126-31.

19. Moitra S, Maity SG, Haldar P, *et al*. Trawler fuel exhaust and respiratory impairments: a cross-sectional pilot study among Indian fishermen working in informal sectors. *Int J Occup Environ Health* 2015;**21**:185-191.

20. Miller MR, Hankinson J, Brusasco V, *et al*. Standardisation of spirometry. *Eur Respir J* 2005;**26**:319-38.

21. Quanjer PH, Tammeling GJ, Cotes JE, *et al*. Lung volumes and forced ventilatory flows. Report Working Party Standardization of Lung Function Tests, European Community for Steel and Coal. Official Statement of the European Respiratory Society. *Eur Respir J Suppl* 1993;**16**:5-40.

22. Oostveen E, MacLeod D, Lorino H, *et al*. The forced oscillation technique in clinical practice: methodology, recommendations and future developments. *Eur Respir J* 2003;**22**:1026-41.

23. Smith HJ, Reinhold P, Goldman MD. Forced oscillation technique and impulse oscillometry. *Eur Respir Mon* 2006;**31**:72-105.

24. Goldman MD. Clinical application of forced oscillation. *Pulm Pharmacol Ther* 2001;**14**:341-50.

25. Skloot G, Goldman M, Fischler D, *et al*. Respiratory symptoms and physiologic assessment of ironworkers at the World Trade Center disaster site. *Chest* 2004;**125**:1248-55.

26. Nieto A, Pamies R, Oliver F, *et al*. Montelukast improves pulmonary function measured by impulse oscillometry in children with asthma (Mio study). *Respir Med* 2006;**100**:1180-5.

27. Minov J, Karadžinska-Bislimovska J, Vasilevska K, *et al*. Occupational asthma in subjects occupationally exposed to herbal and fruit tea dust. *Arh Hig Rada Toksikol* 2007;**58**:211-21.

28. Uragoda CG. Respiratory disease in tea workers in Sri Lanka. *Thorax* 1980;**35**:114-7.

29. Castellan RM, Boehlecke BA, Petersen MR, *et al*. Pulmonary function and symptoms in herbal tea workers. *Chest* 1981;**79**:81-5.

30. Zuskin E, Duncan PG, Douglas JS. The pharmacological characterization of aqueous extracts of vegetable dusts. *Lung* 1983;**161**:301-6.

31. Dennekamp M, Demers PA, Bartlett K, *et al*. Endotoxin exposure among softwood lumber mill workers in the Canadian province of British Columbia. *Ann Agric Environ Med* 1999;**6**:141-6.

32. Færden K, Lund MB, Mogens Aaløkken T, *et al*. Hypersensitivity pneumonitis in a cluster of sawmill workers: a 10-year follow-up of exposure, symptoms, and lung function. *Int J Occup Environ Health* 2014;**20**:167-73.

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