

Morbidity Audit of Women Beedi Workers in an Urban Fringe of West Bengal, India

GANDHARI BASU¹, DEBLINA SARKAR², RANABIR PAL³, SUMAN KUMAR ROY⁴, RAJU DASGUPTA⁵

ABSTRACT

Introduction: Literature has reported morbidity profiles for beedi workers in different parts of India. West Bengal is a place with a good number of beedi workers and only few number of studies have attempted to assess their overall morbidity.

Aim: To find out the overall health status and presence of any morbidity among the beedi workers included in the study.

Materials and Methods: This cross-sectional survey was conducted among beedi workers from November 2016 to January 2017 in Kalyani, West Bengal. A predesigned, semi structured proforma was used to collect data on sociodemographic profile, awareness of hazards, systemic symptoms along with general and anthropometric examination. For measuring weight and Blood Pressure (BP), calibrated weighing scale and aneroid sphygmomanometer was used. Statistical analysis was done with SPSS Version 16.0. Chi-

square value, odd's ratio, confidence interval was calculated for determining association.

Results: A total of 103 women participated with mean (\pm SE) age of 38.69 (\pm 8.53) years. Literacy status was low; worked an average five hours a day, more than half ($n=59, 57.28\%$) started beedi consuming in the age range 15 to 25 years. One-third were in this job for more than 20 years. The proportions of most of the morbidities were quite high. Eye and musculoskeletal system related hazards were most common. Pallor was present in 20 (19.41%) workers. Two-third, ($n=68$) had more than normal BP and more than half were overweight. The association between the increase in BP and Body Mass Index (BMI) with increasing age of the workers was found to significant (p -value <0.05).

Conclusion: The study concludes that the health of the female workforce in an unorganised beedi industry is an important public health issue with worsened scenario of health related hazards.

Keywords: Health hazards, Occupational exposure, Unorganised, Working condition

INTRODUCTION

Occupational health hazards have an upward trend among large number of workers employed in unorganised and informal industry. Beedi industry is a vital agro-industry in Indian National Economy, prevalent in economically backward households as the industry was outsourced long back. Beedi rolling is one of the most common and popular job to reach daily expenses, especially amongst women of India, inspite of it being a hazardous profession. In West Bengal, there are more than 19 lakh beedi workers and out of them nearly 15 lakh were issued identity card [1,2]. Poor working environment, occupational exposure, demographic factors and improper lifestyle greatly affect labour forces of this unorganised industry by exposure to hazardous substances [2,3]. According to Beedi and Cigar workers (Conditions of Employment) Act of 1966, the home workers and also those working under agreement with the employers are contract labourers, classified as beedi rollers and workers [4]. In India, estimated 55 lakh people are associated with this industry, spread over rural and semi-urban areas, in 16 states; five lakh people are in this profession in West Bengal. Overall 1.83 million people have occupational morbidities which is 20% of the global burden. Ironically, these women are not aware of this fact [4-6]. Published literature estimates that about 76% of the beedi making population is female providing half of the total family income [5,7]. The morbidities of beedi workers can be in form of physical, chemical, mechanical, psychosocial hazards leading to lung diseases, musculoskeletal injuries, eye and skin disorders due to exposure to tobacco dust, fumes that absorb via skin, mucous membrane [8,9]. The lung volumes decrease with an increase in the age and tenure of work [10,11]. Despite a hazardous profession, their health and working conditions have never been brought into limelight of public

discussion and awareness. The main aim of the research was to determine the current health status with associated morbidities of the beedi workers of West Bengal, India. The sociodemographic and economic background, working condition and morbidity associated factors were also assessed to achieve the aim.

MATERIALS AND METHODS

A descriptive, cross-sectional survey was conducted from November 2016 to January 2017 in different wards in Kalyani. It was done by the researchers of the College of Medicine and JNM Hospital, Nadia district, West Bengal, India. Ethical clearance was obtained from Institutional Ethics Committee (IEC) and the study was initiated after getting approval from the governing body of the institute. The participants were ensured about strict maintenance of anonymity, confidentiality and protection of all gathered information and use only for research. Kalyani, which is the sub-divisional headquarter of Nadia district was selected purposively out of 19 districts of West Bengal. In Nadia district, beedi work was one of the major occupations at the household level. Kalyani municipality was selected by simple random sampling. This municipality has 20 wards and caters a population of nearly one lakh [12,13]. In the absence of comprehensive nationwide database on the background information of either registered or unregistered beedi rollers, investigators used an incomplete database available from a local Non Government Organization (NGO). The present study was conducted in the four wards among all the resident beedi workers, available during the survey time. No sample size was determined as complete enumeration was done. The workers who had left the job, physically unwell, not in current occupation for at least one year and did not provide consent were excluded. More than 500 beedi workers

were registered with the NGO as evident from an office copy. Data collection was done by the investigators by an interview and general examination with a predesigned data collection tool. The study was explained to each participant individually and a verbal informed consent was obtained. The interview and clinical examination was mostly conducted at their home while closely observing their working condition. Two weeks were allotted for each ward. Initially, one worker was identified in each ward to approach the ward to get help identify other workers. Body weight was measured using a standard portable weighing scale to the nearest 0.1 kg with minimum clothing and without shoes. Height was measured without shoes with help of a wooden stand with steel tape attached to the nearest 0.1 cm. BMI as (kg/m²) was calculated by dividing observed weight (in kg) by height (in square meters) [14]. BP was recorded with calibrated standardised sphygmomanometer in the sitting posture in right upper arm; two readings at five minutes intervals. If high BP ($\geq 140/90$ mmHg) was noted, a third reading was taken after 30 minutes; lowest reading was considered as final. All participants were advised to avoid tea, coffee, smoking, alcohol, and take rest at least 30 minutes before examination [15]. The total procedure for each individual involved 15-20 minutes and data from five to six participants was collected everyday. Adequate privacy was maintained during anthropometric measurements and examinations. A predesigned, semi structured proforma was used to collect data on sociodemographic profile, awareness of hazards, systemic symptoms along with general and anthropometric examination. The proforma was then translated into their local language. After face and content validation by experts, back translation and retranslation was done. During the survey, 125 workers were approached; seven did not give consent, 10 workers were in this occupation for less than one year so not included. The workers who left the job were also not included. Finally, 103 workers participated in the study. The social class, housing status in terms of overcrowding, inadequate lighting and ventilation, awareness of hazards were assessed as per the practical guide book of the concerned department that conducted the study [16]. The self-reported systematic hazards of musculoskeletal, eye, respiratory, cardiovascular system etc., along with presence of high BP and BMI were also assessed in the study. Updated BG Prasad classification (May 2016) was used to determine social class [17]. Overweight was considered with BMI 25 kg/m² or more but less than 30 kg/m² and obesity with BMI 30 kg/m² or more [18]. Hypertension was defined as Systolic Blood Pressure (SBP) more than 140 mmHg and Diastolic Blood Pressure (DBP) more than 90 mmHg [19]. Awareness on hazards of beedi smoking and any available health scheme was enquired. Workers were examined for presence of pallor, clubbing and abnormal gait. The skin of hands was inspected for sensation, tanning, hypopigmented patch.

STATISTICAL ANALYSIS

Data were coded and entered into SPSS Version 16.0 for analysis; descriptive statistics was used for independent variables. Chi-square and Fisher's exact test was calculated to find statistical association between age group, education, social class and hypertension as well as obesity. Odds Ratio (OR), 95% Confidence Interval (CI) was measured by using StatCalc Epi Info version 6.0. An alpha level of 5% was considered significant.

RESULTS

The study had 103 Hindu beedi workers. Mean (\pm SE) age of workers was 38.69 (± 8.53) years. Nuclear family structure was more prevalent (n=60, 58.30%). The average (SE) monthly family income was Rs. 6177.67 \pm 270.90. More than half (57.28%) started beedi rolling in the age range 15 to 25 years [Table/Fig-1]. Nearly, one-third were in this job profile for more than 20 years. The

women worked at home by sitting in uncomfortable posture for long hours. Overcrowding was noted in (n=36, 34.95%) houses, dampness and inadequate lighting was noticed nearly in one in every four houses, while inadequate ventilation was present in (n=21, 20.4%) houses. Regarding safety measures, only (n=30, 29.12%) workers washed their hand after beedi rolling while none of them wore any gloves or masks. The response to the awareness level on any benefitting laws was nil among the respondents. [Table/Fig-2] showed that eyes were most commonly affected followed by musculoskeletal system in majority of participants. Dull aching headache was the most common symptom followed by lower back pain, neck pain, difficulty in vision, palpitation. Epigastric pain after taking food and hyperacidity was in (n=41, 39.81%) and (n=62, 60.19%) respectively. More than half workers had lower limb weakness (n=54, 52.4%) and vertigo (n=60, 58.20%), (n=23, 22.33%) had difficulty in hearing. Pallor was noted in 20 participants and clubbing was observed in (n=9, 8.74%) workers. Skin of the hands showed loss of sensation among five workers. SBP ranged from 90-178 mmHg and DBP ranged from 46-110 mmHg. More than one-third was in pre hypertension stage. Isolated systolic and diastolic hypertension was recorded in (n=17, 16.50%) and (n=5, 4.85%) women respectively. Mean (\pm SE) body weight was 57.12 kg (10.68) and mean BMI (\pm SE) was 25.90 kg/m² (± 4.35); overweight and obesity as noted in (n=46, 44.66%) and (n=14, 13.59%) workers respectively. In bivariate analysis, both high BP (p-value <0.01) and BMI (p-value <0.05) were significantly associated with increasing age but lower education had strong association with high BP (70.9% vs. 41.2%). The variables considered were sociodemographic and economic attributes. The proportion of musculoskeletal symptoms was significantly more among workers who rolled more than 500 beedi per day. Eye problems were more among the workers who were in the profession for more than 20 years and had worked for more than six hours a day (p-value <0.05) [Table/Fig-3,4]. It was noted that both systolic and diastolic blood pressure of the respondents showed ups and downs with advancing age whereas in case of BMI, it was seen that many of the workers were overweight with increasing age [Table/Fig-5,6].

Variables	Frequency (%)	
Age group (years)		
18-27	11 (10.68)	
28-37	35 (33.98)	
38-47	38 (36.89)	
≥ 48	19 (18.44)	
Education		
Illiterate	42 (40.77)	
Primary/middle	44 (42.71)	
Secondary and above	17 (16.52)	
Social class as per modified BG Prasad's Socioeconomic scale, 2016		
Class II	1 (0.97)	
Class III	20 (19.41)	
Class IV	60 (58.25)	
Class V	22 (21.35)	
Descriptive statistics of beedi rolling		
Facts	Range (Maximum, minimum)	Mean (\pm SE)
Age of initiation (years)	44 (50, 6)	21.86 (0.784)
Working days/month	27 (30, 3)	20.04 (0.902)
Duration (months)	420 (432, 12)	184.87 (11.307)
Working hours/day	5 (8, 3)	4.91 (0.144)
Beedi rolled/day	900 (1000, 100)	571.36 (21.381)

[Table/Fig-1]: Background information of study population (n=103).

Morbidities		Age group (years) n (%)			Total n (%)
		18-27	28-37	>37	
Respiratory	Hoarseness	1 (5.00)	6 (30.00)	13 (65.00)	20 (19.41)
	Cough	3 (7.89)	10 (26.31)	25 (65.78)	38 (36.89)
Cardiovascular	Palpitation	4 (7.01)	16 (28.07)	37 (64.91)	57 (55.34)
	Breathlessness	0 (0.00)	12 (37.50)	20 (62.50)	32 (31.06)
Gastrointestinal	Epigastric pain	3 (7.31)	13 (31.70)	25 (60.97)	41 (39.80)
	Hyperacidity	6 (9.67)	17 (27.41)	39 (62.90)	62 (60.19)
Eye	Headache	5 (7.14)	20 (28.57)	45 (64.28)	70(67.96)
	Difficulty in vision	2 (3.22)	12 (19.35)	48 (77.41)	62 (60.19)
	Eye pain	2 (5.55)	10 (27.77)	24 (66.66)	36 (34.95)
	Redness	0 (0.00)	10 (34.48)	19 (65.51)	29 (28.15)
ENT	Vertigo	4 (6.66)	18 (30.0)	38 (63.33)	60 (58.25)
	Difficulty in hearing	2 (8.69)	4 (17.39)	17 (73.91)	23 (22.33)
Musculoskeletal	Low backache	7 (10.29)	18 (26.47)	43 (63.23)	68 (66.01)
	Neckache	5 (7.93)	19 (30.15)	39 (61.90)	63 (61.16)
	Lower limb weakness	5 (9.25)	14 (25.92)	35 (64.81)	54 (52.42)
	Hand weakness	7 (12.06)	17 (29.31)	34 (58.62)	58 (56.31)
Pallor	Present	1 (5.00)	7 (35.00)	12 (60.00)	20 (19.41)
Skin condition	Tanning	2 (6.66)	11 (36.66)	17 (56.66)	30 (29.12)
	Rough	3 (15.78)	2 (10.52)	14 (73.68)	19 (18.44)
Blood pressure	Normal	7 (20.00)	18 (51.42)	10 (28.57)	35 (34.00)
	Pre hypertension	3 (8.57)	7 (20.00)	25 (71.42)	35 (34.00)
	*Hypertension	1 (.03)	10 (30.30)	22 (66.66)	33 (32.00)
Obesity as per BMI	Normal	5 (12.82)	16 (41.02)	18 (46.15)	39 (37.86)
	Overweight	3 (6.52)	13 (28.26)	30 (65.21)	46 (44.66)
	Obesity	1 (7.14)	5 (35.71)	8 (57.14)	14 (13.59)

[Table/Fig-2]: Profile of systematic morbidities reported by beedi workers (n=103). *Isolated systolic and isolated diastolic hypertension, BMI-Body mass index, ENT-Ear, nose and throat

Sociodemographic variables	Over-weight		Statistics	High BP		Statistics
	No	Yes		Yes	No	
Age group (years)						
≤37	22	24	*OR=2.57, **χ ² =4.41, *p=0.03 *CI=1.06-6.26	25	21	OR=5.60, χ ² =13.77, p<0.001 CI=15.31-2.44
>37	40	17		10	47	
Education						
Illiteracy/ Primary	38	48	OR=1.90, χ ² =0.74, p=0.39 CI=0.56-7.46	25	61	OR=0.29, χ ² =4.35 p=0.03 CI=0.08-0.95
Middle/ Secondary/ Higher	5	12		10	7	
Social class as per BG Prasad's SES						
Class II/III	8	13	OR=0.76, χ ² =0.09, p=0.75 CI=0.24-2.24	5	19	OR=0.46, χ ² =1.43, p=0.23 CI=0.12-1.45
Class IV/V	35	43		30	52	

[Table/Fig-3]: Association between socio-demographic variables and hypertension, overweight. *OR=Odds ratio, BP=Blood pressure, CI=Confidence interval, p=significance value **Chi square test was applied

Variables	Morbidities (Frequency)				Overweight/ obesity
	Eye	Musculoskeletal	Hand	Blood pressure	
Age (years) of initiation of beedi making (total number)					
<15 (29)	13	17	11	8	15
15-30 (52)	29	36	26	16	31
>30 (22)	16	16	12	9	14
Statistics	*χ ² =3.97 p=0.137	χ ² =1.36 p=0.506	χ ² =1.63 p=0.442	χ ² =2.27 p=.321	χ ² =0.81 p=0.666

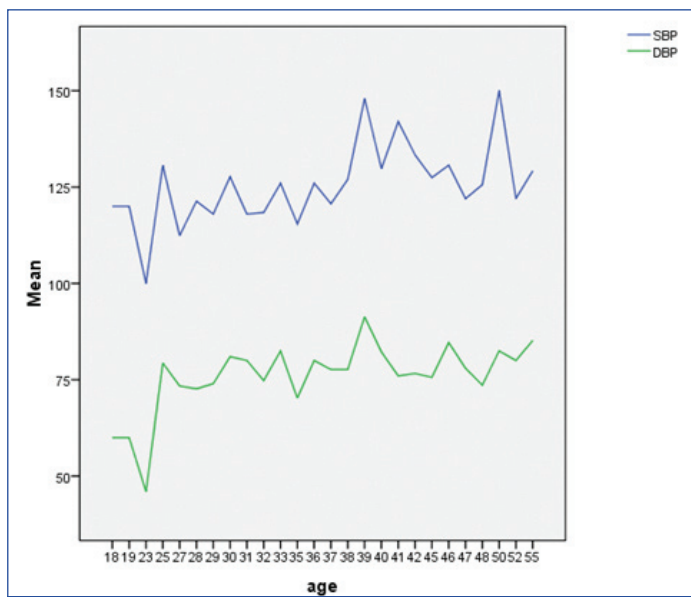
Duration (years) of work (total number)					
1-10 (42)	21	27	21	10	24
11-20 (31)	14	22	14	13	17
>20 (30)	23	20	14	10	19
Statistics	χ ² =7.29 **p=0.026	χ ² =0.36 p=0.834	χ ² =0.18 p=0.913	χ ² =20.22 **p=0.027	χ ² =0.49 p=0.783

Hours per day (total number)					
1-3 (24)	18	18	15	5	11
4-6 (65)	29	40	26	20	39
>6 (14)	11	11	8	8	10
Statistics	χ ² =9.84 **p=0.007	χ ² =2.41 p=0.298	χ ² =4.15 p=0.125	χ ² =5.48 p=0.061	χ ² =2.60 p=0.272

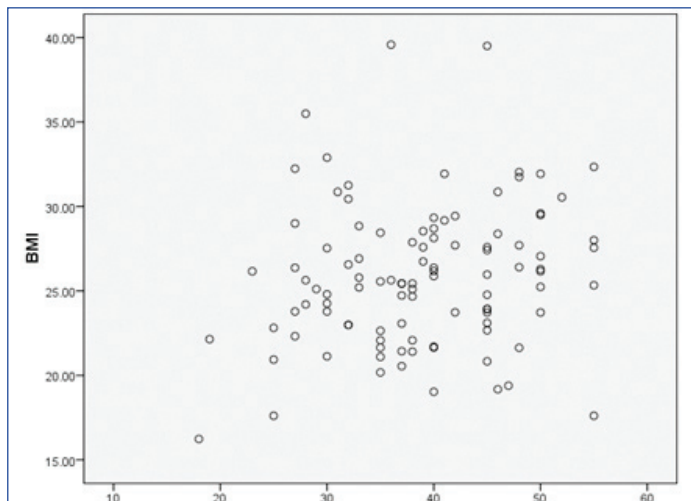
Days/month (total number)					
1-10 (28)	13	20	13	8	17
11-20 (21)	14	15	8	7	13
21-30 (54)	31	34	28	18	30
Statistics	χ ² =2.05 p=0.358	χ ² =0.833 p=0.659	χ ² =1.56 p=0.558	χ ² =5.48 p=0.899	χ ² =0.35 p=0.850

Beedi rolled/day (total number)					
100-500 (61)	34	35	25	17	31
>500 (42)	24	34	24	16	29
Statistics	χ ² =0.02 p=0.525	χ ² =6.25 **p=0.012	χ ² =2.60 p=0.107	χ ² =1.19 p=0.274	χ ² =3.40 p=0.065

[Table/Fig-4]: Association of morbidities with various factors of beedi rolling. *chi-square test was done, **p<0.05



[Table/Fig-5]: Line diagram showing trends of blood pressure with age.



[Table/Fig-6]: Scatter diagram of BMI variation with age.

DISCUSSION

Occupational health hazards are showing an upward trend throughout the world and India is no exception [1,2]. There is a huge impact on their health due to long hours of sitting in uncomfortable posture and regular, consistent exposure to tobacco dust and fumes. Despite a hazardous profession, their health and working conditions have rarely been brought into limelight of public discussion and awareness.

Socioeconomic, Demographic and Environmental Variables

The mean (SE) age of workers 38.69 (± 8.53) years was comparable with coastal Karnataka Study 40.8 (± 11.3) years, while the mean age was more in some other studies [20-24]. Publication from West Bengal and south India reported nearly similar proportion of marriage (91% and 88% vs. 97%) [7,22]. Majority of respondents lived in nuclear family comparable to South Indian studies, though Murshidabad study reported difference in family type with more in favour of joint one and this may be due to geographical difference [7,20,22]. In our study, hypertension was significantly more in respondents with lesser education maybe due to less awareness about the lifestyle correlates. The illiteracy rate in present study found to be quite similar with South India and Mumbai study [20,23]. The illiteracy rate of Murshidabad study was less (6.7%), the difference might be due to the difference in the eligibility criteria of an illiterate, as we included those women who can read or read and write only, in addition to those without any letter introduction [7]. There was wide variation in age group distribution in their study population [Table/Fig-7]. Mumbai slum study using BG Prasad's scale had revealed similar social class structure as present study [Table/Fig-8] [23]. Overcrowding was present in almost all the houses in the south Indian study [22].

Demographic variables	Previous West Bengal study (n=120), %	Our study (n=103), %	Health profile	Previous West Bengal study	Present study
Age group			Chronic cough		
<20 years	13.30	1.90	Yes	76.70	36.90
20-60 years	40.00	98.10	No	23.30	63.10
>60 years	46.70	0.00	Sore throat, hoarseness		
Type of family			Yes	64.20	19.40
Nuclear	39.20	58.30	No	35.80	80.60
Joint	60.80	48.70	Headache		
Education			Yes	72.50	68.00
Illiterate	36.70	40.77	No	27.50	32.00
Primary, middle	50.00	42.71	Weakness in hand		
Secondary and above	13.30	16.52	Yes	55.80	29.10
Marital status			No	44.20	70.90
Unmarried	6.70	1.90	Fatigue/irritation in arm, hand		
Married	91.70	97.10	Yes	59.20	56.30
Divorce/widow	1.70	1.00	No	40.20	43.70
Family size			Blood pressure		
Up to 5 members	29.20	74.70	Normal, low	34.10	34.00
>5 members	70.80	25.30	High	65.80	66.00

[Table/Fig-7]: Discussion on variables of a West Bengal study vs. present study.

Mean duration of work, average working hours and rolled beedi per day was quite similar to our study. Most of the women joined this job due to financial burden and family tradition [20,22-25]. The starting age of beedi rolling was similar to previous studies. Women worked on daily wages like in the previous studies [22,23].

Morbidity profile: Beedi rolling is an important cause of significant health hazards as cited by the International Labour Organisation

Variables	Coastal Karnataka study (n=439)	Mangalore study (n=100)	Mumbai study (n=52)	Present study (n=103)
Prevalent age group (year)	35-44 (32%)	35-44 (32%)	40-50 (26.9%)	38-47 (33.9%)
Mean age (year)	40.8	36	45	38.6
Gender				
Female	98.2%	100.0%	100.0%	100.0%
Male	1.8%	0.0%	0.0%	0.0%
Variables (Misc.)				
Hindu		96.0%	100.0%	100.0%
Muslim/Christian		3.0%	0.0%	0.0%
Illiterate	22.0%	57.0%	42.3%	40.7%
Married	75.0%		88.0%	97.0%
Social status				
*Higher PCI	40.3%	0.0%	**Class III (25.0%) Class IV(42.3%)	20.3%
Lower PCI	50.7%	100.0%		79.7%
Duration of beedi rolling (in years)				
1-10	24.0%	31.0%		31.1%
11-20	32.0%	30.0%		36.0%
>20	44.0%	39.0%	26.9%	32.9%
Average working day/ (month)	5.24	5		20.0
Average working hours/ (day)	5.6	5	8	4.9
No. of beedi rolled/(day)	300-800	300-500	500-1000	100-1000

[Table/Fig-8]: Discussion on background information of beedi workers with factors of beedi rolling in previous studies with present study.

*PCI=Per capita income, ** BG Prasad's scale

that there is exacerbation of different health hazards like asthma, anaemia, giddiness, vertigo, postural problems, eye problems among beedi workers [23]. Mangalore study reported less prevalence of breathlessness and palpitation than our study [26]. Other research groups also found breathlessness and ischaemic heart disease [20-22]. Cough, common cold, sore throat, sneezing were reported in earlier studies with variable proportions (9-76% vs. 30%) [7,20,22,26-28]. Previous studies reported wide variety of eye symptoms as found in our study [21-23,25]. Mittal S et al., study also reported similar eye problems [25]. Musculoskeletal system was the most commonly involved system in addition to eye. Earlier studies also supported the findings [7,21-24,26]. The study of Murshidabad district showed that some symptoms were more among their workers while the proportion of some morbidity corroborated with our findings. The improvement of respiratory symptoms in workers of present study might be as a result of less pollution and better housing condition than the reference study [Table/Fig-8]. The prevalence of pallor reported was less than the South India study (19.41% vs. 40%). The difference was attributed to the gap between laboratory findings and observation [Table/Fig-9] [20]. Skin diseases like allergy, callosities, tanning was also reported from other studies [24,25,27]. The mean height (1.50 mm vs. 1.48 mm) of the workers was close to present study, but the weight was more in current one (51.82 kg vs. 57.12 kg) [21]. The proportion of beedi workers with high BP in a study from West Bengal was similar to current study (65.80% vs. 66%) [7]. Age, education status, social class, number of working hours, duration of work was associated with different health hazards. The present study also revealed similar results [21,25, 27]. The present study revealed that more than one third respondents are not literate and the living condition is inadequate. The workers

Morbidities	Mangalore study	Mumbai study	Present study
Cough	32.0%	13.5%	36.8%
Breathlessness	14.0%	21.2%	31.0%
Palpitation		36.5%	55.3%
Headache	36.4%	32.7%	67.9%
Blurring of vision	13.0%	26.9%	60.1%
Double vision		23.5%	18.4%
Low back pain	35.0%	78.8%	66.0%
Weakness of hand	13.0%	7.7%	29.1%
Pallor	15.0%	75.0%	19.4%
Hyperacidity/ Epigastric pain	39.0%	23.1%	39.8%

[Table/Fig-9]: Discussion on morbidity profile of beedi workers of present study with previous studies.

rarely practiced any safety measures and were completely unaware of any laws benefitting them. Some morbidity are significantly more with increasing working hours cum years, age of workers and also with more number of beedi rolling. Many workers of the unorganised sectors still lived with morbidities without self concern.

LIMITATION

The study would be more appreciable if some aspects on the social security measures could be included. As the study was a self-financed study within stipulated time, therefore, the subclinical cases could not be identified. The recall bias of the participants may not reveal the actual morbidity scenario. Therefore, a multi-centric elaborative study can be done in future including integrating laws and policies. Qualitative research will be the best kind of research for exploring the specific issues.

CONCLUSION

The present research highlighted the role of women in household finance. The most common system involved was musculoskeletal followed by eye, respiratory system. Awareness regarding adverse effects of beedi rolling and safety measures were very poor among the workers.

ACKNOWLEDGEMENTS

We sincerely express our heartfelt thanks to all the participants who had cooperated with the researchers, in their busy hours with a smiling face and hospitality. We also duly acknowledge our students for data collection under supervision of investigators. Mrs. Papia Das, the local health worker for her consistent support in the field that made the project have a smooth run all along.

REFERENCES

- [1] Singh JK, Singh P. Occupational exposure and health risks in women beedi workers in India: A review. *Int J Humanities Soc Stud.* 2015;3(10):45-53.
- [2] Nag A, Vyas H, Nag P. Occupational health scenario of Indian informal sector. *Ind Health.* 2016;54(4):377-85.

- [3] Bentley TA, Parker RJ, Ashby L, Moore DJ, Tappin DC. The role of the New Zealand forest industry injury surveillance system in a strategic ergonomics, safety and Health research programme. *Appl Ergon.* 2003;33(5):395-403.
- [4] Report on evaluation studies on implementation of the minimum wages act, 1948 in beedi Making establishments in Madhya Pradesh. Labour Bureau, Government of India. [online] (cited on 2017 Jun 15). Available from: <http://labourbureau.nic.in/MW3ch2.htm>.
- [5] Dheepa T, Karthikeyan P. Socio-economic stratum and social security of beedi workers in India: a literature standpoint. *Intercontinental J Human Resource Res Rev.* 2017;5(2):07-15.
- [6] Banu K, Sitalakshmi R, Padmavathi R. Pulmonary functions among beedi rolling workers of south India-a cross sectional study. *Int J Biomed Adv Res.* 2014;5(1):31-34.
- [7] Mukherjee M, Goswami A, Mazumdar D, Pal B. A study on health profile of beedi workers in West Bengal, India. *Int J Adv Res Manag Soc Sci.* 2014;3(8):17-25.
- [8] Singh JK, Rana SVS, Mishra N. Occupational health problems amongst women Beedi rollers in Jhansi, Bundelkhand region, Uttar Pradesh. *J Ecophysiol Occup Health.* 2014;14(1-2):17-22.
- [9] Umadevi B, Swarna M, Padmavathi P, Jyothi A, Reddy PP. Cytogenetic effects in workers Occupationally exposed to tobacco dust. *Mutation Res.* 2003;535(2):147-54.
- [10] Waii BS, Raut PD. Lung volume study of female workers in tobacco processing units. *Int J Res Zool.* 2013;3(1):01-03.
- [11] Bharara K, Sandhu P, Sidhu M. Issues of occupational health and injuries among unskilled female labourers in construction industry: a scenario of Punjab state. *Stud Home Com Sci.* 2012;6(1):01-06.
- [12] Kalyani population census 2011. [online] 2011 (cited 2017 Jun 5). Available from: <http://www.census2011.co.in/data/town>
- [13] Statistical Information, Nadia district, West Bengal. [online] 2014 (cited 2017 Jun). Available from: <http://nadia.gov.in>
- [14] WHO expert committee. Physical status: the use and interpretation of anthropometry. WHO Tech Rep Series.1995;854:424-38.
- [15] Rose GA, Blackburn H, Gillum RF, Prineas RJ. Cardiovascular survey methods. 2nd ed. WHO Monograph Series.1982:56.
- [16] Practical guide book on family health care. Department of community medicine, College of medicine & JNM Hospital. 2nd ed. 2016;pp.55-56.
- [17] Vasudevan J, Mishra AK, Singh Z. An update on BG prasad's socioeconomic scale: 2016. *Int J Res Med Sci.* 2016;4(9):4183-86.
- [18] Defining adult overweight and obesity. Centre for disease control and prevention. [online] (cited 2017 Jun 15 2016). Available from: <https://www.cdc.gov/obesity/adult/defining.html>
- [19] Park K. Park's text book of preventive and social medicine; 23rd ed. Jabalpur. M/S Banaroidas Bhanot Publishers. 2015: 373-399.
- [20] Ramakrishnappa V, Kumari MP, Vishwanatha. Unorganized workers in beedi industry: a study on women beedi rollers of Karnataka, India. *Int J Soc Sci.* 2014;3:325-34.
- [21] Madhusudan M, Patil D, Jayaram S. Occupational health profile of beedi workers in coastal Karnataka. *Nat J Com Med.* 2014;5(2):157-60.
- [22] Thomas RA, Cheriamane DC, Irfan. A cross sectional study on health profile of female beedi rollers in a rural area in Mangalore. *IOSR J Dent Med Sci.* 2015;14(12):10-14.
- [23] Sabale RV, Kowli SS, Chowdhary PH. Working condition and health hazards in beedi rollers residing in the urban slums of Mumbai. *Indian J Occup Environ Med.* 2012;16(2):72-74.
- [24] Kumar NS, Bharathi PS. A study on occupational health hazards among women beedi rollers in Tamilnadu, India. *Int J Curr Res.* 2010;11(1):117-22.
- [25] Mittal S, Mittal A, Rengappa R. Ocular manifestations in bidi industry workers: possible consequences of occupational exposure to tobacco dust. *Indian J Ophthalmol.* 2008;56(4):319-22.
- [26] Anil M, Machado L, Sequeira A, Prasanna KS, Subramanya J. Study of morbidity pattern of female beedi workers in the urban field practice area of Mangalore, southern India. *Int J AJ Med Sci.* 2012;1(1):41-46.
- [27] Kanagavalli R. Common health hazards among beedi workers. *Inter J Mod Eng Res.* 2015;5(6):43-45.
- [28] Yasmin S, Afroz B, Hyat B, D'Souza D. Occupational health hazards in women beedi rollers in Bihar, India. *Bull Environ Contam Toxicol.* 2010;85(1):87-91.

PARTICULARS OF CONTRIBUTORS:

1. Assistant Professor, Department of Community Medicine, College of Medicine and JNM Hospital, West Bengal University of Health Sciences, Kalyani, West Bengal, India.
2. Assistant Professor, Department of Community Medicine, College of Medicine and JNM Hospital, West Bengal University of Health Sciences, Kalyani, West Bengal, India.
3. Professor, Department of Community Medicine, ESIC Medical College, Faridabad, Haryana, Faridabad, Haryana, India.
4. Professor, Department of Community Medicine, College of Medicine and JNM Hospital, West Bengal University of Health Sciences, Kalyani, West Bengal, India.
5. Assistant Professor, Department of Community Medicine, College of Medicine and JNM Hospital, West Bengal University of Health Sciences, Kalyani, West Bengal, India.

NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:

Dr. Gandhari Basu,
Abakash, Port Blair Lines, Chiriamore, Barrackpore, Kolkata-700120, West Bengal, India.
E-mail: gandhari.basu@gmail.com

FINANCIAL OR OTHER COMPETING INTERESTS: None.

Date of Submission: **Jun 29, 2017**
Date of Peer Review: **Aug 18, 2017**
Date of Acceptance: **Jan 15, 2018**
Date of Publishing: **Mar 01, 2018**