



# Plagiarism Checker X - Report

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# 1 Exploring Health Problems among Lead Acid Storage Battery Workers in Dhaka City, Bangladesh

## ABSTRACT

This was a cross sectional study. A total 100 correspondents were interviewed and examined to find out the health problem due to exposure to lead in lead acid storage battery factories. The respondents were selected purposively from 11 lead acid storage battery factories in Dhaka city. Data were collected by the researcher using a pretested questionnaire and check list. All respondents were male with ages ranging from 14-50 years. There were 18 respondents among the age group of 14-18 years who are vulnerable group prone to lead poisoning. The study revealed that most of the factories do not follow the factory rules. During manufacturing process the workers handle the lead plate, lead oxide with naked hands, so frequent lead contamination occurs which ultimately ingested with food. Out of 100 respondents 85 had positive clinical signs and symptoms attributable to lead poisoning. The dominant findings were progressive weakness, loss of appetite, constipation, abdominal pain, muscle and joint pain, anaemia and temper. 4 respondents were found hypertensive. The severity of the symptoms increased with the length of job duration. It was observed that there was a relationship between age with clinical signs and symptoms. The association between clinical symptoms with age and job duration was also statistically significant. There was no provision for medical or other facilities. The personal hygiene status was found good. The safety measures taken by the respondents were very poor, only 15% used hand gloves, This study could not identify the relationship between clinical signs and symptoms with previous work experience, level of education, status of personal hygiene and safety measures used.

## INTRODUCTION

Metallic pollution of the environment from anthropogenic sources constituted a major health hazard to human and animal of this earth including our country Bangladesh. This

has led to global concern for imperceptible effect of heavy metals like lead in respect of immediate and long term hazard to the environment. In developed countries, lead

poisoning no longer occupies the predominant position it once did. By contrast, in developing countries, lead poisoning is still commonplace, and on a world wide scale it remains the most common of the occupational poisonings. Lead is released into the environment primarily through air by burning of gasoline and solid wastes and breaking and manufacturing of <sup>1</sup> lead acid storage batteries, the largest used category, tend to be recycled. There <sup>2</sup> are large number of occupations where exposure of lead occur in our country like lead acid storage battery industries. Lead is also used in organic form as tetraethyl lead and tetramethyl lead in petroleum. This lead is released into environment as inorganic after its impartial combustion by motor vehicles. So large numbers of people are exposed to lead poisoning. Fortunately emissions of lead into air have declined dramatically in recent years. Lead may also enter human body through contamination of nails and skin, drinking water, vegetable, fruit, fish and meat.

In <sup>2</sup> Bangladesh there are some people working in lead acid storage battery industries and most of these factories do not follow factory acts and rules and they are handling toxic metal and chemical such as lead, sulphuric acids without knowing its hazard. Conventional method are used to manufacture as well as breaking the lead battery. The break the battery to reclaim the lead and plastic content. <sup>3</sup> Exposure to lead fumes and dust routinely occur during the procedures in which metallic lead plates coated with lead oxide and lead sulphate are removed from the plastic case. To decase the battery, torches are used to cut through the outer case, creating additional lead fumes, nails and skin contamination also occurs during manufacturing process of the battery. The impact of lead on health is generally cumulative. As a result, prolonged exposure to trace amount of lead is dangerous for human body. <sup>9</sup> In accordance with toxicity and data obtained from clinical investigations and various other studies such as animal experiments, very low allowable limit has been recommended by various regulatory authorities for lead in

working place and environment.

There was no study yet concluded <sup>2</sup> to determine the health problems among lead acid storage battery workers in Bangladesh. The present study was aimed to determine the health effect of lead among some of the exposed persons. So that by detecting the magnitude of the problem, proper measures can be taken.

## JUSTIFICATION OF THIS STUDY

In Bangladesh here is no lead mine. All lead is imported from foreign countries, this is used after smelting <sup>1</sup>. Most of the lead imported as different lead compound. There are large number of occupations where exposure of lead occur in our country like lead acid storage battery manufactures. Paints, <sup>2</sup> composer of printing press, worker of grinding cutting by power tools of lead welders, foundry workers and other workers where lead and lead compound have been used. Lead is also used organic form as tetraethyl lead and tetramethyl lead in petroleum. This lead is released in the environment as inorganic after its impartial combustion by Motor vehicles. So large numbers of people are exposed to lead. Fortunately emissions of lead into airs have declined dramatically in recent years because of progressive restrictions <sup>12</sup> of the lead content of gasoline and the increase use of unleaded gasoline. 'Lead may also enter human body through contamination of nails and skin, drinking water, vegetable, fruit, fish and meat.

In <sup>2</sup> Bangladesh there are some people working in Lead acid storage battery factories and most of these factories do not follow the factory acts and rules and use conventional method to manufacture as well as breaking the lead battery. <sup>1</sup> Exposure to lead fumes and dust routinely occur doing manufacturing. Nails and skin contamination also occurs.

In abroad some studies were done on lead acid storage battery workers but there was no such study yet done in Bangladesh. The study result will help to detect the magnitude of

the problem and the outcome of this study may provide necessary guidelines of improvement of working environment and to make awareness in the study population about the ill effect of lead exposure and also be useful for recommendation in preventing **12 lead exposure in** battery workers.

## RESEARCH QUESTION

**What are the** health problems amongst lead acid storage battery workers?

## OBJECTIVES

### A.GENERAL OBJECTIVE.

To identify the health problems amongst **1 lead acid storage battery workers.**

### B. SPECIFIC OBJECTIVE

- 1) To identify the morbidities amongst **lead acid storage Battery workers.**
- 2) To identify the morbidities in relation to the duration of working hours and **length of job duration.**
- 3) **To find out the** number of workers using personal protective device and maintaining personal hygiene.
- 4) To determine the socio demographic characteristics of **lead acid storage battery workers.**

## VARIABLE

In the study following variables were considered.

#### DEPENDENT VARIABLE

- 1) Sign and symptoms attributable to lead poisoning
  - a) Haemopoetic system: Anaemia
  - b) Nervous system: Muscle and joint pain Progressive weakness Full drop wrist drop Tremor.
  - c) G. I system: Loss of appetite. Blue line along the gum abdominal pain Vomiting Diarrhoea. Constipation
  - d) Cardiovascular system: Hypertension

#### INDEPENDENT VARIABLE

- 1) Age
- 2) Sex
- 3) Marital Status
- 4) Duration of exposure
- 5) Working hours.
- 6) Educational qualification.
- 7) Income
- 8) Exposure in previous occultation
- 9) Safety measures.
- 10) Personal hygiene
- 11) Medical facilities.
- 12) Other facilities.

## OPERATIONAL DEFINITION

Progressive weakness: Complain of weakness which is increasing day by day after joining the job.

Lead colic/ Abdominal pain: Occurrence of cramping pain in the abdomen which is localized around of bellow the umbilicus after joining the job.

Lead Line: Blue or grey pigmented line may be present on the dental margin of the gums which is associated with poor dental hygiene with lead exposure.

**1 Lead acid storage battery workers:** The Workers who are primarily concerned with manufacturing process and also breaking of **lead acid storage battery.**

Wrist drop/Foot drop: Asked and examined the patient it there was any loss of sensation, weakness or paralysis of hand or food.

Neurological or psychological problem: Asked the patient about the complain of lethargy, slowness of performance, excessive sleep, confusion, mania and change of personality after joining the job.

Personal hygiene: Total six **17** questions were asked to the respondents to assess the personal hygiene. Each answer of the question carried 1 point for "no" and 2 points for "yes" then summations of pints were done and the **1** status of personal hygiene was classified as bellow:

- a) Poor hygiene:  $\leq 8$
- b) Moderate hygiene: 9.10
- c) Good hygiene: 11.12

#### METHODOLOGY:

##### STUDY DESIGN:

It was a cross sectional study.

##### STUDY AREA:

The study was carried out in 11 lead acid storage factories in Dhanmondi, Mohammedpur and Waizghat of Dhaka city.

##### STUDY PERIOD:

The study was conducted over a period of 12 weeks extending from 1st January to 30th March, 2017. For convenience of work a schedule of activity (work flow chart) was prepared at the beginning of the study and assignments were accomplished as per schedule.

##### STUDY POPULATION:

The study population included the workers who are primarily concerned with manufacturing process and also breaking of lead acid storage battery.

##### SAMPLING TECHNIQUE:

Purposive sampling technique has been followed in this study. 1 A total 100 samples were collected.

##### SAMPLE SIZE:

Before starting my data collection I estimated that I could collect data from 8-10



respondents per day. I collected data from the respondents for 10 days. In this way the sample size became 100.

#### DATA COLLECTION TOOLS:

Inclusion of all key variables as per general and specific objective of the study, a questionnaire was developed and pretested and required alternation and modified were made. A check list was also made to collect the physical findings regarding anaemia. Tremor and blood pressure.

#### DATA COLLECTION METHOD:

Data collection was done by the researcher himself. Before interviewing, the purpose of the study was explained to the respondent and verbal consent taken from the respondent. Questionnaire part was filled in through direct interview and physical examination was done including measurement of blood pressure.

#### DATA ANALYSIS:

The collected data were checked for any errors then edited and entered into the computer in SPSS Version 11.5 and necessary analysis was done. Statistical test of significance also done where necessary.

#### RESULT:

Table No-1:

Distribution of the respondents by Age and Sex:

Sl. No.

Name of Variables

No. of Respondents

Percentage

1`

Age (in groups)

≤20 years

21-30 years

>30 years

33

54

13

33%

54%

13%

2

Gender

Male

Female

100

0

100%

0.0%

Mean of Age= 23.80 years and SD= 6.35 years

Out of 100 respondents it was found that in 9 age group of  $\leq 20$  years. Number of respondents were 33 (33.0%), in the age group 21-30 years. Respondents were 54 (54%) and in the age group  $>30$  years respondents were only 13 (13%). These findings show that highest percentage lie in 1 the age group of 21-30 years which is the main working population in the lead acid storage battery factories. The mean age of the study population was 23.80 years with SD 6.35. The minimum age was 14 years and the maximum age was 50 years. Out of 100 respondents there was no female worker.

Table No-2

Distribution of respondents by religion and marital status.

Sl. No

Name of Variables

No. of Respondents

Percentage

1

Religion

Islam

Hindu

86

14

86%

14%

2

Marital Status

Married

Unmarried

38

62

38%

62%

The total population 100 shows that 86 (86%) were Muslims and 14 (14%) were Hindu. On the basis of marital status, the study population was classified into married and unmarried among which majority were unmarried 62 (62%) and 38 (38%) were married.

Table No.-3

Distribution of the respondent by educational status and monthly income

Sl. No

Name of Variables

4 No. of Respondents

Percentage

1

Educational Status

Illiterate

Class 1-5

Class 6-10

8

50

42

8%

50%

42%

2

Monthly income

≤2000 Tk

2001-3000 Tk

3001-4000 Tk

>4000 Tk

38

31

15

16

38%

31%

15%

16%

Mean= 2574.16 Tk SD=1252.66

The educational status of the respondents shows that only 8 (8%) were illiterate and majority of the respondents 50 (50%) were in the group of class and 42 (42%) were in the group of class 6-10. The 15 monthly income of the respondents of the study indicates that 38 (38%) had monthly income less than 2000tk 31(31%) had monthly income of 2001-3000 Tk, 15 (15%) had 3001-4000 Tk and 16 (16%) workers had income over 4000 Tk.

Figure-2

8 Distribution of the respondent according to their duration of job in lead acid storage battery factory

Mean= 6.06 years with SD 6.08; Min duration 3 Months and max duration 28 years.

Figure 1 shows that 1 out of 100 respondents 68 (68%) had work experience in lead acid storage battery factory equals or less than 5 years and 32 (32%) had work experience more than 5 years.

Figure-3

Figure 3 shows that 29 (29%) respondents had equal or less than 10 hours of working duration and 71 (71%) had more than 10 hours of working duration. The mean working duration was 11.05 hours with SD 1.66.

Table-4

Distribution of respondents by their <sup>1</sup> previous work experience

Previous work Experience

Frequency

Percentage

Battery Making

9

22%

Cultivator

9

22%

Motor garage workers

6

14.59%

Shop keeper

6

14.59%

Lead worker

4

9.75%

Others

7

17.07%

Total

41

100%

Table 2 shows that **previous work experience** of the respondents, **out of 100 respondents** 41 (41%) had **previous work experience** among them 9 (22%) respondents worked at **lead acid storage battery** factory, 9 (22%) were cultivators, 6 (14.59%) were motor garage workers, 6 (14.59%) were shop-keepers, 4 (9.75%) were lead workers and 7 (17.07%) respondents came from other occupations which include rickshaw puller 2, leather factory worker 2, carpenter 1, press worker 1 and a truck helper.

Figure-4

Distribution of the respondents according to the result **1** of Personal Hygiene

Figure 4 shows the **status of personal hygiene**. **Out of 100 respondents** 3 had poor hygiene, 13 (13%) had moderate hygiene and the majority 84 (84%) had good **personal hygiene status**.

Figure 5

Distribution of respondents by using Personal Protective Equipment (PPE)

Figure 5 shows that the safety measure **taken by the respondents** in working place **out of 100 respondents** 15 (15%) used personal protective equipment (PPE) whereas 85 (85%) did not use PPE.

Table -5

**8** Distribution of the respondents according to their sign and symptoms:



Signs and symptoms

Yes

No

Duration in month

Total

Mean

SD

Min

Max

100

Progressive Weakness

74(74%)

26 (26%)

13.14

15.49

1

96

Loss of Appetite

46(46%)

54 (54%)

12.36

16.03

1

60

Constipation

53(53%)

47 (47%)

10.23

13.20

1

60

Abdominal Pain

28(28%)

72 (72%)

14.50

23.21

1

96

1 Muscle and Joint Pain

26(26%)

74 (74%)

14.44

15.06

1

60

Anaemia

57(57%)

43 (43%)

-

-

-

-

Tremor

13(13%)

87 (87%)

37.15

46.33

3

180

Out of 100 respondents 74 (74%) had progressive weakness with mean duration of 13.14 months and SD 15.49, 46 (46%) had a loss of appetite with mean duration of 12.36 months and SD 16.03, 53 (53%) had constipation with mean duration of 10.23 months and SD 13.20, 28 (28%) had abdominal pain with mean duration of 14.50 months and SD 23.21, 26 (26%) had muscle and joint pain with mean duration of 14.44 months and SD 15.06, 57 (57%) had anaemia and 13 (13%) tremor with mean duration of 37.15 months and SD 46.33. the minimum duration was 1 months for all symptoms except tremor which was 3 months and maximum duration was 96 months for progressive weakness and abdominal pain, 60 months for constipation, 1 muscle and joint pain and loss of appetite 180 months for tremor. The above findings indicate the 4 majority of the respondents complained of progressive weakness and the lowest no of respondents complained of tremor.

Figure 6

Distribution of respondents by Clinical 6 signs and symptoms:

The graph was drawn from table 5 showing the frequency of positive signs and symptoms.

Table-6

5 Distribution of the respondents by systolic and diastolic BP

Category of diastolic BP

Category of systolic BP

<90 mm of Hg

>90mm of Hg

<130mm of Hg

>130 mm of Hg

Frequency

96

4

73

27

Percentage

96%

4%

73%

27%

Out of respondents 96 (96%) had diastolic pressure less than 90mm of Hg and 4 (4%) had more than 90mm of Hg. In case of systolic pressure 73 (73%) had less than 130mm of Hg and 27 (27%) had more than 130mm of Hg. The above result shows that 4 respondent had hypertension whose diastolic pressure had more than 90 mm of Hg.

Table: 7

Distribution of respondents by Age and clinical signs and symptoms.

Duration of Job in years

1 Progressive Weakness

Loss of Appetite

Constipation

Abdominal Pain

Muscle and joint pain

Anaemia

Tremor

Yes

No

Yes

No

Yes

No

Yes

No

Yes

No

Yes

No

Yes

No

≤20 years

44

24

29

39

29

39

12

56

6

62

31

37

2

66

21-30 years

48

6

28

26

39

15

19

35

15

39

40

14

9

45

>30 years

12

1

9

4

7

6

6

7

9

4

10

3

3

10

Total

74

26

46

54

53

47

28

72

26

74

57

43

13

87

X2 Value

9.54

0.962

9.14

11.30

32.58

11.29

19.01

P Value

0.000

0.016

0.000

0.009

0.000

0.000

0.095

Out of 100 respondents the age group below 20 years, 14 (42.42%) had progressive weakness, 9 (27.2%) had loss of appetite, 7 (21.2%) had constipation, 3 (9.09%) had abdominal pain, 2 (6.0%) had muscle and joint pain, 7 (21.2%) had anaemia and 1 (3.03%) had tremor. Age group between 21-30 years 48 (88.88%) had progressive weakness, 28 (51.85%) had loss of appetite, 39 (72.22%) had constipation, 19 (35.18%) had abdominal pain, 15 (27.77%) had muscle joint pain, 40 (74.07%) had anaemia and 9 (69.23%) had tremor. Age group of above 30 years 12 (92.30%) had progressive weakness, 9 (69.23%) had loss of appetite, 7 (53.85%) had constipation, 6 (46.15%) had abdominal pain, 9 (69.23%) had muscle and joint pain, 10 (76.93%) had anaemia and 3 (23.07%) had tremor. The table indicates the maximum frequency of 16 clinical signs and symptoms were in the age group between 21-30 years. The statistical result shows significant association between age and clinical signs and symptoms except for tremor.



TABLE: 8

Distribution of the respondents by Job duration and **1 clinical signs and symptoms:**

Duration of Job in years

Progressive Weakness

Loss of Appetite

Constipation

Abdominal Pain

Muscle and joint pain

Anaemia

Tremor

Yes

No

Yes

No

Yes

No

Yes

No

Yes

No

Yes

No

Yes

No

≤5Yrs

44

24

29

39

29

39

12

56

6

62

31

37

2

66

>5yrs

30

2

17

15

24

8

16

16

20

12

28

6

11

21

Total

74

26

46

54

53

47

28

72

26

74

57

43

13

87

X2 Value

9.54

0.962

9.14

11.30

32.58

11.29

19.01

P Value

0.002

0.3237

0.002

0.001

0.000

0.001

0.000

1 The respondents who worked in Lead acid storage battery factory less than 5 years. Among them 44 (64.70%) had progressive weakness. 29 (42.64 %) had loss of appetite, 29(42.64%) had constipation, 12(17.65%) had abdominal pain, 6(8.82%) had muscle and joint pain, 31(45.58%) had anaemia and 2 (3.0%) had tremor. The respondents who worked more than 5 years 30 (93.75%) had progressive weakness, 17 (53.12%) had loss of appetite, 24 (75.0%) had constipation, 16 (50.0%) had abdominal pain, 20 (62.50%) had muscle and joint pain 26 (81.25%) had anaemia and 11 (34.38%) had tremor. The result suggests that more duration of job, the more prevalence of clinical signs and symptoms except for loss of appetite and this association was also statistically significant.

Table-9

4 Distribution of respondents by number of clinical symptoms and job duration

Duration of job in years.

≤ 3 Symptoms

4-5 symptoms

>5 symptoms

Total

≤5 years

34

18

2

54

>5years

7

12

12

31

Total

41

30

14

85

$\chi^2 = 21.47, P = 0.000$

Table 9 shows that the respondents who 7 had less than 5 years job experience, among them 34 (62.00%) had less than 3 symptoms, 18 (33.3%) had 4-5 symptoms, 2 (3.70%) had more than 5 symptoms and the respondents who had more than 5 years. Job experience 7 (22.5%) had less than 3 symptoms, 12 (38.70%) had 4-5 symptoms and 12 (38.70%) had more than 5 symptoms. There is a positive association between 1 length of job duration and frequency of symptoms which was also statistically significant.

TABLE-10

Distribution of the respondents by working hours and clinical signs and symptoms.

Working hours

Progressive Weakness

Loss of Appetite

Constipation

Abdominal Pain

Muscle & joint pain

Anaemia

Tremor

Yes

No

Yes

No

Yes

No

Yes

No

Yes

No

Yes

No

Yes

No

<10 hours

20

9

8

21

11

18

8

21

6

23

14

15

4

25

> 10 hours

54

17

38

363

42

29

20

51

20

51

43

28

9

62

Total

74

26

46

54

53

47

28

72

26

74

57

43

13

87

The respondents whose work duration were less than 10 hours among them 20 (68.96%) had progressive weakness, 8 (27.58%) had **loss of appetite**, 11 (37.93%) had constipation , 8 (27.58%) had abdominal pain , 6(20.68%) had **muscle and joint pain** , 14 (48.27%) had anaemia and 4 (13.79%) had tremor and the respondents whose work duration were more than 10 hours among them 54 (76.05%) had progressive weakness, 38(53.52%) had **loss of appetite**, 2(59.15%) had constipation, 20(28.16%) had abdominal pain 20 (28.16%) had **muscle and joint pain** , 43(60.56%) had anaemia and 9(12.67%) had tremor. The table shows that the respondents whose work duration more than 10 hours had more **positive clinical signs and symptoms** but the result fails to demonstrate any statistically significant association between working hours and **clinical signs and symptoms**.

Table -11

Previous experience

**Progressive Weakness**

**Loss of Appetite**

**Constipation**

**Abdominal Pain**

**Muscle & joint pain**

**Anaemia**

**Tremor**

**Yes**



No

Yes

No

Yes

No

Yes

No

Yes

No

Yes

No

Yes

No

Battery workers

8

1

6

3

5

4

5

4

6

3

8

1

2

7

Motor garage workers

5

1

4

2

5

1

4

2

3

3

5

1

1

5

Distribution of the respondents by previous work experience and clinical signs and symptoms.

The respondents who previously worked in lead acid storage battery factory, among them 8(88.8%) had progressive weakness, 6(66.6%) loss of appetite, 5(55.5%) had constipation, 5(55.5%) had abdominal pain, 6(66.6%) had muscle and joint pain, 8(88.8%) had anaemia and 2(.22%) had tremor. 1 The respondents who were previously motor garage workers, among them 5(83.33%) had progressive weakness, 4(66.6%) loss of appetite, 5(83.3%) had constipation, 4(66.6%) had abdominal pain, 3(50.0%) had muscle and joint pain, 5(83.3%) had anaemia and 1 (16.66%) had tremor. The results fail to show statistically significant association between previous work experience and clinical signs and symptoms.

Table – 12

Distribution of the respondents according to their **level of education** and **clinical signs and symptoms**.

Level of education

Progressive Weakness

Loss of Appetite

Constipation

Abdominal Pain

Muscle & joint pain

Anaemia

Tremor

Yes

No

Yes

No

Yes

No

Yes

No

Yes

No

Yes

No

Yes

No

Illiterate

7

1

6

2

6

2

1

7

1

7

4

4

0

8

Class 1-5

32

18

17

33

21

29

7

43

9

41

22

28

4

46

Class 6-10

35

7

23

19

26

16

20

22

16

26

31

11

9

33

Total

74

26

46

54

53

47

28

72

26

74

57

43

13

87

8 respondents were illiterate among which 7(87.50%) had progressive weakness, 6(75.0%) had loss of appetite, 6(75.0%) had constipation, 1 had (12.50%) abdominal pain, 1 (12.50%) had muscle and joint pain, 4(50.0%) had anaemia and tremor was absent. The respondents who were in the group of class 1-5 among them 32(64.0%) had progressive weakness, 17(34.0%) had loss of appetite, 21(42.0%) had constipation, 7 had (14.05) abdominal pain, 9(18.0%) had muscle and joint pain, 22(44.0%) had anaemia and 4(8.0%) had tremor. Among the respondents who were in the group of class 6-10 among which 35(83.0%) had progressive weakness, 23(54.0%) had loss of appetite, 26(61.90%) had constipation, 20(47.61%) had abdominal pain, 16(38.09%) had muscle and joint pain, 31(73.80%) had anaemia and 9(21.42%) had tremor. The table shows that 13 the prevalence of clinical signs and symptoms were more among class group of 6-10 than that of other but the result failed to demonstrate the significant statistical association based education level and clinical signs and symptoms.

TABLE – 13

5 Distribution of the respondents by using PPE and clinical signs and symptoms.

Using PPE

1 Progressive Weakness

Loss of Appetite

Constipation

Abdominal Pain

Muscle & joint pain

Anaemia

Yes

No

Yes

No

Yes

No

Yes

No

Yes

No

Yes

No

Yes

12

3

10

5

9

7

5

10

7

8

10

5

No

42

23

36

49

44

40

23

62

19

68

47

38

Total

74

26

46

54

53

47

28

72

26

74

57

43

Out of 100 respondents 15 used PPE among them 12 (80.0%) had progressive weakness 10(66.66%) had loss of appetite, 9(60.0%) had constipation, 5 (33.34%) had abdominal pain, 7(46.66%) had muscle and joint pain 10 (66.66%) anaemia 5 (33.33%) had tremor 85 respondents did not use PPE. In 62(72.35%) had progressive weakness 36 (42.35%) had loss of app (51.76%) had constipation, 22(27.05%) had abdominal pain, 19(22.35%) 1 muscle and joint pain 47 (55.29%) had anaemia and 8 (9.41%) had tremor was no significant statistical association between clinical symptoms and PPE.



TABLE -14

Distribution of the respondents by personal hygiene status and clinical signs and symptoms.

Level of personal Hygiene

Progressive Weakness

Loss of Appetite

Constipation

Abdominal Pain

Muscle & joint pain

Anaemia

Tremor

Yes

No

Yes

No

Yes

No

Yes

No

Yes

No

Yes

No

Yes

No

Poor Hygiene

2

1

2

1

1

2

0

3

0

3

2

1

0

3

Modorator Hygiene

11

2

9

4

10

3

6

7

5

8

10

3

5

8

Good Hygiene

61

23

35

49

42

42

22

62

21

63

45

39

8

76

Total

74

26

46

54

53

47

28

72

26

74

57

43

13

87

Tables 14 shows that the prevalence of clinical signs and symptoms had more in the respondents who were amongst the group of moderate hygiene but there was no significant statistical association obtained between clinical symptoms with the status of personal hygiene.

## DISCUSSION

There were total 100 respondents included in this study who worked in lead acid storage battery factory. The respondents were selected purposively from 11 lead acid storage battery factories in Dhaka city.

The study revealed that during manufacturing process the workers handle the lead plate, lead oxide with naked hands so frequent lead contamination occurs which ultimately ingested with food.

Table 1 revealed all respondents were male ages ranging from 14-50 years and majority was in the age group of 21-30 years. It is noted that there were 18 respondents among the age group of 14-18 yrs. Who are the vulnerable group prone to lead poisoning? Table 5 shows the prevalence of positive signs and symptoms attribute to lead poisoning which included Progressive weakness (74.0%) with mean duration of 13.14 months, loss of appetite (46.0%) with 6 mean duration of 12.36 months, constitution (53.0%) with mean duration of 10.23 months, abdominal pain (28.0%) with mean duration of 14.50 months, muscle and joint pain (26.0%) with mean duration of 14.44 months, tremor (13.0%) with mean duration of 37.15 months and anaemia (57.0%). Two of the studies were conducted in secondary lead smelters who smelted lead from used automobile storage batteries. The first of these smelters was located in Memphis, Tennessee and employed 84 workers. The second smelter, 18 in Salt lake City, Utah and employed only 30 workers. Critical

manifestations of lead poisoning were evident in both plants. **1** The dominant findings were colic, gastrointestinal symptoms, anorexia, fatigue, myalgia, joint pain and extensor muscle weakness which are similar to my study findings.

Table 6 shows that 4 respondents were found hypertensive whose **14** diastolic blood pressure was above 90 mm Hg. Recently hypertension is defined as diastolic pressure 90 mm of Hg or above. A **1** study was conducted to determine the lead level in blood in a lead acid storage battery in Sudan. Total 70 workers had weakness, constipation and muscle and joint pain, 6(8.57%) workers were found hypertensive.

Table 8 and 9 shows that 68 respondents worked in lead acid storage battery less than 5 years and 32 respondents worked more than 5 years. There was a positive relationship between length of job duration and clinical signs and symptoms. The more duration means more exposure to lead hence there were more prevalence of clinical signs and symptoms found, and this was also statistically significant except for loss of appetite. But the Table 10 revealed no association between working hours and clinical symptoms.

Table 7 shows there were a positive relationship between age and clinical signs and symptoms and this association was also statistically significant except for tremor.

Table 4 and Table 11 show the previous work experience where 9 workers worked in motor garage workshop. Lead exposure also occurs in motor garage workshop. The other previous work experience of the respondents was not significant **7** in relation to lead exposure. So total 15 respondents had previous lead exposure and it was found that the prevalence of clinical signs and symptoms were more in these groups.

Fig 4 and Table 4 shows the **1** status of personal hygiene where maximum respondents (84.0%) had good hygiene, (13.0%) had moderate hygiene and only (3.0%) had poor personal hygiene status. No relationship was found between status of personal hygiene and clinical symptoms.

Table 11 shows that clinical symptoms was more prevalent in the group of class 6-10 but no significant association was obtained between educational status and clinical symptoms.

Fig 5 shows the safety measures taken by the respondents. Out of 100 respondents only 15

used hand gloves and 85 respondents did not use any PPE so during manufacturing process frequent lead contamination occurs which ultimately ingested with food. To de-case the battery, 3 torches are used to cut through the outer case, creating additional lead fumes which are inhaled.

There were no provisions for medical or other facilities for the workers hence it was not shown in the table.

## CONCLUSION

This study comes to the conclusion that 1 during manufacturing process of lead acid storage battery, workers are frequently exposed to lead. Out of 100 respondents 85(85.0%) had positive clinical signs and symptoms attributable to lead exposure. The dominant findings were progressive weakness, loss of appetite, constipation, abdominal pain, muscle and joint pain, anaemia and tremor. 4 respondents were found hypertensive. There were positive associations between clinical signs, symptoms with the length of job duration and Age of the respondents though there was no relationship found between clinical symptoms with working hours. This study could not identify the relationship between clinical signs and symptoms with previous work experience, level of education, personal hygiene status and safety measure used. There was no provision for medical or other facilities. The personal hygiene status was good, 84(84.0%) respondents had good personal hygiene. The safety measures taken by the respondents was very poor, only 15(15.0%) used hand gloves. The result 4 of the study may be questioned for many reasons, because there was no control group, the sample size was very small and the positive clinical signs symptoms was nonspecific and more over the measurement of the blood lead level of the respondents was not done. Besides all above lacking it was an attempt 1 to find out the health problems amongst lead acid storage battery workers in Bangladesh. The study result will help to magnitude of the problem and may provide necessary guidelines for improvement of working environment and to make awareness 7 in the study population about the health hazard of lead exposure and also be useful for formulating recommendation in

preventing lead exposure in battery workers and this surely will also inspire us for further research.

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