ANALYTICAL STUDY ON CAUSES OF INDUSTRIAL HEALTH HAZARDS IN JUTE INDUSTRY AND POSSIBLE MANAGEMENT THERE IN FOR IMPROVEMENT OF INDUSTRIAL SAFETY

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ABSTRACT

This paper deals with the overall status of occupational injury among workers of concerned jute industry in West Bengal, India.. Injury data were collected from company's 'Accident Record Book' and 'Daily First Aid Record Book'. The collected database were compiled and analyzed in terms of different variables, such as body parts, age group, department and different sickness/illness of staffs and women workers at the workplace. The study disclosed that 30-39 & 40-49 age group (having high experience and skill) had the maximum injury frequency. The incidents of injury were dominated in 'A 'shift, the shift having pressure for both productivity and maintenance work. 'Weaving' section of jute industry contrite 33.75 of total injury and as such considered as the maximum risk zone of the industry. The study also disclosed that Finger, Leg and Hand covered 76.7 % of the total injury. Based on Root cause analysis by brainstorming session among departmental HODs, staffs and interviews of the injured workers, specific measures and action plans have been suggested for the improvement of human safety at work place.

Key words: Injury. Human safety, Jute Industry, Productivity, Weaving, Acidity

1 INTRODUCTION

Jute is one of the most important fiber used for industrial applications. It is secondly to cotton in the World's production in Textile natural fibers. It is mostly used in making packaging and carpet-backing fabric. Besides, Jute fibres are utilized as furnishing fabric, floor covering, upholstery, geotextile, etc.

The main advantage of Jute lies in its eco-compatibility. Jute has also been considered as an ecologically sound fiber because of its inherent properties. Jute as a natural fiber is finding keener acceptance as an environment friendly product since its contents are cellulose and lignin which are biodegradable.With growing concern for environment and ecology, the global trend of opting for natural products in various sectors hold bright prospects for

the jute industry. The emergence of environment awareness among consumers the world over has led to the growing demand for environment friendly products.

Jute industry is a major revenue earning/generation industry in West Bengal, India. It is known that 90% of major jute industry are located in West Bengal. In this connection, it is to be mentioned that the accident risk are higher in jute industry. High injuries and accident among workers in jute industry leads to low productivity, high absenteeism, less moral value, and high discomfort. As such, necessary research needs to be carried out to identify the causes for the same so that appropriate remedial measures need to be initiated.

Accident has been defined as "an unpremeditated event resulting in recognizable damage "(WHO, 1956). This can also be more appropriately defined as "an occurrence in a sequence of events which usually produces unintended injury, death or property damage". On the other hand industrial injury can be the result of unsafe acts and unsafe working conditions. An industrial accident may disturb the moral of the workers and affect their working capacity. If skilled and experienced workersare getting disabled, there seems to be immense loss to the organization. Hence, their health needs to be protected/preserved throughout their working life by providing comfortable and safe working conditions. This will certainly help them to motivate more onto their work – thereby improving productivity and efficiency of the work system. Industrial health thus depends upon the appropriateness of the safety measures provided by the organization.

This research paper delineates findings of the systematic investigations on the status of occupational health hazards,and associated protective measures used for the workforce of Jute industry.

2 A BRIEF REVIEW OF RESEARCH PUBLICATIONS

Ahasan M R(2002)[1], basedon questionnaire and checklist surveys, site visits, interviews and volunteered physiological tests on the target group of workers in some small and medium-sized enterprises in Bangladesh, made comprehensive assessment of tasks, jobs and associated ergonomic issues. The results revealed stressful working environment, extensive use of muscle force to perform their jobs, inconvenience associated with using older machinery, economic constraints, and a lack of enforcement of work regulations and labour legislation. This invariably indicated increased risk of occupational hazards.In order to get rid of this situation, emphasis need to be given on the upliftment of workers' and employers' awareness and public attention towards unsafe acts and working conditions, as well as strengthening/enforcement of work regulations and labour legislation with adequate safety measures.

Khan M M A ,et al.,(2006)[2]conducted research study in order to find out the attributes of occupational injury among workers in the chemical industry and to enhance safety issues. Injury data were collected and processed in terms of different variables, such as age, gender, skills, type of hazard, etc. Pareto analysis was then applied to find a pattern of occupational injury among the workers. The study revealed that 79.52% of the injured workers were in the 40–59 age group; 57.14% of accidents occurred during the 1st shift; 73.26% of accidents caused injury to arms, hands, feet, thigh, chest and eyes; and 70.93% of injuries were caused by pumps, carrying and lifting, vehicles, pipelines, valves, and grinding. Surprisingly, no one was injured in the group of temporary workers. Khan F ,et al., (2008)[3] undertook a cross sectional work on Bangladeshi females, working in different fibre industries, to study the effect of exposure to fibre dust on pulmonary functions. The ventilatory capacities were measured by VMI ventilometer in 653 apparently healthy women (160, 162 and 167 were jute, textile and garment industry workers, respectively). For the control group, 164 females were selected who never worked in any fibre industry. The observed FVC, FEV1 and PEFR were lower in all groups of fibre industry workers than those of the control group. Among the industry workers, the jute mill workers had the lowest ventilatory capacities and garment industry workers had the highest values. The jute and textile mill workers had also significantly lower FEV1 and PEFR than those of garment industry workers. The FEV1 and PEFR were significantly lower in jute mill workers than those of textile mill workers. The low ventilatory capacities were almost proportionate with the length of service of the workers. This concludes that the fibre dust, on regular exposure for longer duration, may limit the lung functions.

MondalA K (2009)[4], in his research findings, has pointed out that hazardous work, working conditions, and environment fail to maintain homeostasis results in death or severe disability. Up to the 1980s, governments did not pay major attention to occupational health in developing countries, including India. The Bhopal Gas Tragedy, in 1984, was the turning point in the history of health and safety in India. It was time for the government to think deeply and review the existing legislative measures, for the upliftment of the occupational health situation in India. However, all the services remain grossly underutilized because of inadequate strategies, policies, and the lack of

proper monitoring mechanism.He pointed out that inaction or destruction of demands, use of power, appeal to the existing bias of the system, and exportation and flexibility of the workers are some of the main reasons for the alarming situation of the Occupational Health Policy (OHP) in India.

Iqbal S A , et al., (2010)[5]presented the overall scenario of the occupational injury among workers in selected four cement industries of Bangladesh based on injury data, collected through questionnaires from the workers as well as supervisors. The data collected were analyzed in terms of different variables, such as body parts, agent of accident, experience, age, skill, and type of injury. Pareto analysis was then applied to find a pattern of occupational injury among the workers. The study disclosed that arm, leg, hand finger, eye and head covered 82.81% of total injury frequency, 76.56% of total injuries caused during welding, bucket elevator, belt conveyor and weight lifting, low experienced and high experienced workers combinely have 84.38% of total injury frequency, age group of 21-25 and 51-55 have the maximum injury frequency, 78.13% injury occurred by highly skilled and unskilled workers and 79.1% of total injury is temporary disable type injury. Based on their research findings, they suggested specific action plans.
Singh S B , et al., (2012)[6]considered the existence of potential risk of health hazards and diseases at workplaces of jute industries. Respiratory symptoms were common among workers exposed to high dusty area. About 24 % workers belonged to 25-29 years of age. Around 21% and 86% workers were smokers and tobacco chewers respectively. Two fifth (41.6%) of workers were working for less than 5 years. Acute upper respiratory infection (14.2%), chronic bronchitis (0.3%), acute lower respiratory infections (0.77%), allergic rhinitis (0.1%) and asthma (0.4%) were the respiratory morbidities among the workers. Besides, there exists problems like chest and difficulty in breathing. The PEFR variations were found significant among workers in the low and high dusty areas and without and with symptom of cough.

MandalA , et al., (2014)[7] were on the view thatthe Jute industry workers constantly exposed themselves to jute dust and were at risk of impairment of lung function.FVC, FEV1, FEF 200-1200 and PEFR values of higher age group non-smoker of low dust zone were significantly higher in comparison to the non-smoker of high dust zone. The prevalence of chest tightness was 33.49% and liver dysfunction was 41.9% in dusty zone workers of jute mill in comparison to less dusty zone. Again, incidence of chest tightness and cough was highest (35.44%) in higher age group workers and prevalence of byssinosis like symptoms and chronic bronchitis was 30- 37% after 10 – 30years of exposure. But occurrence of bronchial asthma was 11.9% in workers. Prevalence of all the above respiratory abnormalities was higher among smokers than non-smokers. Concentration of jute dust exposure had been associated with decrease in FVC, FEV1, and PEFR with a higher risk of developing chronic bronchitis, bronchial asthma, byssinosis and other respiratory symptoms. This indicated high occupational health hazards which would create an alarming situation, if remained unchecked.

BudhathokiS , et al.,(2014)[8] stressed on the use of safety measures by welders in order to prevent and/or reduce health hazards. They also expressed the need of research to identify the underlying factors leading to low utilization of personal protective equipment (PPE) despite the welders of eastern Nepal being knowledgeable of it.

SettM ,et al.,(2012)[9] pointed out the existence of various work-related problems, many of which could be prevented with common ergonomics considerations. Analyses of working postures (OWAS) of hacklers revealed the adaptation of awkward postures, which seems to be very stressful. A large number of hacklers (92.5% suffered from intense pain in different body parts as compared to workers in other departments of the jute industries. Workers report that the pain even lasts many hours after work. Since most of the workers perform repetitive tasks, so both the workplace as well as the work-rest schedule need to be reorganized.

3 METHODOLOGY

A systematic research investigation was carried out at Bally Jute Company Ltd, Bally, Howrah. West Bengal, India. The organization is a pioneer Jute Industry in West Bengal. Around 3500 employees are directly linked with this unit. The salient features of the research methodology are summarized below:

- Detail injury incidents from 1st January 2015 to 9th April 2015 of the concerned jute industry was collected from "Accident registered Book" and 'First Aid registered Book ' of the company.
- Injury statistics were compiled and analysed.

- Several focus group discussions were arranged with the officers of the company. In the brain storming session of these group discussions, the views of the concerned officers were collected and summarized as "Root Cause analysis" in Fish Bone Diagram.
- Based on these discussion, necessary correction actions have been formulated.

4 RESULTS AND ANALYSIS

Table 1 and Fig 1(a) & (b) display the distribution of injured workers by age groups during the study period of the Bally Jute Company Ltd. As per the existing system of the company, after retirement at the age of 58 years, skilled workers are allowed to continue their service. The Table 1 indicates highest number of injured workers (52) in the age group of 30-39 years, followed by 40-49 years of age group (49). 60-70 years of age group had least number of injury (2). In total 151 number of major injury incidents have been identified during 1 st January 2015 to 9 th April 2015. All of them received First Aid service from the company's own dispensary and thereafter admitted to ESI hospitals for treatment with leave.

Table 1 :- Distribution of Injured workers by Age Group

Age Group	No. of Injury	%age of Injury among different Age Group
20 – 29	25	16.6
30 – 39	52	34.4
40 – 49	49	32.5
50 – 59	23	15.2
60 – 70	2	1.3
Total :	151	100.0

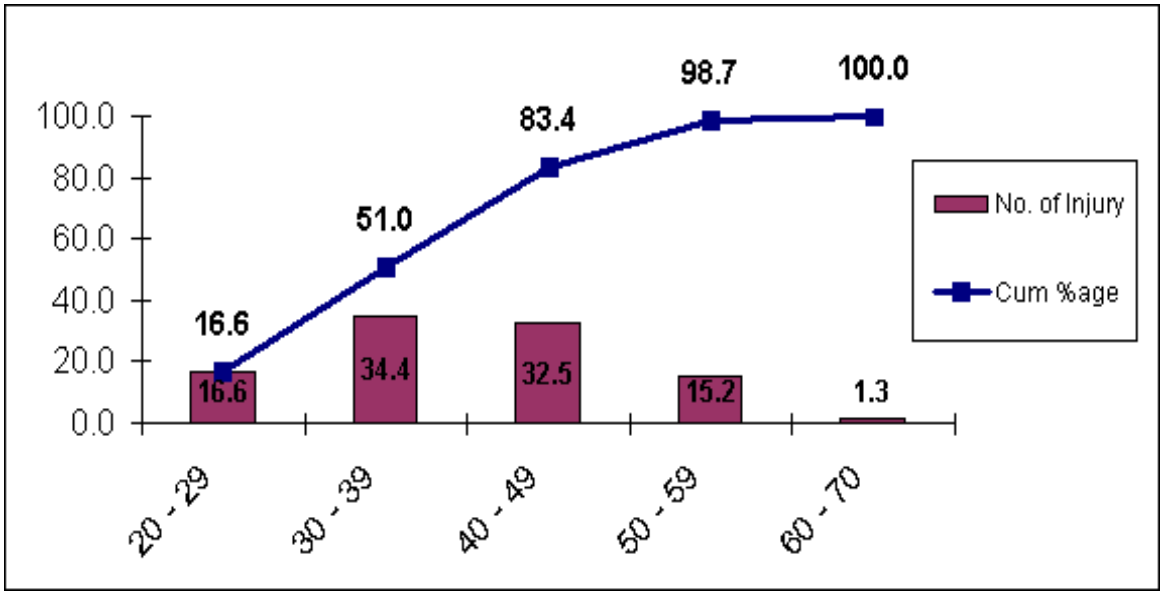


Figure 1(a) :Parato chart indicating incidents of injury by Age group

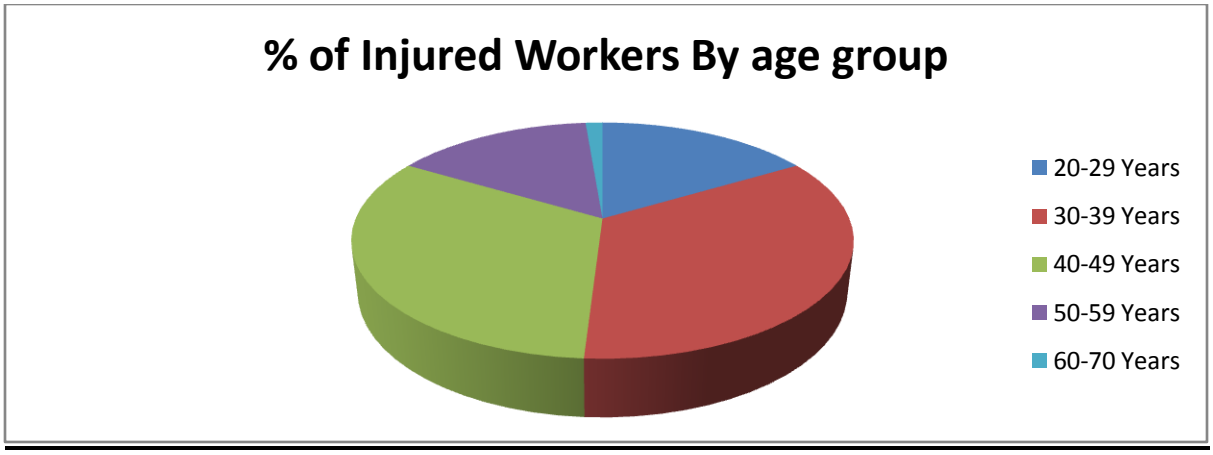


Figure 1(b): Pie Diagram indicating Distribution of injured workers by age group

Table 2 and Fig 2(a) & (b) represents the shift wise distribution of occurrence of injury. A and B shifts, being busy with production and maintenance activities, cause more injury incidents. C shift having comparatively less work load depicts occurrence of less number of injury incidents.

Table 2:Shift wise distribution of occurrence of injury

Shift	No. Injured Workers	%age Based on Total
A	69	45.7
B	63	41.7
C	19	12.6
Total :	151	100.0

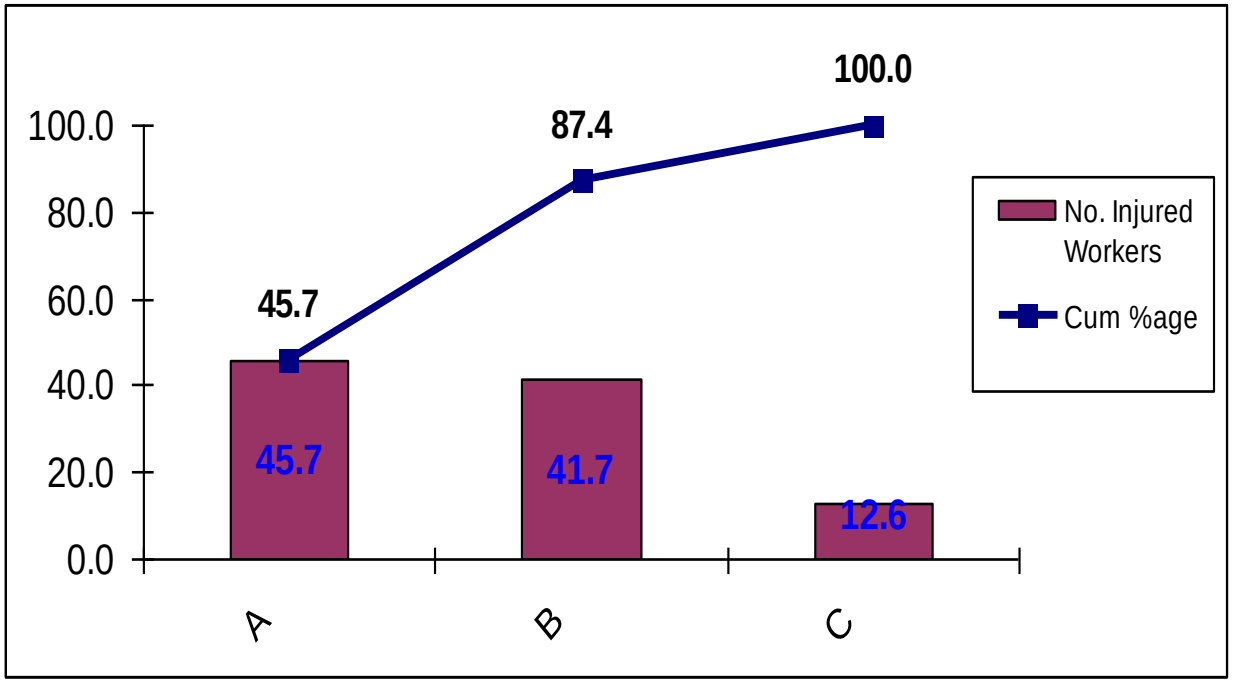


Figure 2(a): Parato chart of the shift wise occurrence of injury incidents

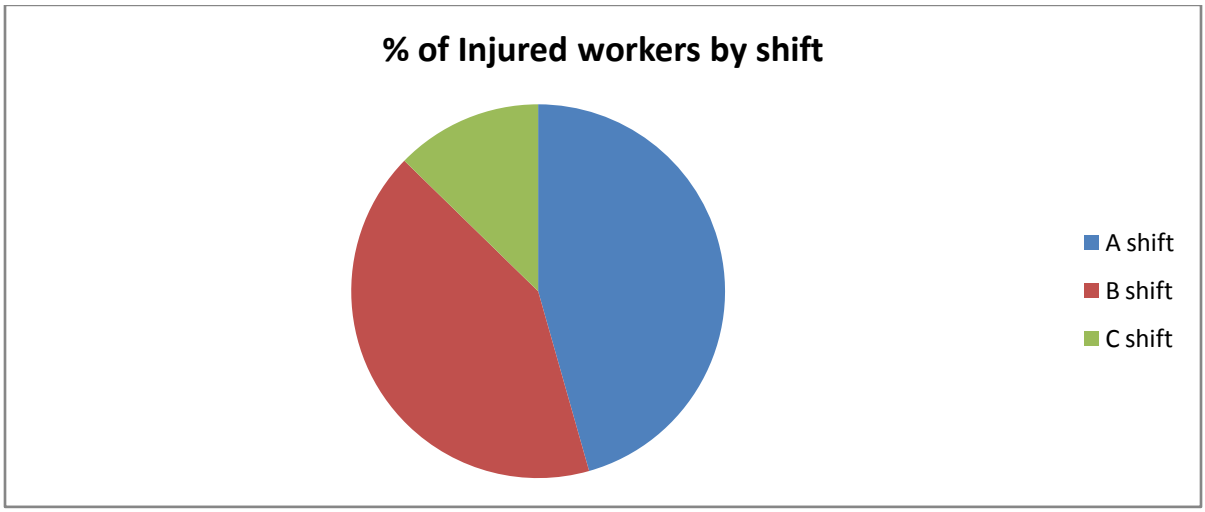


Figure 2(b): Pie Diagram indicatingshift wise occurrence of injury incidents

Table 3 and Fig 3 depicts the department wise distribution of injured incidents. Out of the total 151 injury incidents during the study period, 33 and 18 incidents took place in the Hessian Weaving and Sacking Weaving sections respectively. These two department are the main production area of concerned Jute industry and yarn to fabric of various qualities are being manufactured here. Spinning (17) and Winding (wrap winding-16 and weft winding-11) departments are the next accidental proneareas. In spinning, fibre to yarn formation are taken place. In Winding , small packages to big packages are manufactured. Apart from these areas, there exists few incidents of injuries to preparing, Batching, Broadloom, and Sack Sewing department.

Table 3: Department wise distribution of Injured Incidents

Departments	No. of Persons Injured	%age based on Total
Hessian Weaving	33	21.85
Sacking Weaving	18	11.92
Spinning	17	11.26
Warp Winding	16	10.60
Preparing	13	8.61
Batching	12	7.95
Weft Winding	11	7.28
Sack Sewing	10	6.62
Broad Loom /CBP	9	5.96
Beaming	6	3.97
Finishing	2	1.32
Factory Mechanic	2	1.32
Mill mechanic	2	1.32
Total :	151	100.00

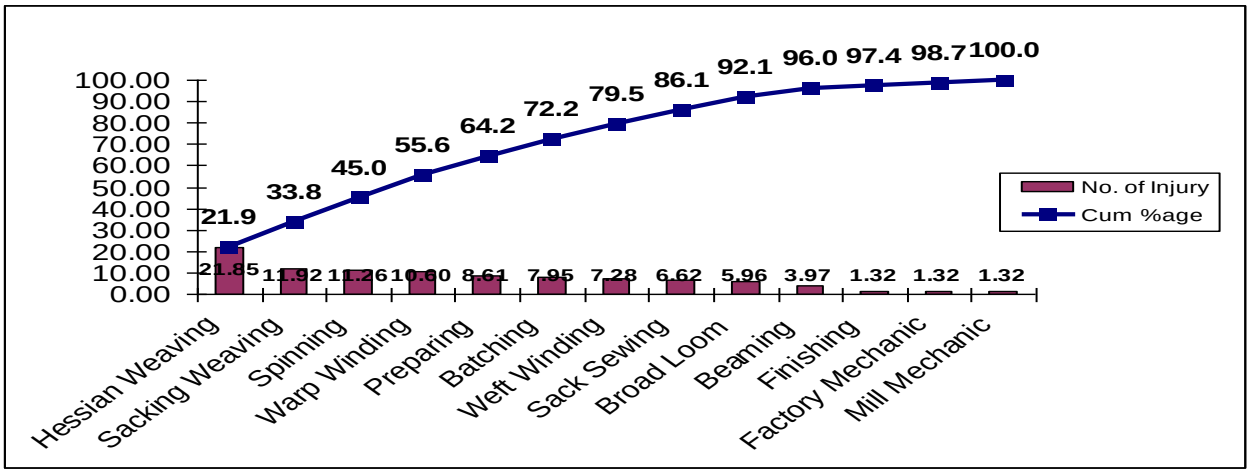


Figure 3:Parato chart indicating Department wise injury incidents

Body part wise distribution of injury cases are being displayed in Table 4 and Fig 4.As it is evident from the Table and Fig, "Finger" is the organ injured most followed by leg, hand, waist and head.

Table 4:Body part wise distribution of injury incidents

Age Group	No. of Injury	%age based on Total
Finger	60	39.74
Leg	34	22.52
Hand	22	14.57
Waist	17	11.26
Head	10	6.62
Chest	2	1.32
Nose	2	1.32
Neck	2	1.32
Shoulder	1	0.66
Testicle	1	0.66
Total :	151	100.00

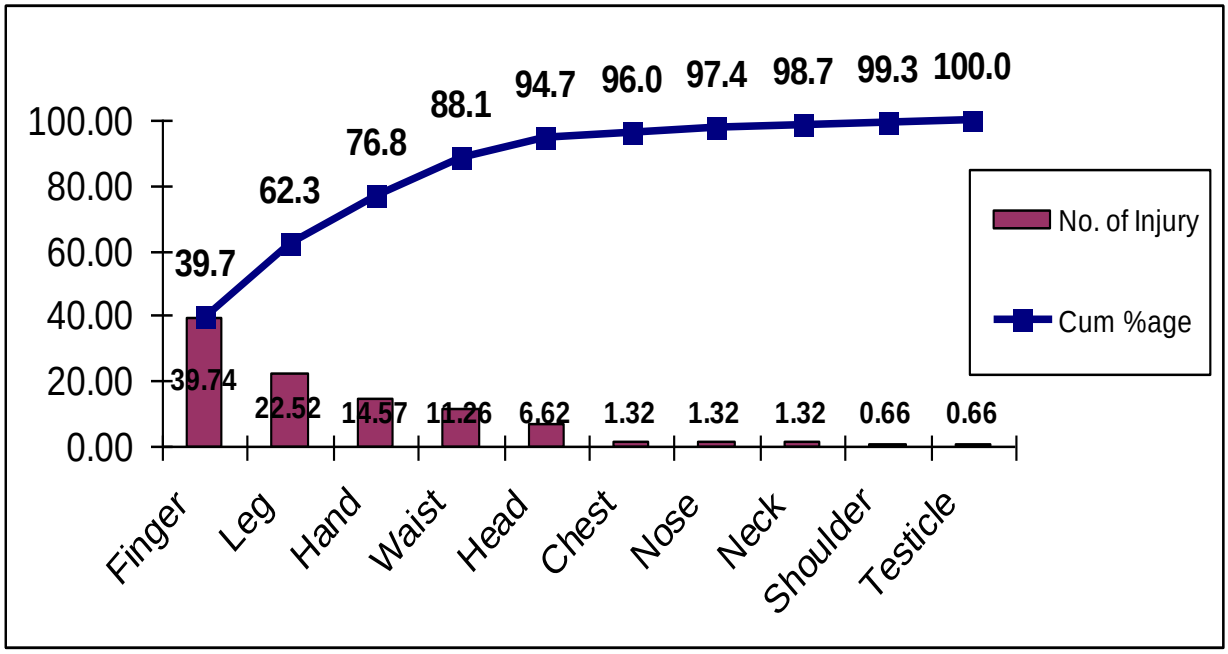


Figure 4: Parato chart indicating body part wise injury incidents

Table 5 displays department wise minor injury/sickness. The workers undergoing minor injury/sickness receive necessary "First Aid "treatment and then continue their service at their respective workplace. During study period, 1803 number of such incidents were registered at company Registered First Aid Book. As seen from Table 5, most of the minor incidents have taken place at Hessian Weaving (288), Spinning (218), Sacking Weaving (206) and Winding (177) sections. It is interesting to note that 141 number of such incidents happens to "staff "members of the company. Quality Control department responsible for different types of testing activities related to raw material,

semi-finished products, finished products and process of manufacturing registers least number of minor injuryincidents (5).

Table 5 : Distribution of Minor injury/Sickness of Workers by Various Department

Sl No.	Name of Department	No. of Persons Injured	% Based on Total
01.	Hessian Weaving	288	15.90
02.	Spinning	218	12.14
03.	Sacking Weaving	206	11.40
04.	Winding	177	9.81
05.	Staff	141	7.80
06.	Batching	136	7.54
07.	Factory Mechanic	130	7.20
08.	Broad Loom/CBP	96	5.32
09 .	Preparing	92	5.10
10.	Sack Sewing	82	4.50
11.	Mill Mechanic	62	3.40
12.	Engineering	50	2.77
13.	Beaming	28	2.27
14.	Finishing/Dispatch	39	2.16
15.	STB	28	1.50
16.	Workshop	11	0.61
17.	SQC	5	0.27
Total		1803	100 %

Table 6 and Fig 5indicates the gender wise distribution of various major/minor injuries. Female workers are also engaged for service at different department of Jute industry. It is found that out of 151 major incidents, female workers are involved in 3 cases. Two of them are from Weaving department and one from Sack sewing department. In such cases, the victim women were provided necessary First Aid service and thereafter, then referred to ESI hospital for further medical treatment with leave. However, in case of minor injury, 62 number of cases were reported for female workers during the study period.

Table 6 : Distribution of Various Major /Minor injury/sickness by Gender

Sl No.	**Gender**	**No. Of major Injured Employee**	**No. of Minor injury /Sickness/illness Employees**
1	Male	148	1741
2	Female	3	62
Total		151	1803

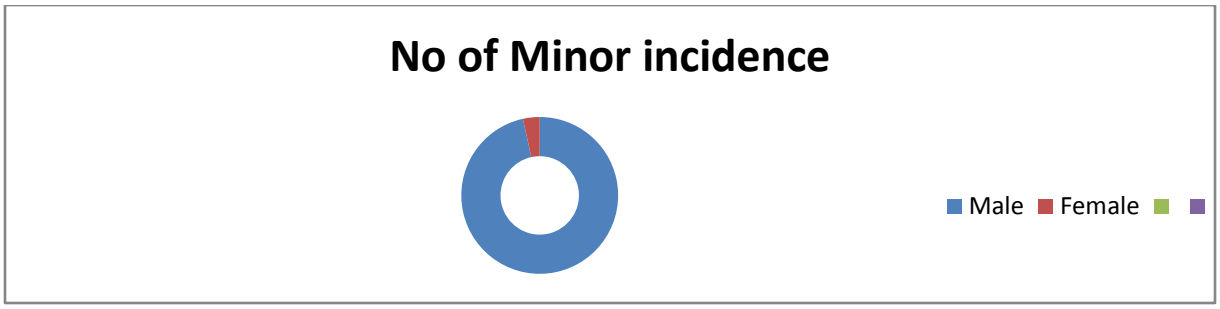


Figure 5 : Distribution of Major Incidence by Gender

Table 7 displays distribution of minor injury/illness of the female workers. The table indicates that they suffer from acidity, body ache, fever, pain, etc. Four crushed injuries at leg, one finger injury and six hand injuries are reported.

Table 7 : Distribution of Minor Injury /Sickness of Female Workers at Work place

Sl No.	Sickness/ Injury particulars	No. of Incidence	% Based on Total
1	Minor Injury	17	27.41
2	Acidity	11	17.74
3	Body ache	9	14.51
4	Pain leg/Other parts	9	14.51
5	Crushed injury at hand	6	9.67
6	Crushed injury at leg	4	6.45
7	Fever	3	4.83
8	Toothache	2	3.22
9	Crushed injury at finger	1	1.61
Total		62	100

The Table 8 and Fig 6 depicts the distribution of sickness of staff members at workplace. It is found that 141 number of incidents related to Staffs' sickness/illness are reported during the study period. It is observed that 25% of staffs suffer from 'Acidity', 18% from Body ache, 17% from Cold , 10% from Fever and 14% from Dysentery.The victims receives necessary "First Aid "serviceor medicine facilities from Company's own dispensary.

Table 8 : Distribution of Sickness of Staff members at workplace

Sickness Particulars	Noof Injury	%age based on Total
Acidity	35	24.82
Bodyache	26	18.44
Cold	24	17.02
Fever	23	16.31
Desentry	20	14.18
Headache	13	9.22
Total :	141	100.0

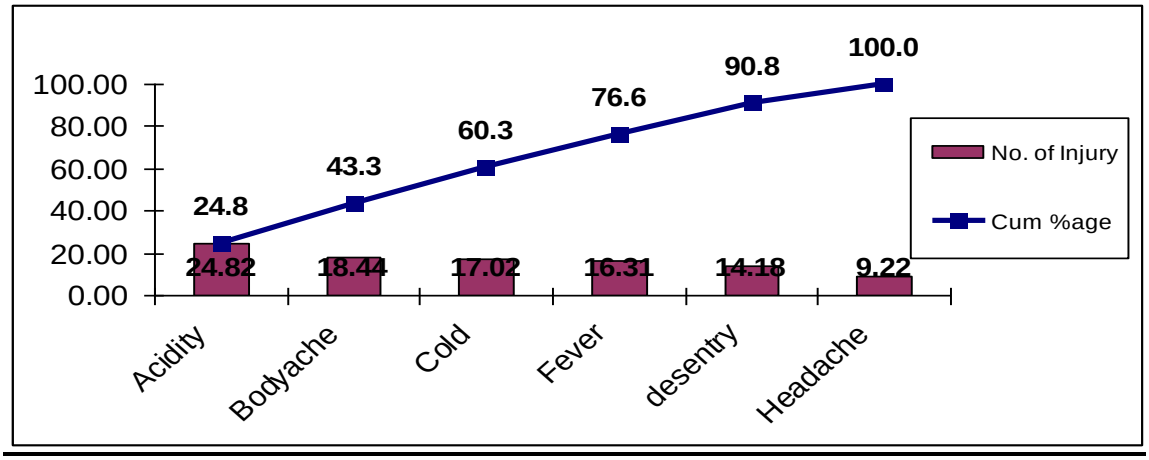


Figure 6: Parato chart indicating incidents of Sickness/Illness of Staff

5 ROOTCAUSE ANALYSIS USING FISHBONE ANALYSIS

The Risk management and safety program provides a mechanism for supervisors and designated personnel to assist in the identification of causes for work related injuries and illness and corrective/preventive actions need to be taken to prevent future incidents. Root cause analysis is a structured team process that assist in identifying underlying factors or cause of an adverse event or near-miss. Understanding the contributing factors or causes of a system failure can help develop actions that sustain the correction. A cause effectdiagram, often called as 'fishbone diagram' has been applied here during brainstorming sessions of all departmental HODs and senior staffs of the company. A fishbone diagram is a visual way to look at cause and effect. It is a more structured approach. The problem is displayed at the head or mouth of the fish. Possible contributing causes are listed on the smaller 'bones' under various cause categories. 'Fishbone' structure in this study (Fig 7) has been constructed from the following sources:

- Brainstorming session of all departmental HODs, senior staffs and a few workmen from each department.
- Interview to the people who were involved in the incident, a witness to the incident and who were involved in the reporting and response to the incident.

From the Brainstorming sessions, it is concluded that following main factors are responsible for and occupational injury. They are stated below.

- People
- Procedure
- Processes
- Machineries
- Materials
- Environment
- Technology
- Transportation system in floor area

The related 'causes' and 'sub-causes' are written at the bones or branches of the diagram. After stating the problem at the mouth of the Fish, 'Why"questionsare asked to the team of the sessions. Different points related

to incidents are coming during brainstorming sessions and are noted on the diagram. Fishbone diagram thus developed, reveals the following.

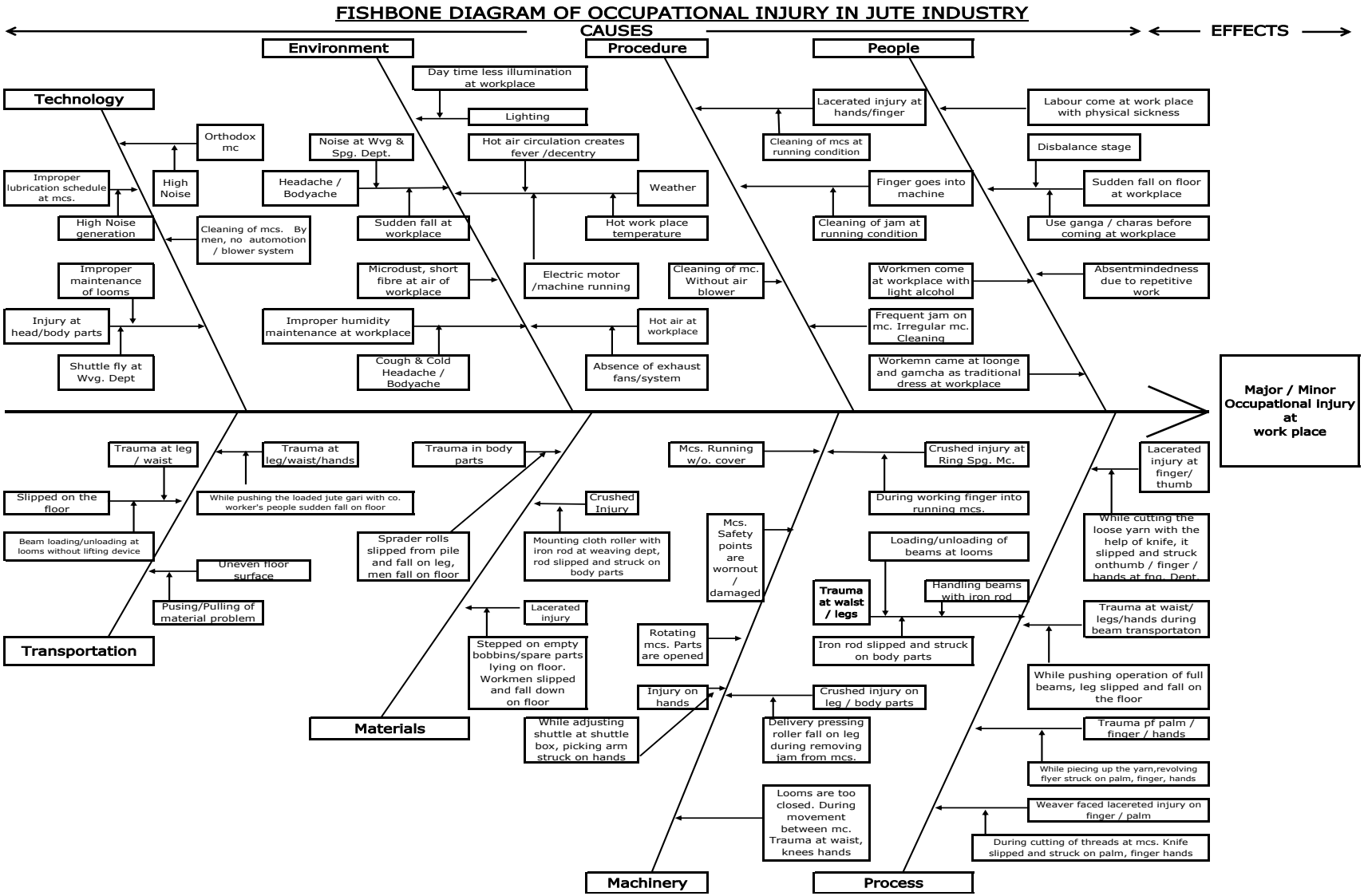
- The Jute industry constitute potential for many hazards and risks to workers, ranging from exposure to noise and metallic substance, to manual handling and working with different machineries. Each processing stage from the production of materials to the manufacturing, finishing, packaging, loading unloading of packages possess risks for workers and some of these are particularly dangerous for women's health. From the Fishbone diagram, it gives idea that muscular hazards and associated pains are due to manual handling, holding, lifting, pushing, pulling, carrying or movement of a load, is the largest causes of injury in the jute industry. Manual handling can also leads to muscular pain of hand, leg, waist, etc. and creates acute trauma such as cuts or fractures due to accidents.
- The exposure todusts, floating short fibrecreated during weaving, spinning, cutting and different processing stages seems to be prone to injury and illness..
- Exposed to noise and vibrations, for example during weaving, spinning, sewing, twisting and cutting can also results in temporary and permanent hardness of hearing.
- Transportation inside the workplace, operations of numerous equipment of different types, risk of slips from uneven surface of the floor, struck by metallic objects, such as moving machinery parts and trolley – all seems to be significant cause of injury. There exists also the risks of fire due to heat generation at machineries.
- Work related stress, e.g., repetitiveness and fast paced work, may be an issue in some areas of the jute sector.

7 COMPANY 'S INITIATIVES FOR IMPROVEMENT IN SAFETY MEASURES

The company has already taken initiative to provide necessary medical facilities as and when required.

- Well Equipped Dispensary with sufficient stocks of important medicines first –aid facilities and medical staffs.
- Medical Doctor with no consultation fee.
- Company's own First Aid Assistant Staff in each shifts.
- 24x7 hours availability of company's own Ambulance.
- ESI Medical Facilities to workmen.
- Good Record keeping related to First Aid services rendered and major injury occurred.
- Banners, display board with pictures at various places of departments related to 'Do' or "Don't".

Fig 9


FISHBONE DIAGRAM OF OCCUPATIONAL INJURY IN JUTE INDUSTRY
CAUSES
EFFECTS
Environment
Procedure
People
Technology
Day time less illumination at workplace
Lighting
Lacerated injury at hands/finger
Labour come at work place with physical sickness
Orthodox mc
Noise at Wvg & Spg. Dept.
Hot air circulation creates fever /decentry
Cleaning of mcs at running condition
Disbalance stage
Improper lubrication schedule at mcs.
High Noise
Headache / Bodyache
Weather
Finger goes into machine
Sudden fall on floor at workplace
High Noise generation
Cleaning of mcs. By men, no automotion / blower system
Sudden fall at workplace
Hot work place temperature
Cleaning of jam at running condition
Use ganga / charas before coming at workplace
Improper maintenance of looms
Microdust, short fibre at air of workplace
Electric motor /machine running
Cleaning of mc. Without air blower
Workmen come at workplace with light alcohol
Absentmindedness due to repetitive work
Injury at head/body parts
Improper humidity maintenance at workplace
Hot air at workplace
Frequent jam on mc. Irregular mc. Cleaning
Shuttle fly at Wvg. Dept
Cough & Cold Headache / Bodyache
Absence of exhaust fans/system
Workemn came at loonge and gamcha as traditional dress at workplace
Major / Minor Occupational Injury at work place
Trauma at leg / waist
Trauma at leg/waist/hands
Trauma in body parts
Mcs. Running w/o. cover
Crushed injury at Ring Spg. Mc.
Lacerated injury at finger/ thumb
Slipped on the floor
While pushing the loaded jute gari with co. worker's people sudden fall on floor
Crushed Injury
During working finger into running mcs.
Beam loading/unloading at looms without lifting device
Sprader rolls slipped from pile and fall on leg, men fall on floor
Mounting cloth roller with iron rod at weaving dept, rod slipped and struck on body parts
Mcs. Safety points are wornout / damaged
Loading/unloading of beams at looms
While cutting the loose yarn with the help of knife, it slipped and struck onthumb / finger / hands at fng. Dept
Uneven floor surface
Trauma at waist / legs
Handling beams with iron rod
Pusing/Pulling of material problem
Lacerated injury
Trauma at waist/ legs/hands during beam transportaton
Transportation
Stepped on empty bobbins/spare parts lying on floor. Workmen slipped and fall down on floor
Rotating mcs. Parts are opened
Iron rod slipped and struck on body parts
While pushing operation of full beams, leg slipped and fall on the floor
Injury on hands
Crushed injury on leg / body parts
Materials
While adjusting shuttle at shuttle box, picking arm struck on hands
Delivery pressing roller fall on leg during removing jam from mcs.
Trauma pf palm / finger / hands
While piecing up the yarn,revolving flyer struck on palm, finger, hands
Looms are too closed. During movement between mc. Trauma at waist, knees hands
Weaver faced lacereted injury on finger / palm
During cutting of threads at mcs. Knife slipped and struck on palm, finger hands
Machinery
Process

8 RECOMMENDATION FOR IMPROVEMENT OF THE HAZARDS

ACTION PLAN

- Lubrication schedule should be properly maintained for reduction of noise level.If irregular noise are coming out from a machine, that should be taken for maintenance work.
- Work place need to be properly cleaned.
- Walking space of the floor should be properly leveling, so that transportation trolleys can move freely.
- Full/empty bobbins, spare parts, etc. need to be kept in proper place. Separate place should be made for exhaust spare parts, if possible, outside the concerned department.
- Full or empty beams loading /unloading at looms need to be done with the aid of lifting trolleys
- Timely maintenance is essential. Checking of loom timing, slay movement, shuttle picking and housing mechanism, etc. will reduce the shuttle flying incidents.
- Manual lifting of load and pushing/pulling of load should be replaced. Forklift or lifting hoist, small cranes are to be used at the department. This could minimized injury of people for doing such work.
- Machine covers should be closed during running of machines. In case of too much heat generation from electric motor or machine, special attention need to be taken.
- At summer session, overhead windows must be opened for air circulation and day light. Large exhaust fans, must be placed at proper place of each department. If necessary, large wall fans can also be fixed in each department. Humidifier must run at summer session. These activities can control indoor workplace environment.
- Necessary accident investigation and safety training need to be arranged for all supervisors, principal investigators, safety representatives, and/or designated departmental responsible persons. Top management must have to be involved in organizing relevant safety training programme in the company premises. Education, instruction, training, enforcement of company procedures and regular health and safety meetings with employees are the perquisite for providing injury/accident free work environment.
- Supervisors, members of safety committee should routinely inspect the workplaces to identify potential unsafe conditions which need to be corrected.
- The views of the witnesses of accident occurrence need to be properly documented. These information will provide immense help to the safety committee in preparing necessary action plan. In this connection, the notification of concerned supervisor is also very important. As such, he should provide complete incident statement regarding details of notification and action taken. The supervisor will have to provide information regarding earlier behavior, activities of the person (s) involved in the incident, or related personnel issues.
- Corrective and Preventive Action(s) : After investigation of Root Cause of each incident, corrective actions and Preventive Action ‘Form’ should be made and document relating to each incident will be maintained. The corrective and Preventive Action Form can be used to list the causes which require additional action. Once the corrective or preventive action has been identified, it should be assigned a due date and a responsible person must involveto coordinate completion. This ‘Form’ should be reviewed periodically to ensure progress and eventually close out the action item by filling in the completion date. At this point, the incident is considered ‘closed ‘.
- It is to be accepted that there exists some risk that cannot be avoided. It is the responsibility of the safety committee to evaluate these un-avoidable risks in work situations and incorporate necessary safety measures accordingly.

- Counseling of labors for improving awareness over the safety aspects, harmful effect of drinking of alcohol, etc. will go a long way to improve the work environment.

9 CONCLUSION

This research paper mainly present onan overall picture of occupational injury problems among workersand to enhance safety conditions of the concerned Jute Industry. While conducting the study, it was found that workers at the age group 30-39 and40-49 class (having high skill and experience) were more exposed to leg, hand, finger, head and other body parts injury. Based on Root Cause Analysis, specific measures and action plan has been suggested.

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