CHAPTER IV

FINDINGS AND DISCUSSION

This chapter describes and discusses the findings received after analyzing the data and information obtained from the interview and observation. Suitable interpretations and discussions are then provided for the findings. The chapter has been categorized into the following sections in order to present the results in a systematic manner:

Section I:

4.1. Background Information of the Respondents
- 4.1.1. Personal Information
- 4.1.2. Family Related Information
- 4.1.3. Work Related Information

Section II:

4.2. Problems Faced by the Respondents
- 4.2.1. Physiological Problems
- 4.2.2. Psychosocial Problems

Section III:

4.3. Occupational Health Hazards
- 4.3.1. Ergonomic Hazards
- 4.3.2. Physical Environment Hazards

Section IV:

4.4. Testing of Hypotheses

Section V:

4.5. Suggesting Coping Strategies

Section VI:

4.6. Developing Comfort Enhancing Products

Section VII:

4.7. Feedback on the Comfort Enhancing Products

Section I

4.1 Background Information of the Respondents

4.1.1 Personal Information

Personal information consists of the demographic details of the respondents. Demography measures life events (such as births, deaths, marriages, and migration), examines the variables that affect how frequently these events occur, and, to a lesser extent, looks at the effects of these patterns (Hobcraft, J. et al, 1985).

Purposive sampling technique of selecting the respondents was used for the study. The data was collected from 500 respondents through the interview method. Information was then analyzed in order to meet the objectives. Age, gender, marital status, education status, location of present stay, type of house and migration history were the parameters considered to analyze the general demographic profile of the respondents.

4.1.1.1 Age of the Respondents

Data revealed that the largest percentage of the respondents (47.4 per cent) belonged to the age group of 22-33 years. This was closely followed by 39.4 per cent of the respondents aged between 34-45 years and 13.2 per cent of the respondents aged between 46-57 years. The youngest respondent was 22 years old and the eldest was 57 years old. The mean age of the respondents was 35.28 years.

Table 6: Distribution of the respondents according to their Age

n=500

Sr. No.	Age (in years)	f	%
1	22-33	237	**47.4**
2	34-45	197	39.4
3	46-57	66	13.2
Total		**500**	**100**
Mean		**35.28 years**	

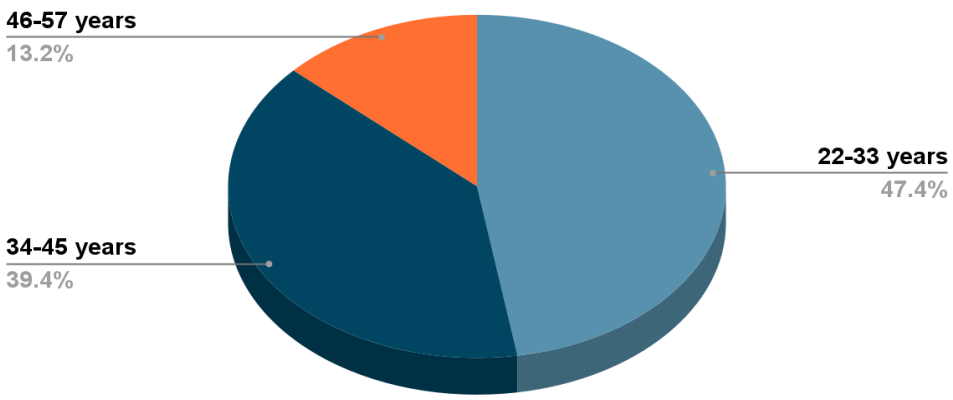

Figure 1: Percentage distribution of respondents according to their Age

4.1.1.2 Gender

The information gathered with regards to the gender of the workers in the polishing industry, revealed that 89.6 per cent of the respondents were males while only 10.4 per cent were females. Although in recent times there has been an increase in the number of female diamond polishers, still this sector remains male dominated.

Table 7: Distribution of the respondents according to their Gender

n=500

Sr. No.	Gender	f	%
1	Male	448	**89.6**
2	Female	52	10.4
Total		**500**	**100**

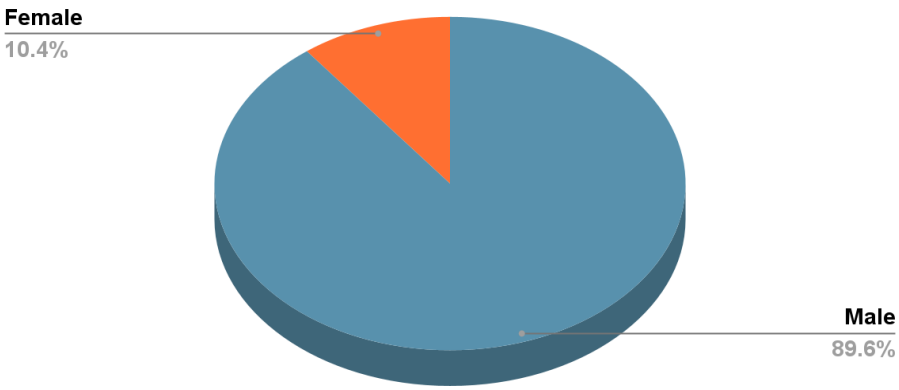

Figure 2: Percentage distribution of respondents according to their Gender

4.1.1.3 Marital Status

The data revealed that 83 per cent of the respondents were married while the remaining 17 per cent were unmarried.

Table 8: Distribution of the respondents according to their Marital Status

n=500

Sr. No.	Marital Status	f	%
1	Married	415	**83**
2	Unmarried	85	17
Total		**500**	**100**

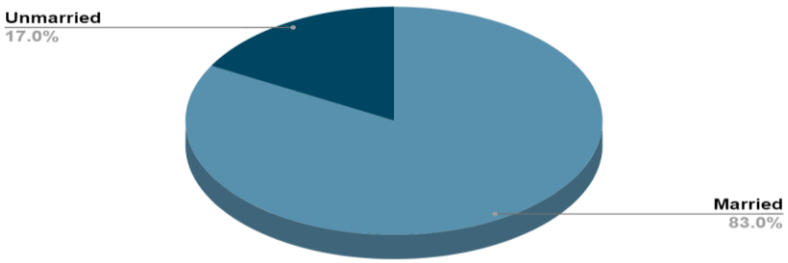

Figure 3: Percentage distribution of respondents according to their Marital Status

4.1.1.4 Education Level

The data collected on the education of the respondents showed that 67.2 per cent of the respondents received education ‘up to middle school’, 26.8 per cent received education ‘up to high school’ and only 6 per cent had received ‘no formal education'.

Table 9: Distribution of the respondents according to their Education Level

n=500

Sr. No.	Education Level	f	%
1	No Formal Education	30	6
2	Up to Middle School	336	**67.2**
3	Up to High School	134	26.8
Total		**500**	**100**

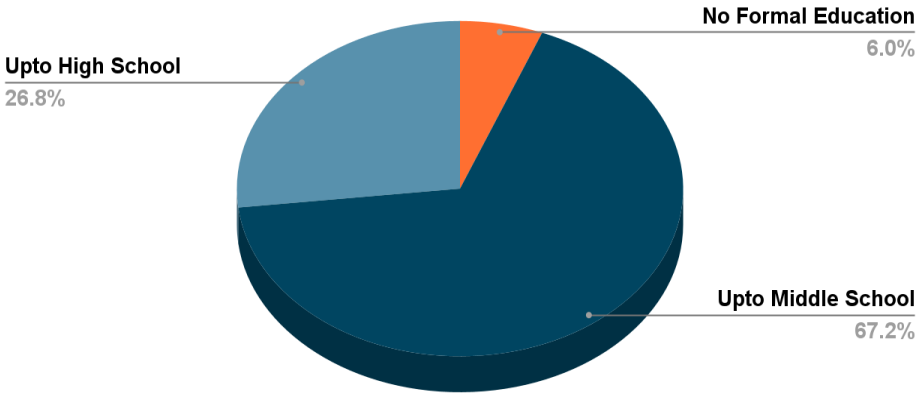

Figure 4: Percentage distribution of respondents according to their Education Level

4.1.1.5 Location of Stay

Information collected on their place of stay revealed that 62 per cent of the respondents stayed in urban areas, 34 per cent of them lived in suburban areas and only 4 per cent of them lived in rural areas.

Table 10: Distribution of the respondents according to their Location of Stay

n=500

Sr. No.	Location of Stay	f	%
1	Urban	310	**62**
2	Sub-Urban	170	34
3	Rural	20	4
Total		**500**	**100**

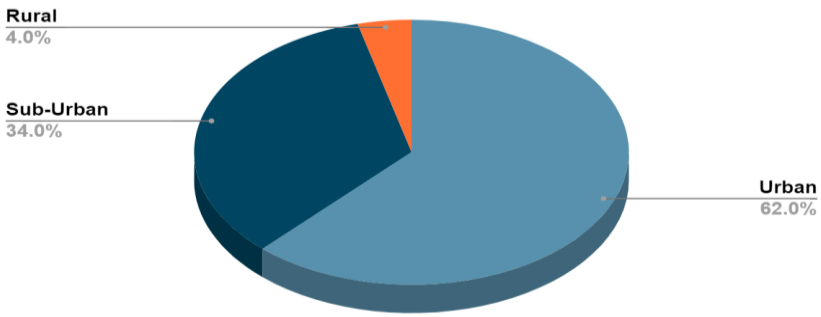

Figure 5: Percentage distribution of respondents according to their Location of Stay

4.1.1.6 Type of House

The information collected on the type of house of the workers showed that 61 per cent of them stayed in rented houses while 39 per cent of them had their own house.

Table 11: Distribution of the respondents according to the Type of House

n=500

Sr. No.	Type of House	f	%
1	Owned	195	39
2	Rented	305	**61**
Total		**500**	**100**

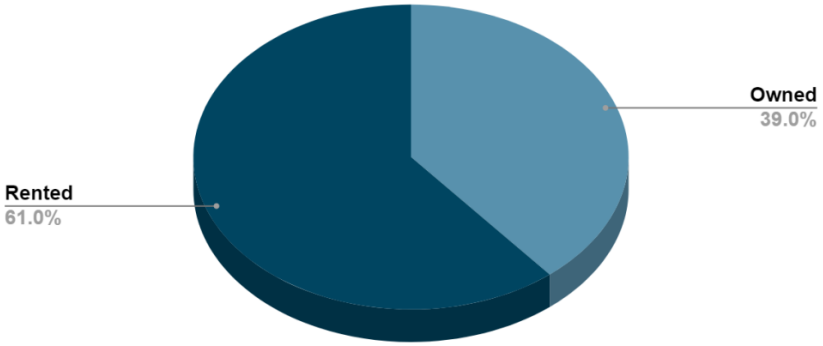

Figure 6: Percentage distribution of respondents according to the Type of House

4.1.1.7 Migration History

The migration history revealed that out of 500 respondents, 185 were migrants. Among them, 37.8 per cent migrated from rural to urban set-up within the state of Gujarat, 35.1 per cent had migrated from other states and 27 per cent from other cities within the state.

Table 12: Distribution of the respondents according to their Migration History

n=185

Sr. No.	Migration History	f	%
1	Intercity (within state)	50	27.0
2	Rural to Urban (within state)	70	**37.8**
3	Inter State	65	35.1
Total		**185**	**100**

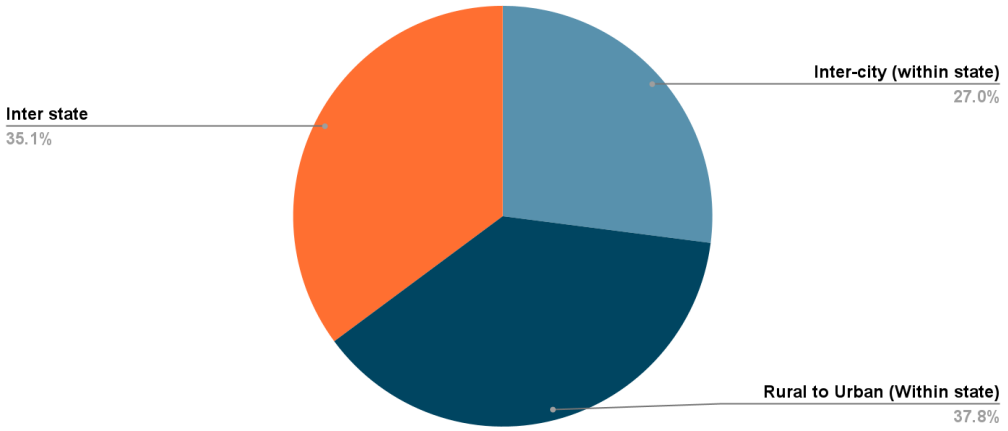

Figure 7: Percentage distribution of respondents according to their Migration History

4.1.1.8 Reason for Migration

Upon investigating the reason for their migration it was observed that out of the 185 migrated workers, 44.3 per cent of them migrated due to the 'desire to earn more'. 'Lack of employment opportunities' was the reason for migration for 27.6 per cent of them, while 15.1 per cent of respondents migrated to get a 'better lifestyle' and 13 per cent migrated for 'other reasons'.

Table 13: Distribution of the respondents according to Reason for Migration

n=185

Sr. No.	Reason for Migration	f	%
1	Better Lifestyle	28	15.1
2	Desire to Earn More	82	**44.3**
3	Lack of Employment Opportunities	51	27.6
4	Other Reasons	24	13.0
Total		**185**	**100**

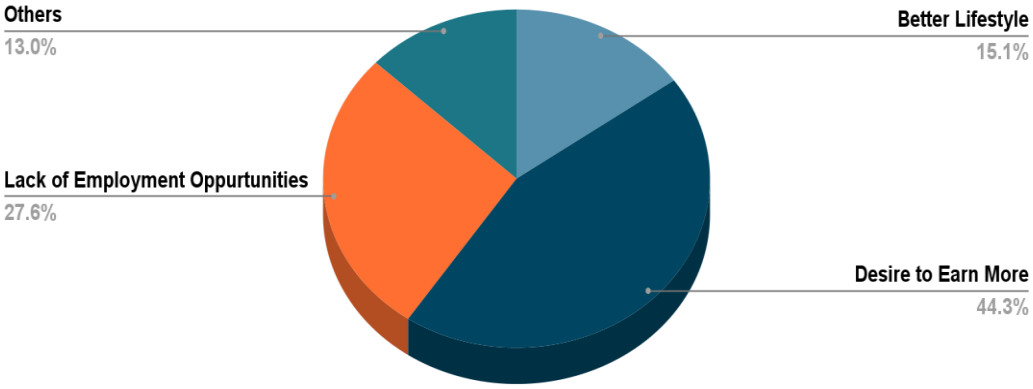

Figure 8: Percentage Distribution of Respondents according to Reason for Migration

4.1.2 Family Related Information

4.1.2.1 Residing Status

It was observed that 59.4 per cent of the respondents were residing with their family while 40.6 per cent of them were residing away from them.

Table 14: Distribution of the respondents according to their Residing Status

n=500

Sr. No.	Residing Status	f	%
1	Residing with Family	297	**59.4**
2	Residing away from Family	203	40.6
Total		**500**	**100**

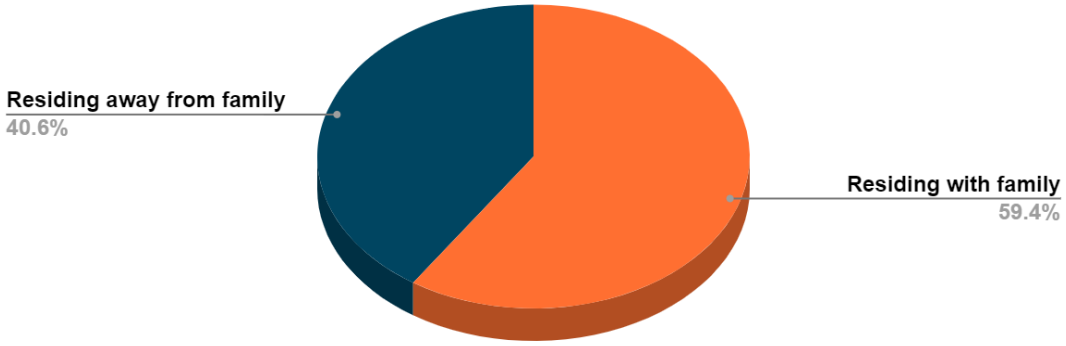

Figure 9: Percentage Distribution of Respondents based on their Residing Status

4.1.2.2 Family Type

Type of family was categorized as Nuclear and Joint Family.

It was observed that 60.2 per cent of the respondents had joint families while 39.8 per cent of them were living in nuclear families.

Table 15: Distribution of the respondents according to their Family Type

n=500

Sr. No.	Family Type	f	%
1	Joint	301	**60.2**
2	Nuclear	199	39.8
Total		**500**	**100**

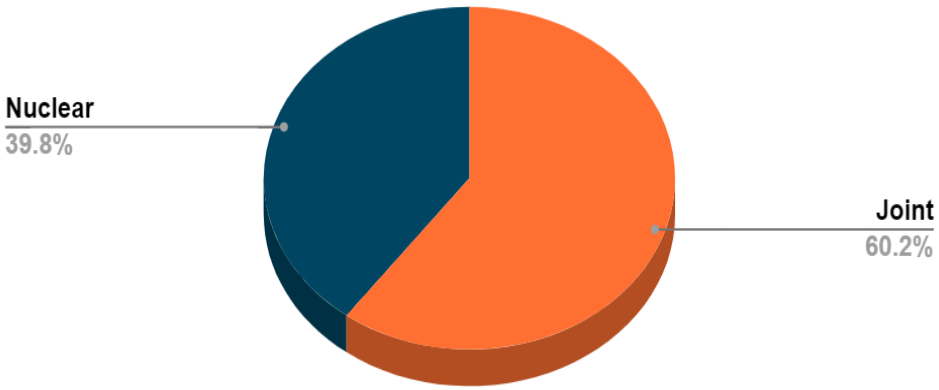

Figure 10: Percentage distribution of respondents according to their Family Type

4.1.2.3 Number of Family Members

For the present study the number of family members ranged from 1 to 6 and above. It was observed that 44.2 per cent of the respondents had 4-6 people in their family, while 39.4 per cent had more than 6 family members staying together. The remaining 16.4 per cent of the respondents had 1-3 family members.

Table 16: Distribution of the respondents according to Number of Family Members

n=500

Sr. No.	Number of Family Members	f	%
1	1-3	82	16.4
2	4-6	221	**44.2**
3	6<	197	39.4
Total		**500**	**100**

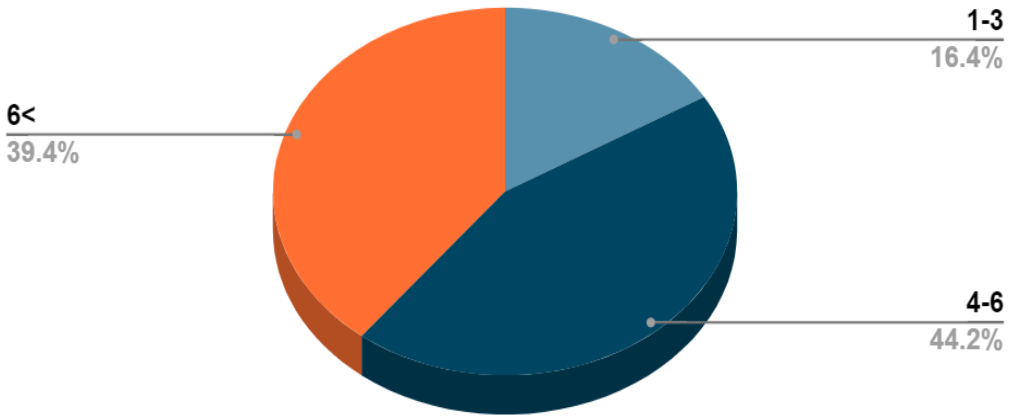

Figure 11: Percentage Distribution of Respondents according to the Number of Family Members

4.1.2.4 Number of Earning Members

For the present study the number of earning family members ranged from 1 to 4 and above. It was observed that 48 per cent of the respondents had 1-2 earning members in the family, while 46.8 per cent had 3-4 earning members in the family. Only 5.2 per cent of the respondents had more than 4 earning members in their family.

Table 17: Distribution of the respondents according to Number of Earning Family Members

n=500

Sr. No.	Number of Earning Members	f	%
1	1-2	240	**48**
2	3-4	234	46.8
3	4<	26	5.2
Total		**500**	**100**

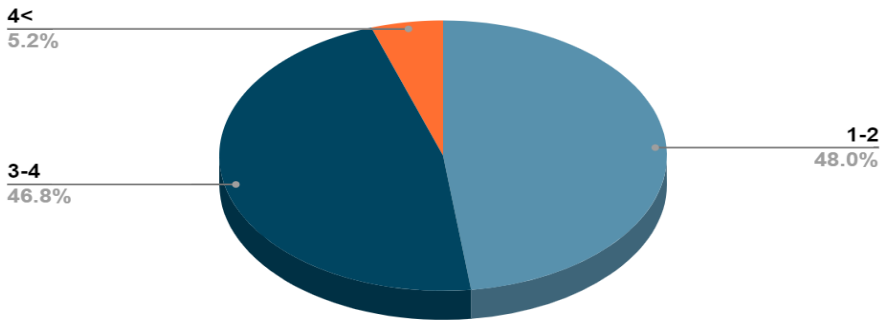

Figure 12: Percentage distribution of respondents according to the Number of Earning Family Members

4.1.2.5 Employment Status of Family Members in the Diamond Polishing Industry

It was observed 83.2 per cent of the respondents did not have any family members employed in the diamond polishing industry while the remaining 16.8 per cent had family members employed in the diamond polishing industry.

Table 18: Distribution of the respondents according to Employment Status of Family Members in the Diamond Polishing Industry

n=500

Sr. No.	Employment Status of Family Members in the Diamond Polishing Industry	f	%
1	Employed	84	16.8
2	Not Employed	416	**83.2**
Total		**500**	**100**

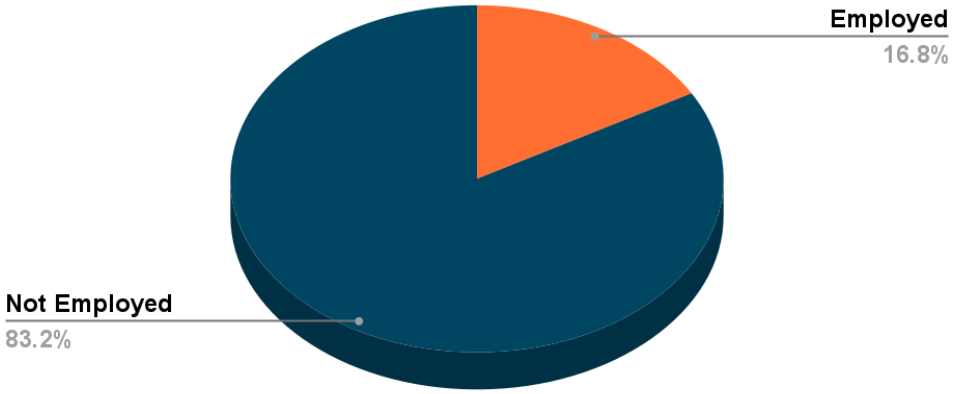

Figure 13: Percentage distribution of respondents according to Employment Status of Family Members in the Diamond Polishing Industry

4.1.3 Work Related Information

4.1.3.1 Work Experience

The number of years spent in the industry spanned from 2 years to 37 years. Data revealed that 42.6 per cent of the respondents had been working for 2-10 years, while 32.6 per cent had been for 11-19 years in the industry. Others had an experience of 20-28 years (18.6 per cent) and 29-37 years (6.2 per cent) in the industry.

Table 19: Distribution of the respondents according to their Work Experience

n=500

Sr. No.	Work Experience (In years)	f	%
1	2-10	213	**42.6**
2	11-19	163	32.6
3	20-28	93	18.6
4	29-37	31	6.2
Total		500	100

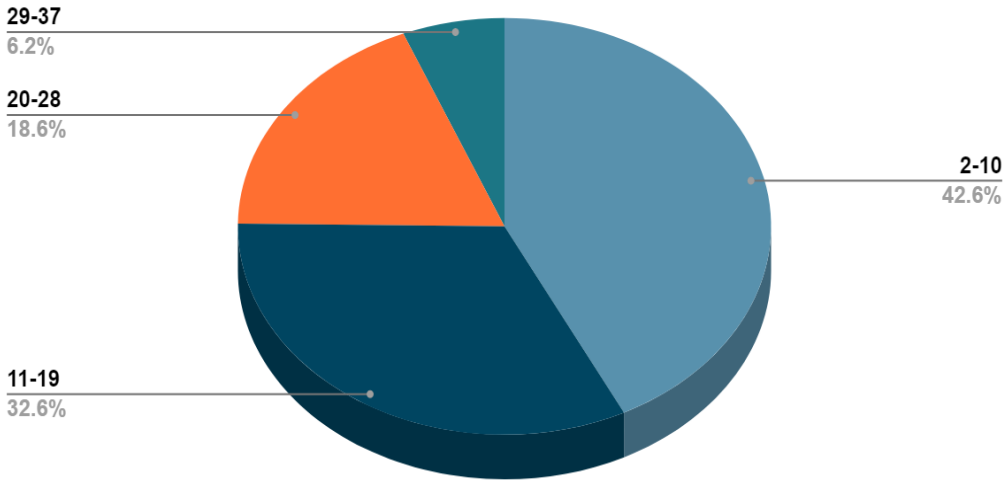

Figure 14: Percentage distribution of respondents according to their Work Experience

4.1.3.2 Number of Years in the Current Workplace

Data was collected to get information on the number of years in the current workplace. It was seen that 46.6 per cent of the respondents had 2-6 years of experience while 32.6 per cent had 7-12 years of experience in the current workplace. The remaining 20.8 per cent of the respondents had 13-18 years of experience in the current workplace.

Table 20: Distribution of the respondents according to Number of Years in the Current Workplace

n=500

Sr. No.	Number of Years in the Current Workplace	f	%
1	2-6 years	233	**46.6**
2	7-12 years	163	32.6
3	13-18 years	104	20.8
Total		**500**	**100**

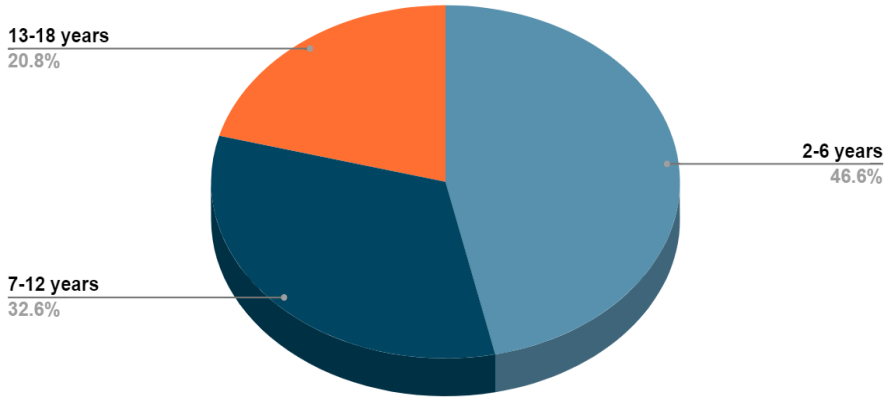

Figure 15: Percentage distribution of respondents according to the Number of Years in the Current Workplace

4.1.3.3 Source of Getting the Present Job

The source of securing the present job was categorized under 'through reference' and 'self'. The data collected showed that 63.8 per cent of the respondents got their present job through 'reference', while 36.2 per cent of them secured the job themselves through self-application.

Table 21: Distribution of the respondents according to Source of Getting Present Job

n=500

Sr. No.	Source of Getting the Present Job	f	%
1	Self	181	36.2
2	Reference	319	**63.8**
Total		**500**	**100**

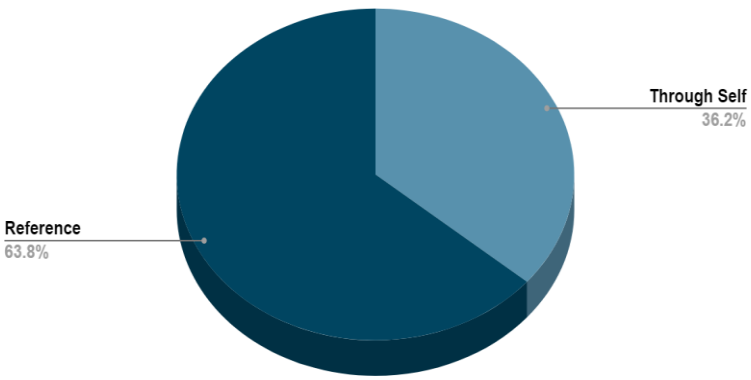

Figure 16: Percentage distribution of respondents according to Source of Getting the Present Job

4.1.3.4 Work Type

From the total number of 500 respondents, 100 (20 per cent) respondents from each of the 5 diamond polishing activities were selected.

Table 22: Distribution of the respondents according to Work Type

n=500

Sr. No.	Work Type	f	%
1	Table work	100	20
2	Girdle Rounding	100	20
3	Talia Work	100	20
4	Athpel Work	100	20
5	Mathala Work	100	20
Total		**500**	**100**

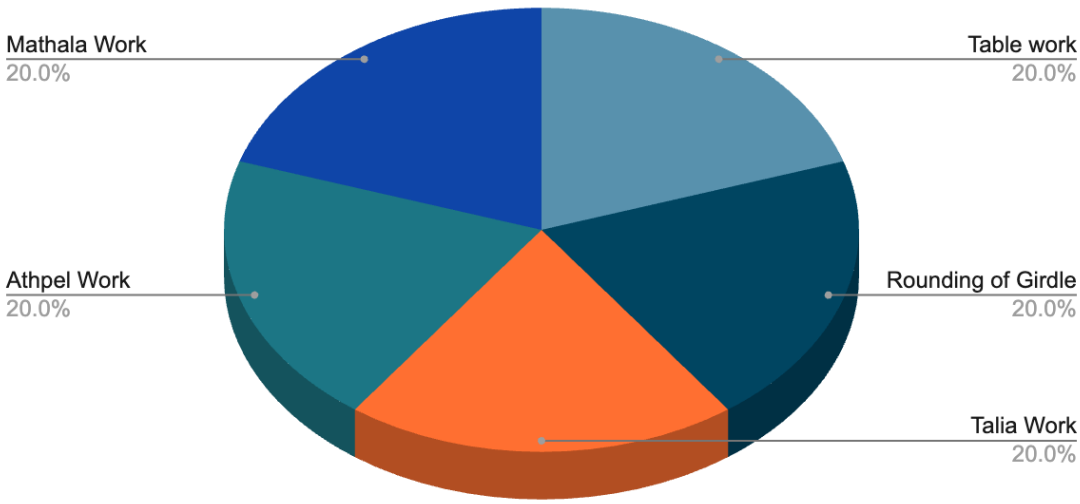

Figure 17: Percentage distribution of respondents according to Work Type

Section II

4.2 Problems Experienced by the Respondents

4.2.1 Physiological Problems

This section deals with the different physiological problems experienced by the respondents in the last one year, which they attribute to their present job. Physiological problems included chronic problems, respiratory problems, musculoskeletal problems and other problems related to ear, eye, skin, eating and sleeping disorders.

4.2.1.1 Chronic Problems

From the data collected it was observed that 60.2 per cent of the respondents suffered from hypertension, which they attributed to their present workplace and the nature of their work. Very few respondents reported other chronic problems that they would attribute to their present job.

Table 23: Distribution of the respondents according to their Chronic Problems

n=500

Sr. No.	Chronic Problems	Yes		No	
		f	%	f	%
1	Hypertension	301	**60.2**	199	39.8
2	Cholesterol	64	12.8	436	87.2
3	Kidney Problem	63	12.6	437	87.4
4	Heart Disease	35	7	465	93
5	Diabetes	110	22	390	78

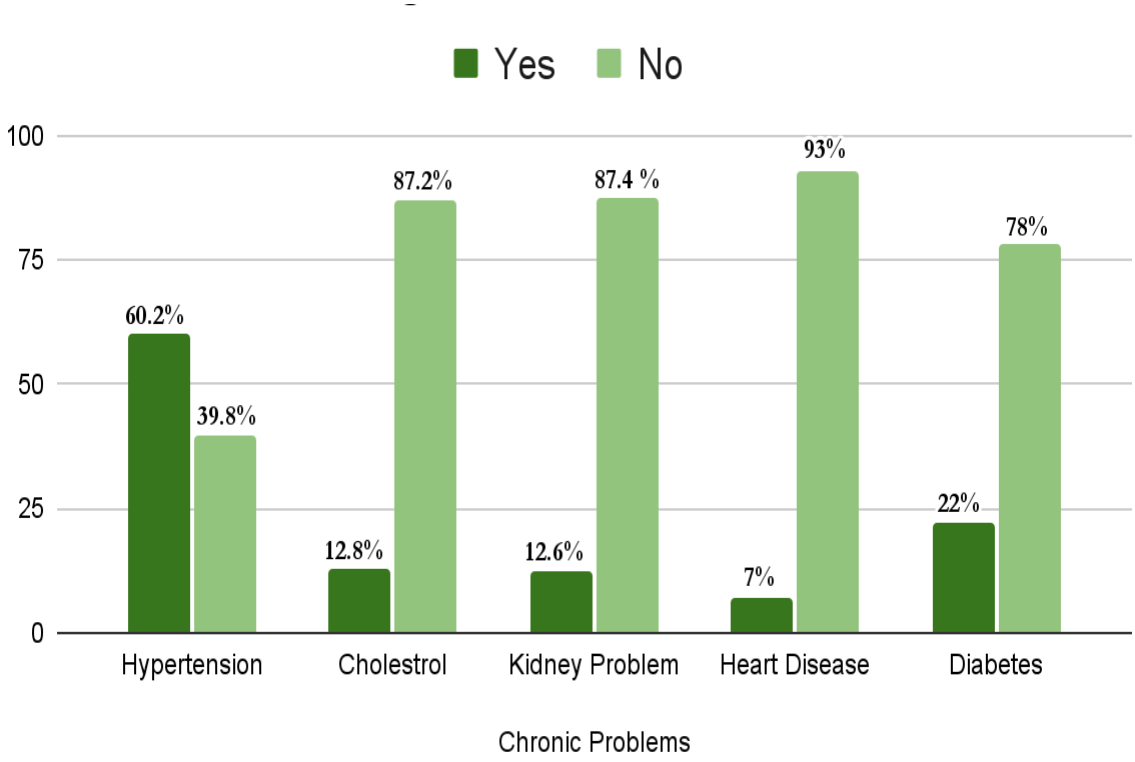

Figure 18: Percentage distribution of respondents according to their Chronic Problems

4.2.1.2 Respiratory Problems

Looking at the present nature of the job and the work environment, the respiratory problems faced by the respondents were also assessed. The results indicated that 65.6 per cent of the respondents complained of being allergic to pollution and 32.6 per cent reported frequent respiratory infections. Other problems majorly reported by the respondents were chest tightness (29.4 per cent) and loss of smell (23.2 per cent).

Table 24: Distribution of the respondents according to their Respiratory Problems

n=500

Sr. No.	Respiratory Problems	Yes		No	
		f	%	f	%
1	Frequent Respiratory Infections	163	32.6	337	67.4
2	Allergy to Pollution	328	**65.6**	172	34.4
3	Loss of Smell	116	23.2	384	76.8
4	Chest Tightness	147	29.4	353	70.6
5	Chronic Cough	86	17.2	414	82.8
6	Shortness of Breath	89	17.8	411	82.2
7	Asthma	23	4.6	477	95.4

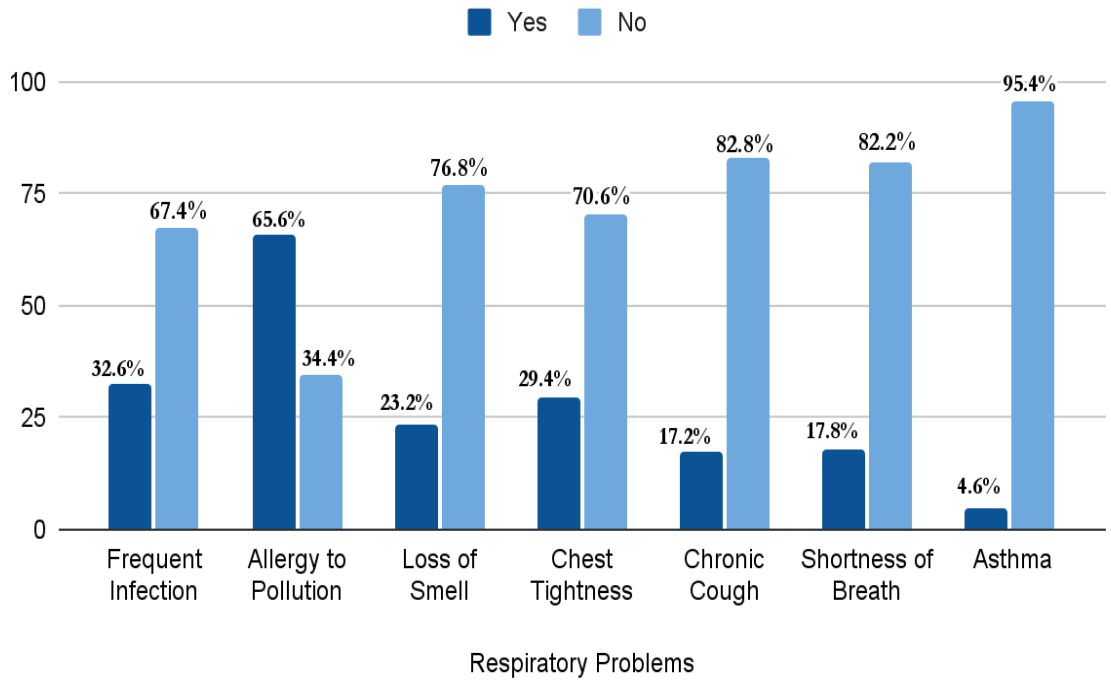

Figure 19: Percentage distribution of respondents according to their Respiratory Problems

4.2.1.3 Musculoskeletal Problems

Since the present task involves repetitive movements and long hours of sitting in the same position, the musculoskeletal problems experienced by the respondents were assessed. It was observed that the maximum number of respondents (84 per cent) complained of fatigue followed by 64.2 per cent who complained of weakness and 57.4 per cent complained of numbness in legs and the same percentage also reported bent back.

Table 25: Distribution of the respondents according to their Musculoskeletal Problems

n=500

Sr. No.	Musculoskeletal Problems	Yes		No	
		f	%	f	%
1	Weakness	321	64.2	179	35.8
2	Fatigue	420	**84**	80	16
3	Swollen Legs	122	24.4	378	75.6
4	Numbness in Legs	287	57.4	213	42.6
5	Numbness in Right Hand	110	22	390	78
6	Numbness in Left Hand	160	32	340	68
7	Numbness in Fingers	110	22	390	78
8	Pain in Gripping	143	28.6	357	71.4
9	Bent Back	287	57.4	213	42.6
10	Joint Pain	115	23	385	77

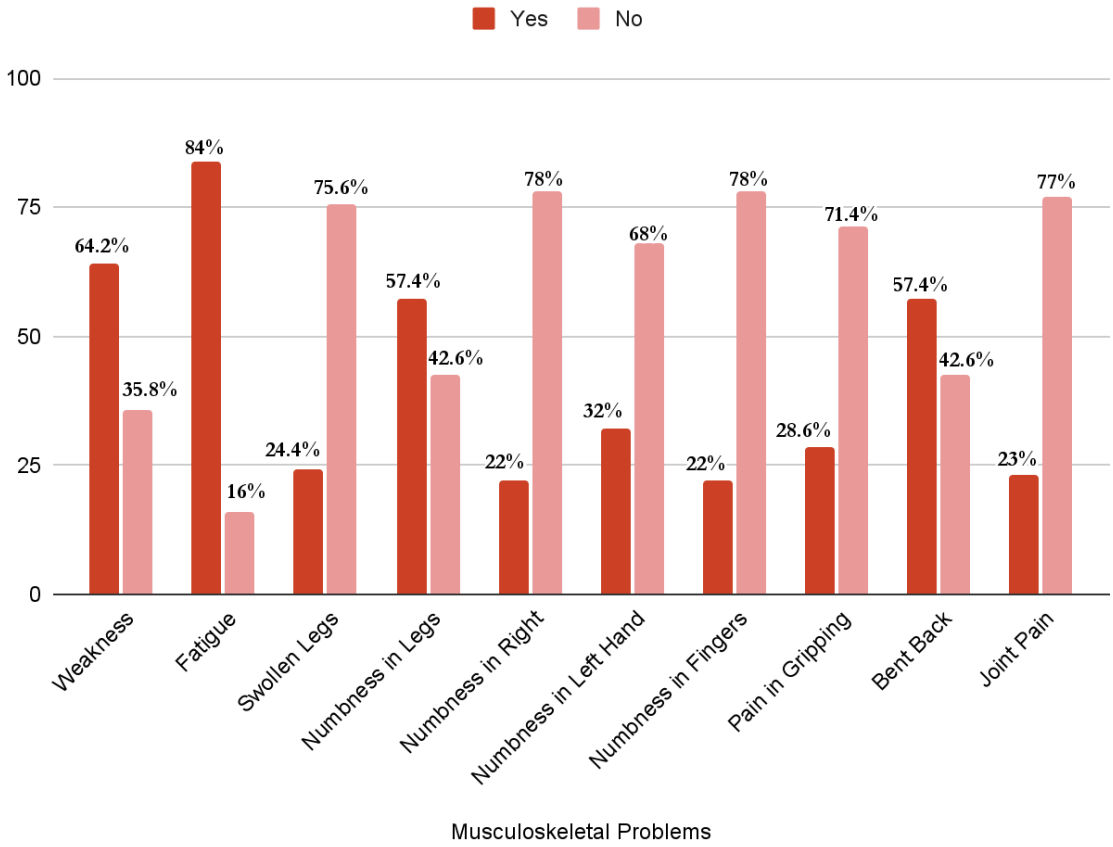

Figure 20: Percentage distribution of respondents according to their Musculoskeletal Problems

4.2.1.4 Other Physiological Problems

Apart from the chronic, respiratory and musculoskeletal problems some other physiological problems that the respondents might be facing related to the eye, ear, skin etc. were also assessed. It was observed that 80 per cent of the respondents complained of tired eyes, ear irritation and severe headache were the other problems reported by 68.8 per cent and 55.2 per cent of the respondents respectively.

Table 26: Distribution of the respondents according to Other Physiological Problems

n=500

Sr. No.	Other Physiological Problems	Yes		No	
		f	%	f	%
1	Eye Irritation	202	40.4	298	59.6
2	Tired Eyes	400	**80**	100	20
3	Watery Eyes	197	39.4	303	60.6
4	Problem seeing near object	102	20.4	398	79.6
5	Problem seeing far object	159	31.8	341	68.2
6	Ear Irritation	344	68.8	156	31.2
7	Ear Pulsation	175	35	325	65
8	Hearing Loss	32	6.4	468	93.6
9	Skin Rashes	24	4.8	476	95.2
10	Itchy Skin	162	32.4	338	67.6
11	Severe Headache	276	55.2	224	44.8
12	Loss of Taste	100	20	400	80
13	Loss of Hunger	132	26.4	368	73.6
14	Tendency to Overeat	197	39.4	303	60.6
15	Insomnia	179	35.8	321	64.2

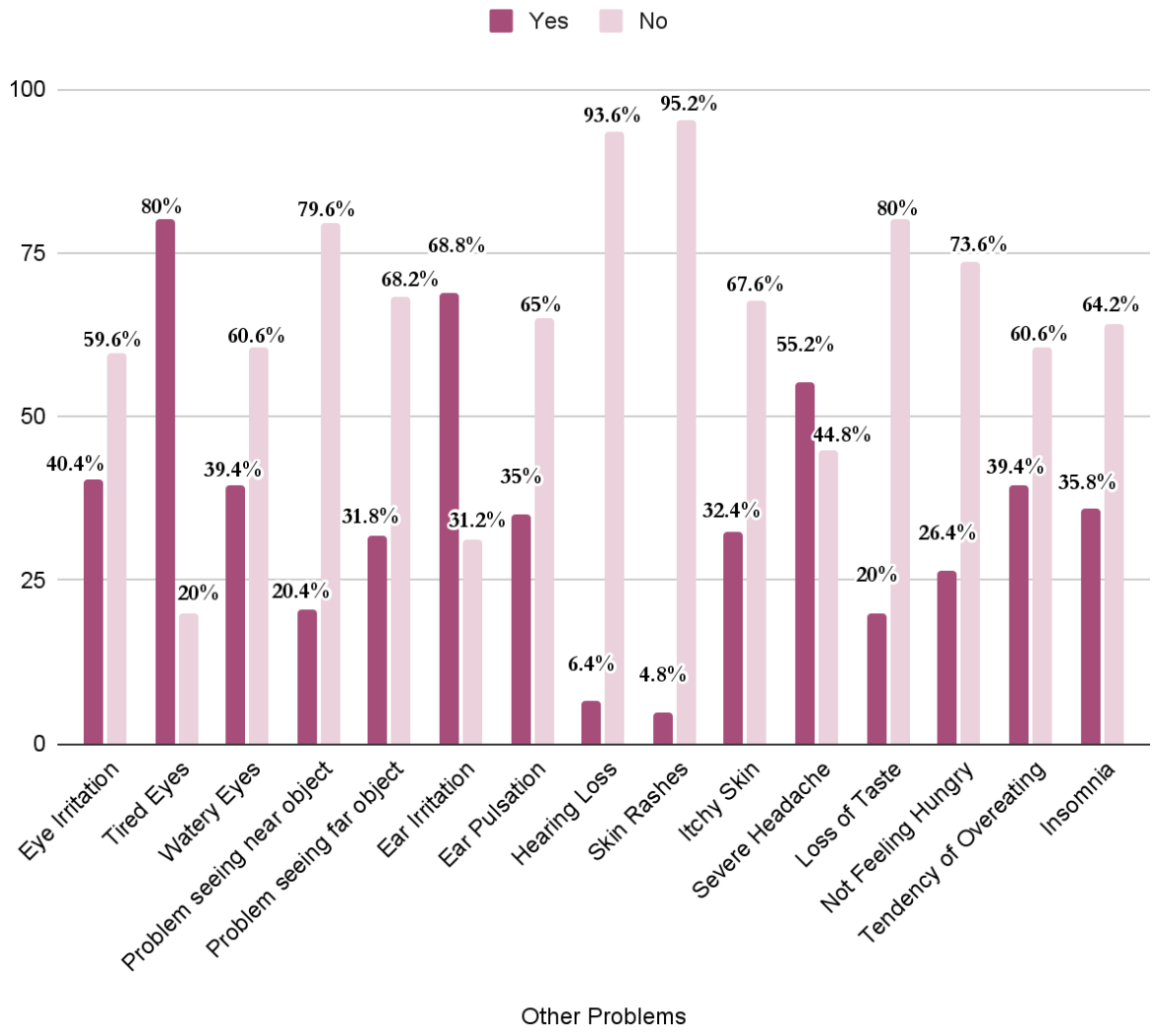

Figure 21: Percentage Distribution of Respondents according to Other Physiological Problems

4.2.2 Psychosocial Problems

This section deals with the different psychosocial problems faced by the respondents that include the psychological as well as social issues that they experience at their workplace. Psychosocial problems include aspects related to social factors at work, work organization and work environment as perceived by the respondents.

4.2.2.1 Problems Related to Social Factors at Work

Various parameters were considered in order to study the problems related to the social factors at the workplace. It was observed that poor communication with coworkers and work hours not being flexible were the two major problems related to social factors at work that was faced by 64.4 per cent and 64 per cent of the respondents respectively. Being addicted to tobacco and not having good relations with co-workers was also reported by 58 per cent and 56 per cent of the respondents respectively. Not having enough time to spend with the family was another problem faced by 55 per cent of the respondents.

Table 27: Distribution of the respondents according to Problems Related to Social Factors at Work

n=500

Sr. No.	Problems Related to Social Factors At Work	Agree		Disagree	
		f	%	f	%
1	Poor relationship with employer	74	14.8	426	85.2
2	Poor relationship with co -worker	279	55.8	221	44.2
3	Poor communication between staff and management	101	20.2	399	79.8
4	Poor communication between co-workers	322	**64.4**	178	35.6
5	Feel harassed/bullied at work	79	15.8	421	84.2
6	Feel dis-respected at work	95	19	405	81.0
7	Face discrimination	141	28.2	359	71.8
8	Sense a risk of violence at workplace	67	13.4	433	86.6
9	Do not feel an integral part of the organization	211	42.2	289	57.8
10	Grievances not handled effectively	115	23	385	77
11	Work hours are not flexible	322	64	178	36
12	Do not get enough holidays	231	46.2	269	53.8
13	Do not get leaves when required	211	42.2	289	57.8
14	Do not receive medical aid when needed	98	19.6	402	80.4
15	Do not get time to socialize	203	40.6	297	59.4
16	Do not get time for family	276	55.2	224	44.8
17	Addicted to tobacco	289	57.8	211	42.2
18	Addicted to alcohol	156	31.2	344	68.8
19	Not motivated to come to work	154	30.8	346	69.2

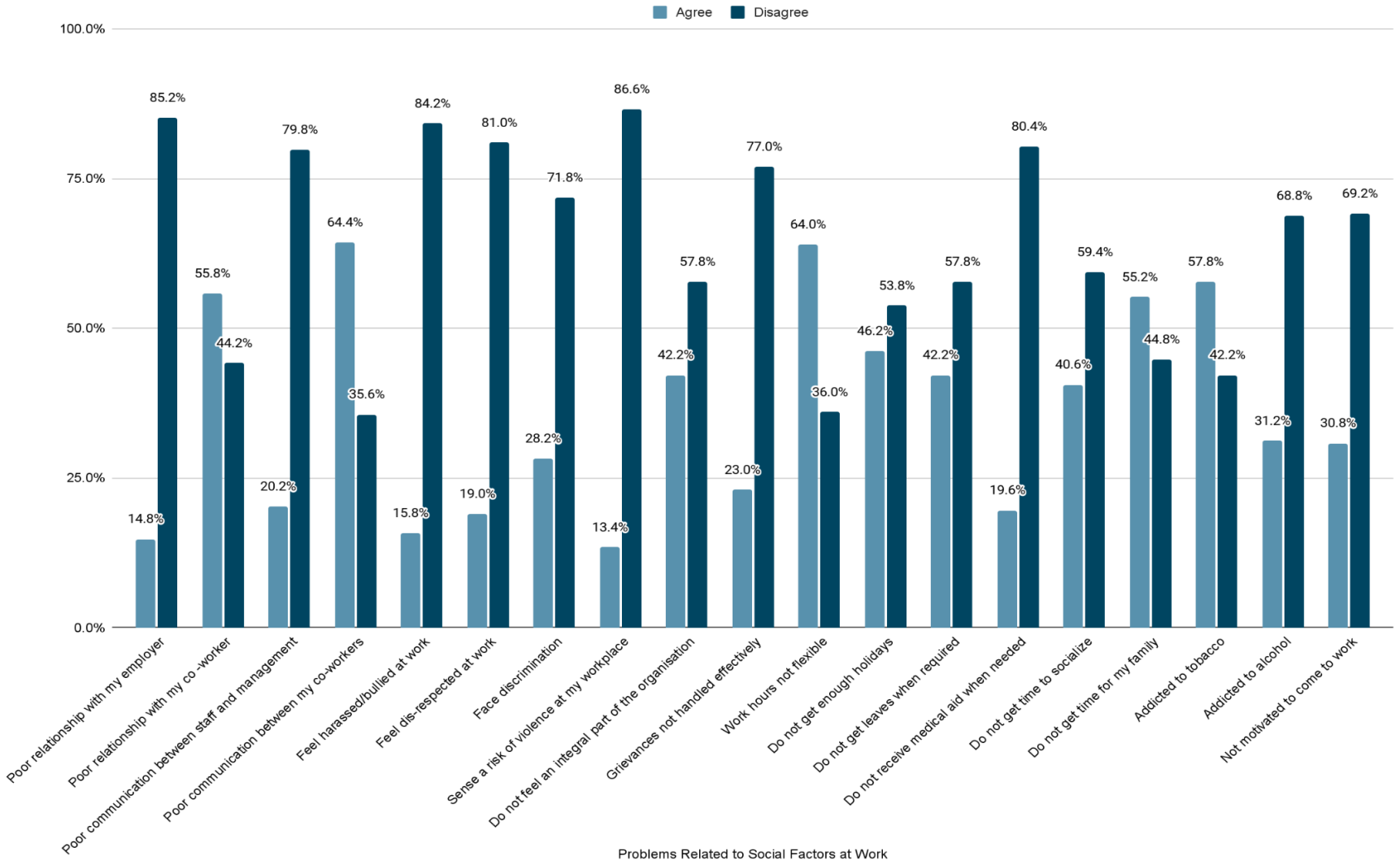

Figure 22: Percentage distribution of respondents according to Problems related to Social Factors at Work

4.2.2.2 Problems Related to Work Organization

The problems experienced by the respondents related to the work organization at their workplace were studied considering the parameters such as; feeling overburdened, feeling that the work is monotonous, time not enough to complete tasks, not enough rest breaks, work being physically demanding etc. It was observed that 80.2 per cent of the employees complained of feeling frustrated while 78.2 per cent of the respondents felt that the work was monotonous. A large percentage (76 per cent) of the respondents also felt that enough job specific training was not provided to them and 73.6 per cent of them complained of lack of good facilities.

Table 28: Distribution of the respondents according to Problems Related to Work Organization **n=500**

Sr. No.	Problems Related to Work Organization	Agree		Disagree	
		f	%	f	%
1	Feel overburdened	146	29.2	354	70.8
2	Feel the work is monotonous	391	78.2	109	21.8
3	Time not enough to complete tasks	178	35.6	322	64.4
4	Not enough rest breaks	174	34.8	326	65.2
5	Work is physically demanding	341	68.2	159	31.8
6	Requires a lot of mental effort	198	39.6	302	60.4
7	Targets are difficult to achieve	145	29	355	71
8	Not enough job specific training given	380	76	120	24
9	Skills not utilized fully	45	9	455	91
10	Too much performance pressure	302	60.4	198	39.6
11	Discipline is over harsh	256	51.2	244	48.8
12	Too much supervision	301	60.2	199	39.8
13	Not paid enough	260	52	240	48
14	Lack of good facilities	368	73.6	132	26.4
15	No job security	123	24.6	377	75.4
16	Do not feel appreciated for the work	301	60.2	199	39.8
17	Emotionally exhausted	45	9	455	91
18	Feel frustrated	401	**80.2**	99	19.8
19	Tired after waking up in the morning	312	62.4	188	37.6
20	Feel tense during the day	167	33.4	333	66.6
21	Lost enthusiasm in work	145	29	355	71
22	Incapable of resolving problems at work	98	19.6	402	80.4
23	Incapable of reaching goals	176	35.2	324	64.8
24	Incapable of contributing towards the organization	35	7	465	93
25	Do not feel confident about work	78	15.6	422	84.4

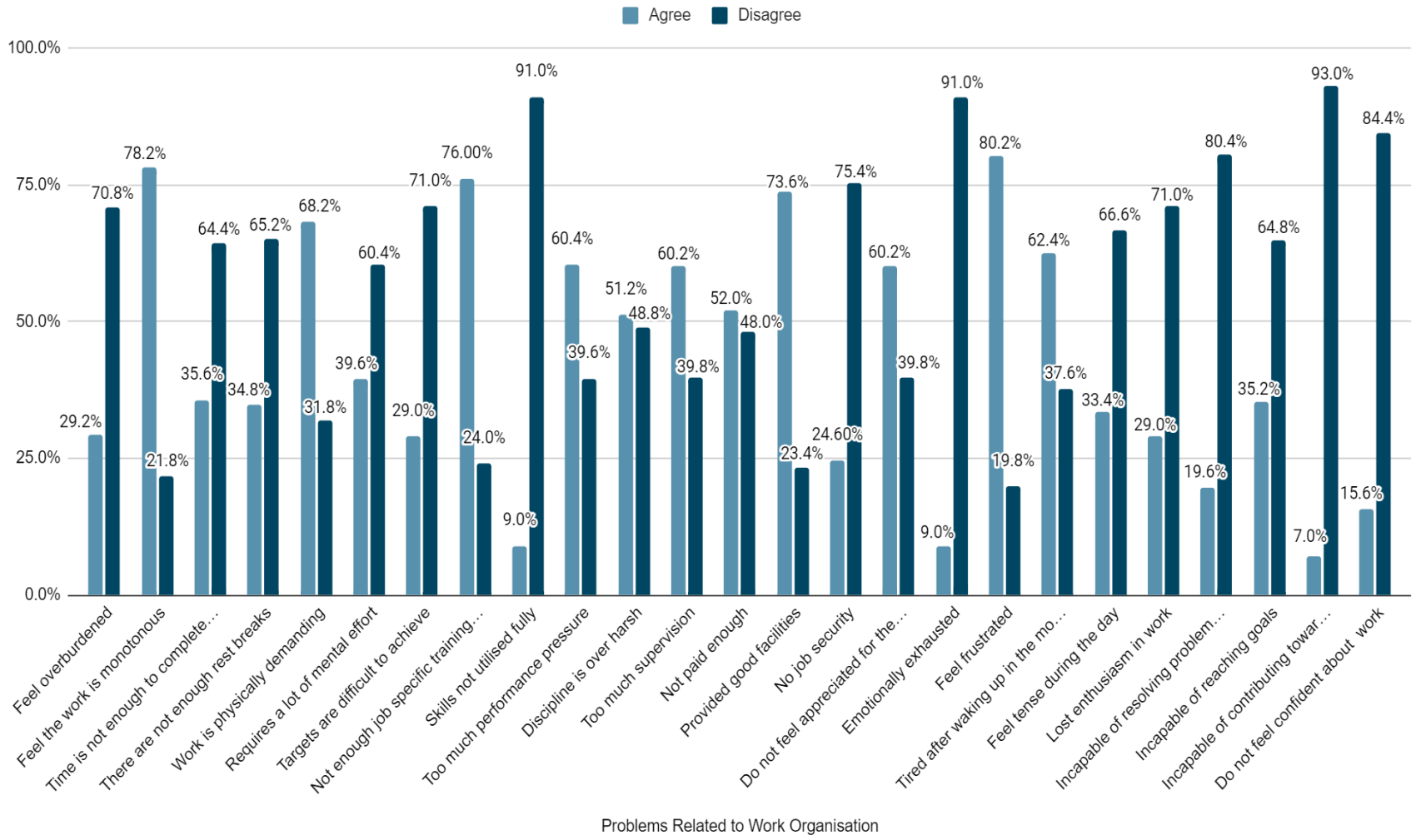

Figure 23: Percentage distribution of respondents according to Problems related to Work Organisation

4.2.2.3 Problems Related to Work Environment

The physical work environment has a significant impact on the psychosocial wellbeing of the workplace and to understand this the various parameters pertaining to the work environment like suitability of equipment, comfortable temperature, ventilation, odor, light etc. were analyzed. From the data collected it was observed that 68.6 per cent of the respondents complained of inadequate ventilation while 64 per cent of them said that the temperature was not comfortable. More than half the respondents (61 per cent) found the noise to be irritating while 54.6 per cent found the seat to be uncomfortable.

Table 29: Distribution of the respondents according to Problems Related to Work Environment

n=500

Sr. No.	Problems Related to Work Environment	Agree		Disagree	
		f	%	f	%
1	Equipments not suitable	0	0	500	100
2	Temperature not comfortable	320	64	180	36
3	Inadequate ventilation	343	**68.6**	157	31.4
4	It gets suffocating inside	178	35.6	322	64.4
5	Presence of unpleasant odour	200	40	300	60
6	It is dusty indoors	78	15.6	422	84.4
7	Light is insufficient	198	39.6	302	60.4
8	Noise is unbearable	164	32.8	336	67.2
9	Noise is irritating	305	61	195	39
10	Room color is uncomfortable	76	15.2	424	84.8
11	Seat is uncomfortable	273	54.6	227	45.4
12	Machines not inspected regularly	78	15.6	422	84.4
13	Damaged machines are not repaired immediately	22	4.4	478	95.6

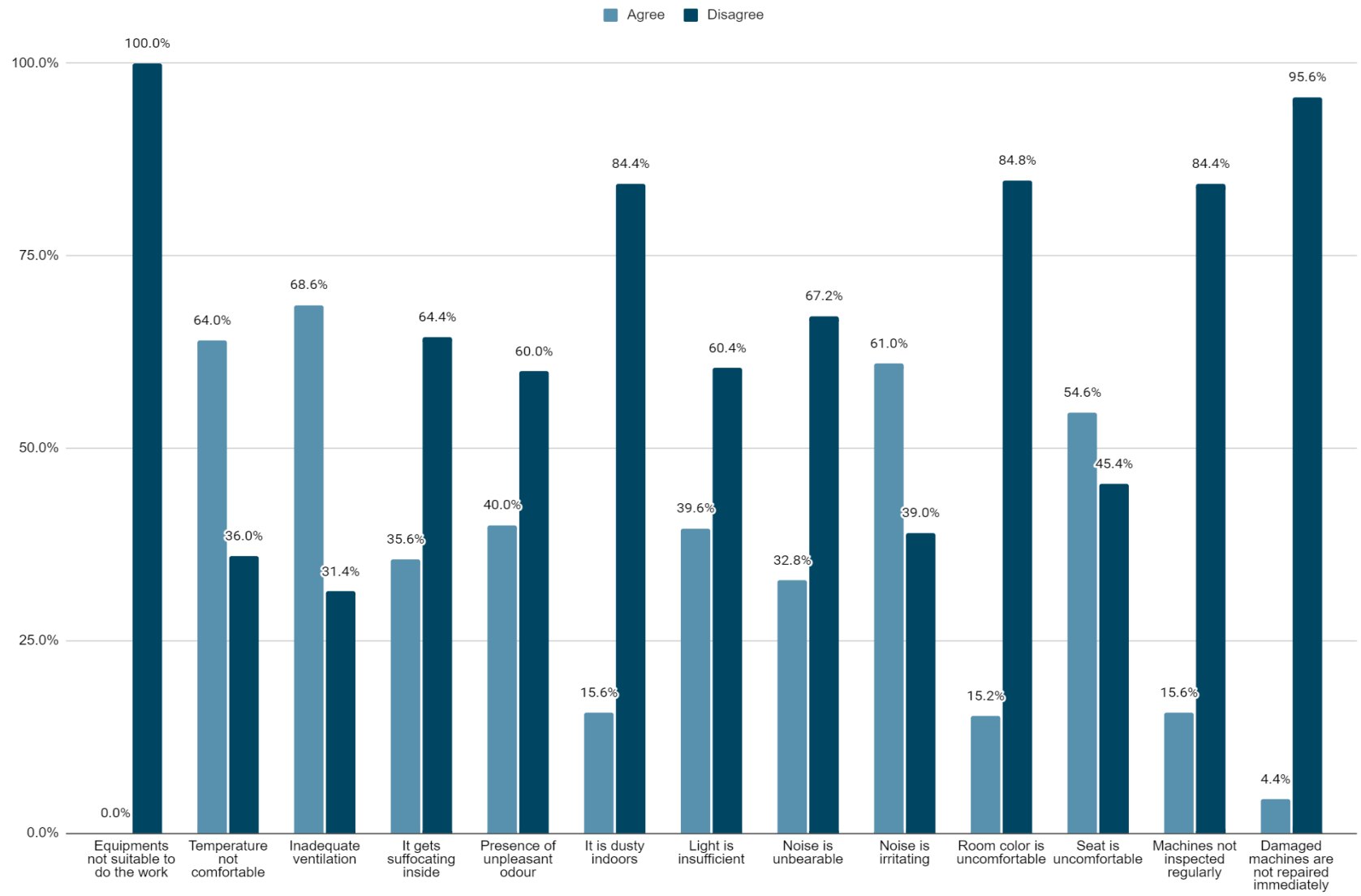

Figure 24: Percentage distribution of respondents according to Problems related to Work Environment

Section III

4.3 Occupational Health Hazards

4.3.1 Ergonomic Hazard

4.3.1.1 Perceived Musculoskeletal Pain Experienced by the Respondents

In order to assess the ergonomic hazard that the diamond polishers are exposed to, Nordic Body Map was used to determine the perceived musculoskeletal pain experienced by them at 28 different locations in the body. The respondents were instructed to rate the level of pain experienced on a 4-point scale ranging from 'no pain', 'moderate pain, 'pain' and 'very painful'. Weighted mean score was calculated to determine the location where the highest pain was reported.

Table 30: Distribution of the respondents according to the Degree of Musculoskeletal Pain experienced by them in different locations of their body

Sr. No.	Location	n=500								
		No Pain (1)		Moderate Pain (2)		Pain (3)		Very Painful (4)		Weighted mean score
		f	%	f	%	f	%	f	%	
1	Pain/stiff in the upper neck	238	47.6%	110	22%	121	24.2%	31	6.2%	1.89
2	Pain in the lower neck	142	28.4%	183	36.6%	147	29.4%	28	5.6%	2.12
3	Pain in the left shoulder	44	8.8%	154	30.8%	173	34.6%	129	25.8%	2.77
4	Pain in the right shoulder	70	14%	171	34.2%	204	40.8%	55	11%	2.49
5	Pain in the left upper arm	71	14.2%	166	33.2%	147	29.4%	116	23.2%	2.62
6	Pain in the back	62	12.4%	90	18%	172	34.4%	176	35.2%	**2.92**

Sr. No.	Location	n=500								
		No Pain (1)		Moderate Pain (2)		Pain (3)		Very Painful (4)		Weighted mean score
		f	%	f	%	f	%	f	%	
7	Pain in the right upper arm	92	18.4%	173	34.6%	165	33%	70	14%	2.43
8	Pain in the waist	81	16.2%	140	28%	164	32.8%	115	23%	2.63
9	Pain in the buttock	58	11.6%	129	25.8%	171	34.2%	142	28.4%	2.79
10	Pain in the bottom	58	11.6%	138	27.6%	154	30.8%	150	30%	2.79
11	Pain in the left elbow	95	19%	166	33.2%	170	34%	69	13.8%	2.43
12	Pain in the right elbow	118	23.6%	197	39.4%	153	30.6%	32	6.4%	2.19
13	Pain in the left lower arm	65	13%	129	25.8%	197	39.4%	109	21.8%	2.7
14	Pain in the right lower arm	79	15.8%	217	43.4%	155	31%	49	9.8%	2.35
15	Pain in the left wrist	72	14.4%	114	22.8%	191	38.2%	123	24.6%	2.73
16	Pain in the right wrist	95	19%	179	35.8%	162	32.4%	64	12.8%	2.39
17	Pain in the left hand	86	17.2%	176	35.2%	169	33.8%	69	13.8%	2.44
18	Pain in the right hand	132	26.4%	216	43.2%	111	22.2%	41	8.2%	2.12
19	Pain in the left thigh	108	21.6%	212	42.4%	138	27.6%	42	8.4%	2.23

Sr. No.	Location	n=500								
		No Pain (1)		Moderate Pain (2)		Pain (3)		Very Painful (4)		Weighted mean score
		f	%	f	%	f	%	f	%	
20	Pain in the right thigh	98	19.6%	202	40.4%	138	27.6%	62	12.4%	2.33
21	Pain in the left knee	80	16%	210	42%	168	33.6%	42	8.4%	2.34
22	Pain in the right knee	74	14.8%	212	42.4%	174	34.8%	40	8%	2.36
23	Pain in the left calf	59	11.8%	218	43.6%	132	26.4%	91	18.2%	2.51
24	Pain in the right calf	62	12.4%	216	43.2%	131	26.2%	91	18.2%	2.50
25	Pain in the left ankle	89	17.8%	204	40.8%	152	30.4%	55	11%	2.35
26	Pain in the right ankle	89	17.8%	204	40.8%	152	30.4%	55	11%	2.35
27	Pain in the left foot	92	18.4%	178	35.6%	195	39%	35	7%	2.35
28	Pain in the right foot	92	18.4%	178	35.6%	195	39%	35	7%	2.35

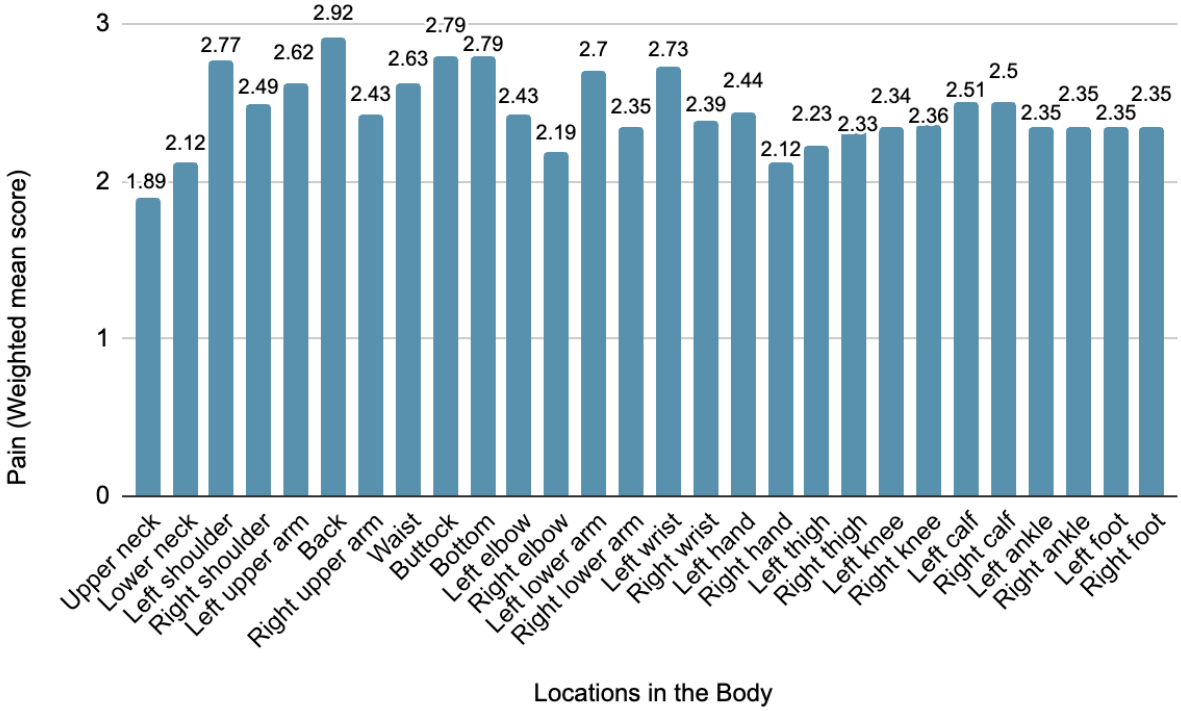

Figure 25: Weighted mean score of the Musculoskeletal Pain experienced by the respondents in different parts of their body

The calculation of weighted mean score reported that pain in the ‘back’ was rated the highest by the diamond polisher followed by pain in the ‘buttock’ and ‘bottom’. Pain in the ‘left shoulder’ was also rated high by the respondents.

Since the diamond polishing work involves five sub activities, a comparison of the amount of pain experienced by the respondents of each activity in the 28 body locations was also assessed.

Table 31: Comparative Table of weighted mean score (out of 4) of the Musculoskeletal Pain experienced by the respondents while doing the different diamond polishing activities

Sr. No.	Location	n=100/Activity				
		Weighted Mean Score				
		Table work	Girdle Rounding	Talia Work	Athpel Work	Mathala work
1	Pain/stiff in the upper neck	1.84	1.91	1.87	1.93	1.9
2	Pain in the lower neck	2.06	2.1	2.23	2.06	2.16
3	Pain in the left shoulder	2.92	2.44	2.72	2.85	2.94
4	Pain in the right shoulder	2.64	2.4	2.35	2.45	2.6
5	Pain in the left upper arm	2.74	2.16	2.84	2.65	2.69
6	Pain in the back	2.98	2.23	2.92	3.14	3.35
7	Pain in the right upper arm	2.28	2.03	2.49	2.59	2.74
8	Pain in the waist	2.74	2.06	2.52	2.42	3.01
9	Pain in the buttock	3	2.08	2.82	2.72	3.05
10	Pain in the bottom	3.08	2.34	2.82	2.63	2.89
11	Pain in the left elbow	2.54	2.05	2.32	2.49	2.73
12	Pain in the right elbow	2.14	1.96	2.06	2.34	2.49
13	Pain in the left lower arm	2.69	1.83	2.52	2.96	3.16
14	Pain in the right lower arm	2.27	1.81	2.49	2.54	2.63
15	Pain in the left wrist	2.94	2.24	2.69	2.91	2.87
16	Pain in the right wrist	2.23	1.93	2.52	2.61	2.66

Sr. No.	Location	n=100/Activity				
		Weighted Mean Score				
		Table work	Girdle Rounding	Talia Work	Athpel Work	Mathala work
17	Pain in the left hand	2.78	1.65	2.59	2.55	2.64
18	Pain in the right hand	2.03	1.41	2.36	2.36	2.45
19	Pain in the left thigh	2.16	1.54	2.45	2.48	2.51
20	Pain in the right thigh	2.66	1.54	2.45	2.48	2.51
21	Pain in the left knee	2.48	1.8	2.45	2.46	2.53
22	Pain in the right knee	2.56	1.8	2.45	2.46	2.53
23	Pain in the left calf	2.34	1.97	2.75	2.71	2.78
24	Pain in the right calf	2.3	1.97	2.75	2.71	2.78
25	Pain in the left ankle	2.48	1.78	2.39	2.53	2.55
26	Pain in the right ankle	2.48	1.78	2.39	2.53	2.55
27	Pain in the left foot	2.59	1.61	2.48	2.49	2.56
28	Pain in the right foot	2.59	1.61	2.48	2.49	2.56
	Total	2.52	1.93	2.51	2.54	**2.67**

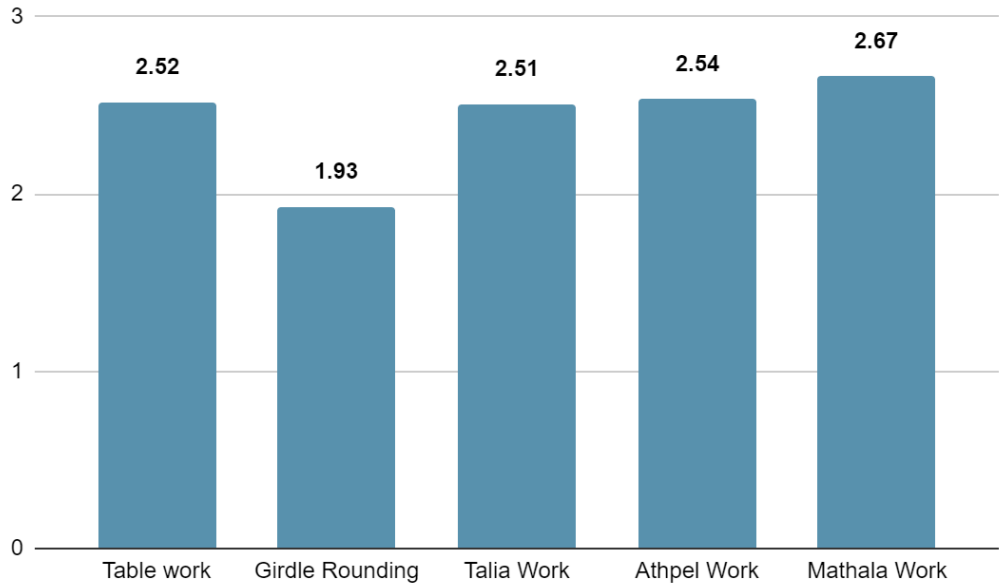

Figure 26: Comparison of weighted mean score of the Musculoskeletal Pain experienced by the respondents while doing different diamond polishing activities

On calculating the weighted mean score of the five activities individually it was observed that the respondents involved in doing the last activity i.e. the 'mathala work' experienced the highest amount of pain. This was closely followed by the respondents doing 'athpel work', 'table work' and 'talia work'. Respondents doing 'girdle rounding work' reported the least amount of pain.

Individual scores of the respondents based on their responses to the Nordic Body Map were also calculated. It was observed that a large number of them i.e. 46.4 per cent and 46.2 per cent belonged to the high risk and medium risk categories respectively. Much lesser percentage i.e. 6.2 per cent and 1.2 per cent belonged to the low risk and very high risk categories respectively. According to the Nordic Body Map, for respondents belonging to the high risk category 'improvement is needed' while those belonging to the medium risk category 'may require improvement'. For low risk there was 'no improvement' required while for very high risk category, 'improvement was needed as soon as possible'.

Table 32: Distribution of Respondents according to the Level of Risk on the basis of the Nordic Body Map

n=500

Activity	Level of Risk			
	Low	**Medium**	**High**	**Very High**
Table work	1	43	56	-
Girdle Rounding	28	69	3	-
Talia Work	1	46	52	1
Athpel Work	1	40	58	1
Mathala Work	-	33	63	4
Total	**31 (6.2%)**	**231 (46.2%)**	**232 (46.4%)**	**6 (1.2%)**

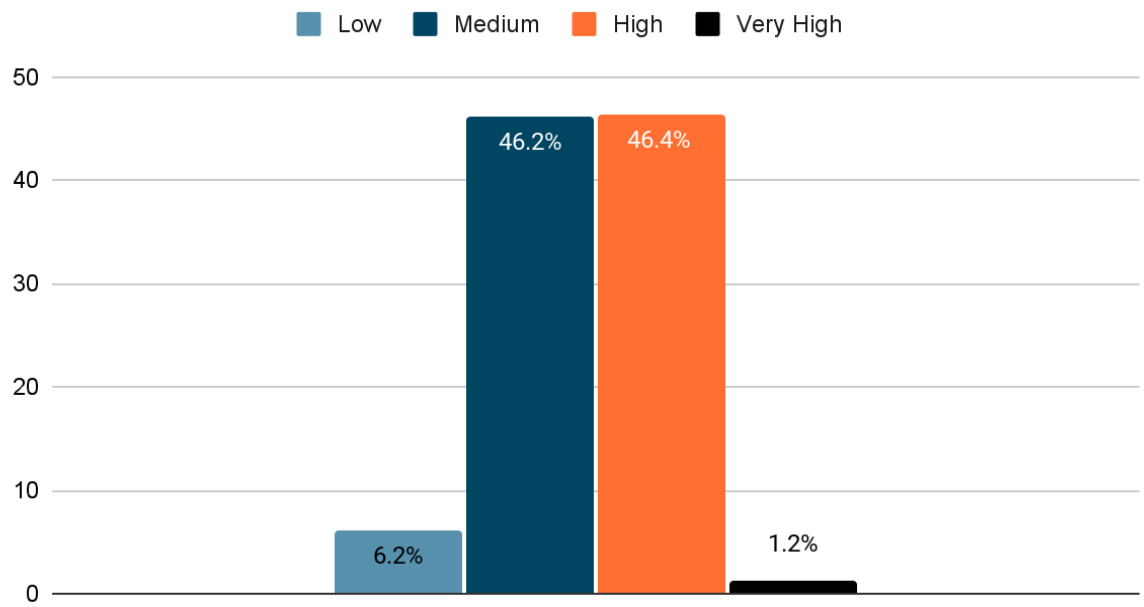

Figure 27: Percentage Distribution of Respondents according to the Level of Risk (Nordic Body Map)

4.3.1.2 Postural Load Requirements of Job Tasks

Upper body analysis was conducted for 50 respondents who experienced pain in their body to find the postural load requirements of job tasks on neck, trunk and upper extremities. From each of the five diamond polishing activities, 10 respondents were selected for the analysis. Video recordings were taken and

photographs of each of the activities were taken. Data was then analyzed using the RULA analysis sheet. Scores were assigned to each posture and computed on the RULA score sheet.

Table 33: Distribution of Respondents according to the Level of Risk on the basis of RULA Assessment

Activity	Level of Risk (n=50)			
	1-2 = Acceptable posture	3-4 = Further investigation, change may be needed	5-6 = Further investigation, change soon	7 = Investigate and implement change
Table work	-	4	6	-
Girdle Rounding	7	3	-	-
Talia Work	-	-	6	4
Athpel Work	-	-	7	3
Mathala Work	-	-	6	4
Total	**7 (14%)**	**7 (14%)**	**25 (50%)**	**11 (22%)**

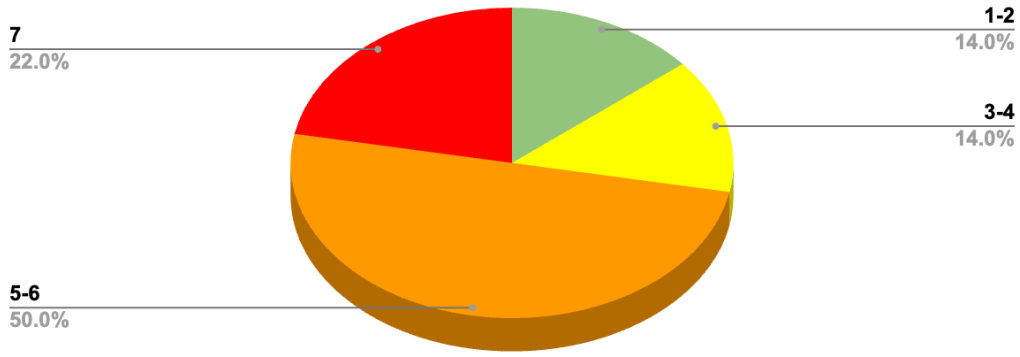

Figure 28: Percentage distribution of the respondents according to the Level of Risk as per RULA Assessment

From the above analysis it can be observed that 50 per cent of the respondents scored 5-6 on the RULA score sheet which meant that 'further investigation and change' was needed. Equal percentage of respondents (14 per cent), scored 1-2 and 3-4, meaning that some of them had 'acceptable posture' while for the other 'further investigation and change may be needed'. The remaining 11 respondents (22 per cent), scored 7 which meant that there should be further 'investigation and implementation of

change'. Thus it can be concluded that none of the participants from the girdle rounding work belonged to the high risk categories which clearly indicates that the polishers doing this activity were at very less risk in comparison to the workers performing other activities.

Plate 21: Researcher studying the structure of a diamond

WORKERS DOING DIFFERENT POLISHING ACTIVITIES

Plate 22: Polishers doing Table Work

Plate 23: Bent back developed over several years

Plate 24: Polishers doing Girdle Rounding Work

Plate 25: Polisher doing Talia Work

Plate 26: Polishers doing Athpel Work

Plate 27: Polishers doing Mathala Work

4.3.2 Physical Environment Hazard

This part deals with the physical attributes of the work environment. Data was collected regarding the temperature, humidity, light and noise of the workplace. For this purpose, indoor outdoor thermometer with hygrometer, digital lux meter and digital sound meter were used. The data presented below was collected during the peak hours of the diamond polishing work so as to get the most accurate data.

4.3.2.1 Indoor Temperature

It is a known fact that working in comfortable temperatures contributes to better health and productivity at work. The researcher recorded three readings on the indoor outdoor thermometer to measure the indoor temperature between 1:00 pm to 3:00 pm when it was the middle of the work day that used to start at 10:00 am and end at 7:00 pm. An average temperature was recorded from each industry. The lowest temperature recorded was 28.1°C and the highest recorded was 34.1°C. The mean indoor temperature of the polishing unit was 31.02°C. Larger cutting and polishing units may be able to afford air conditioning facilities, but installing an air conditioner in smaller industries would mean an additional financial burden for them.

Table 34: Percentage distribution of the diamond polishing units according to Average Indoor Temperature

n=15

Indoor Temperature (°C)	f	%
28-31	11	73.33
32-35	4	26.67
Total	**15**	**100**
Mean	**31.02°C**	

4.3.2.2 Indoor Humidity

The researcher recorded three readings on the Indoor Outdoor Thermometer with Hygrometer for the presence of humidity between 1:00 pm to 3:00 pm

when it was the middle of the work day that used to start at 10:00 am and end at 7:00 pm. The average was calculated from each of the units. It was seen that the lowest recorded humidity was 34 per cent and the highest recorded humidity was 44 per cent.

Table 35: Percentage distribution of the diamond polishing units according to Average Indoor Humidity Levels

n=15

Indoor Humidity Level (%)	f	%
34-39	5	33.33
40-44	10	66.67
Total	**15**	**100**
Mean	**39.33%**	

4.3.2.3 Indoor Light Levels

The polishing units majorly rely on artificial light as they are located in closed rooms with minimum supply of natural light. Polishing of diamonds involves a lot of detail and precision work and therefore task lighting is provided on each of the polishing machines. A Digital Lux Meter was used to measure the general lighting condition and level of lighting at the machine. It was observed that the lighting at the machine was found insufficient at 3 polishing units while the general lighting was adequate in all the 15 polishing units.

Table 36: Percentage distribution of the diamond polishing units according to Average Indoor Lighting Levels

n=15

Level of Lighting	Light at the Machine Recommended Light (1000 Lux) (Source: RQQ,1980)		General Lighting Recommended Light (100-150 Lux) (Source: RQQ,1980)	
	f	**%**	**f**	**%**
Less Light (Below Recommended Level)	3	20	0	0
Appropriate Light (≥ Recommended Level)	12	80	15	100
Total	**15**	**100**	**15**	**100**

4.3.2.4 Indoor Noise Levels

The Digital Noise Meter was held near the machine and three readings were recorded at an interval of five minutes. The workers were working for 8-10 hours per day and 6 days a week in the polishing unit (48-60 hours/week).

Table 37: Average Noise Level inside the diamond polishing units

n=15

Average Noise Recorded (db)	Permissible Standard
87.33 db	85db-90db (for 8 hours per day) (Source: OSHA, 2019)[4]

It was observed that the noise levels in all the units were within the permissible standards of 85-90 db given by OSHA for exposure for 8 hours per day. The average of all the recordings taken from the 15 units was 87.33 db. Although the level of noise was not too high, the kind of shrieking noise created due to the rubbing of rough stone against the metallic rotating wheel was quite irritating for the occupants.

Section IV

4.4 Testing of Hypotheses

Based on the objectives of the study a number of hypotheses were formulated. For the present investigation, as per the nature of the variables, Coefficient of Correlation, Kruskal-Wallis H Test and Dunn's Multiple Comparison Test (Post Hoc Test) were computed. For the purpose of statistical analysis, null forms of the hypotheses were formulated. The results are discussed as under.

H_{O1}: There exists no relationship between Physiological Problems and Psychosocial Problems.

In order to find the relationship between physiological problems and psychosocial problems, the coefficient of correlation was computed.

Table 38: Coefficient of Correlation showing the relationship between Physiological Problems and Psychosocial Problems.

Sr. No.	Selected Variables	n	r-value	Level of significance
1	Physiological Problems	500	0.499	0.05
2	Psychosocial Problems			

The coefficient of correlation was found to be significant between the physiological problems and the psychosocial problems experienced by the respondents. Hence the null hypothesis was rejected (Table 38). Thus it can be concluded that there is a positive relationship between physiological problems faced by the respondents and the psychosocial problems experienced by them at their workplace.

H_{O2}: There exists no relationship between Physiological Problems and Perceived Musculoskeletal Pain

In order to find the relationship between physiological problems and perceived musculoskeletal pain, the coefficient of correlation was computed.

Table 39: Coefficient of Correlation showing relationship between Physiological Problems and Perceived Musculoskeletal Pain

Sr. No.	Selected Variables	n	r-value	Level of significance
1	Physiological Problems	500	0.140	0.05
2	Perceived Musculoskeletal Pain			

The coefficient of correlation was found to be significant between physiological problems and perceived musculoskeletal pain experienced by the respondents. Thus the null hypothesis was rejected (Table 39). Hence it can be concluded that there was a relationship between the physiological problems experienced by the respondents and the perceived musculoskeletal pain experienced by them.

H_{O3}: There is no variation in the Physiological Problems experienced by the respondents with their Age, Gender, Marital Status, Education Level, Family Type, Number of Family Members, Work Experience and Work Type.

To find out the difference between Physiological Problems experienced by the respondents with their Age, Gender, Marital Status, Education Level, Family Type, Number of Members in the Family, Work Experience and Work Type 'Kruskal Wallis H Test' was computed.

Table 40: Kruskal Wallis H Test showing difference in the Physiological Problems experienced by the respondents with Age, Gender, Marital Status, Education Level, Family Type, Number of Family Members, Work Experience and Work Type

Sr. No.	Source of Variation	n	p-value	df	Level of significance
1	Age	500	0.000	2	0.05
2	Gender		0.803	1	N.S.
3	Marital Status		0.000	1	0.05
4	Education Level		0.000	2	0.05
5	Family Type		0.002	1	0.05.
6	Number of Family Members		0.037	2	0.05
7	Work Experience		0.000	3	0.05
8	Work Type		0.000	4	0.05

Note: N.S.= Not Significant, df= Degree of Freedom

Results in Table 40 indicate that the null hypothesis is rejected for all the given variables except for gender. This indicates that the physiological problems vary with age, marital status, education level, family type, number of family members, work experience and work type.

The p-values computed shows that there is no difference in the physiological problems experienced by male and female respondents. While the physiological problems vary with marital status i.e. among married and unmarried respondents. The results further indicated that the physiological problems experienced by respondents belonging to different family types, i.e. joint and nuclear, vary significantly.

Dunn Multiple Comparison Test was conducted as a post hoc test to assess the multiple independent variable groups to identify the groups with significant differences in the physiological problems experienced by the respondents.

Table 41: Dunn's Multiple Comparison Test showing the difference in Physiological Problems experienced by comparison groups for Age, Education Level, Number of Family Members, Work Experience and Work Type

Sr. No.	Source of Variation	Comparison groups	n	p-value	Level of significance
1	Age (in years)	22-33 ~ 34-45	500	0.000	0.05
		22-33 ~ 46-57		0.000	0.05
		33-45 ~ 46-57		0.000	0.05
2	Education Level	No formal education ~ Up to High School	500	0.000	0.05
		No formal education ~ Up to Middle School		0.000	0.05
		Up to High School ~ Up to Middle School		0.000	0.05
3	Number of Family Members	1-3 ~ 4-6	500	0.377	N.S.
		1-3 ~ 6<		0.293	N.S.
		4-6 ~ 6<		0.010	0.05
4	Work Experience (in years)	11-19 ~ 2-10	500	0.000	0.05
		11-19 ~ 20-28		0.000	0.05
		2-10 ~ 20-28		0.000	0.05
		11-19 ~ 29-37		0.000	0.05
		2-10 ~ 29-37		0.000	0.05
		20-28 ~ 29-37		0.887	N.S.
5	Work Type	Athpel Work ~ Girdle Rounding		0.000	0.05
		Athpel Work ~ Mathala Work		0.398	N.S.
		Girlde Rounding ~ Mathala Work	500	0.000	0.05
		Athpel Work ~ Table Work		0.525	N.S.
		Girdle Rounding ~ Table Work		0.000	0.05

Sr. No.	Source of Variation	Comparison groups	n	p-value	Level of significance
	Work Type	Mathala Work ~ Table Work	500	0.833	N.S.
		Athpel Work ~ Talia Bottom Work		0.536	N.S.
		Girdle Rounding ~ Talia Bottom Work		0.015	0.05
		Mathala Work ~ Talia Bottom Work		0.278	N.S.
		Table Work ~ Talia Bottom Work		0.195	N.S.

Note: N.S.= Not Significant

From the Kruskal Wallis test it was established that there was a significant difference between at least one of the comparison groups of age, education level, number of family members, work experience and work type with regards to the physiological problems experienced by the respondents. Thus the Dunn Multiple Comparison Test was applied to determine such groups.

Age

From Table 41, it can be observed that there is a significant difference in the physiological problems experienced by the respondents among all age groups.

Education Level

Similarly, for education level also it was observed that physiological problems for all education level groups were different.

Number of Family Members

In the case of the number of family members it was observed that, there was a significant difference between the physiological problems experienced by respondents belonging to families with 4-6 family members and more than 6 family members. The other groups did not show any difference in this aspect.

Work Experience

It was computed that there was no difference in the physiological problems experienced by respondents with work experience of 20-28 years and those with work

experience of 29-37 years. However there is a significant difference in the physiological problems experienced among other work experience groups.

Work Type

The statistical computation indicated that the physiological problems faced by the respondents performing the girdle rounding work was significantly different in comparison to physiological problems faced by respondents doing all the other work namely, table work, talia work, athpel work and mathala work.

> **H_{O4}: There is no variation in the Psychosocial Problems experienced by the respondents with their Age, Gender, Marital Status, Education Level, Family Type, Number of Members in the Family, Work Experience and Work Type.**

To find out the difference between Psychosocial Problems experienced by the respondents with their Age, Gender, Marital Status, Education Level, Family Type, Number of Members in the Family, Work Experience and Work Type 'Kruskal Wallis H Test' was computed.

Table 42: Kruskal Wallis H Test showing difference in the Psychosocial Problems experienced by the respondents with Age, Gender, Marital Status, Education Level, Family Type, Number of Family Members, Work Experience and Work Type

Sr. No.	Source of Variation	n	p-value	df	Level of significance
1	Age	500	0.609	2	N.S.
2	Gender		0.002	1	0.05
3	Marital Status		0.119	1	N.S.
4	Education Level		0.084	2	N.S.
5	Family Type		0.010	1	0.05
6	Number of Family Members		0.415	2	N.S.
7	Work Experience		0.528	3	N.S.
8	Work Type		0.000	4	0.05

Note: N.S.= Not Significant, df= Degree of Freedom

The results in Table 42 indicate that the null hypothesis is accepted for all the other parameters except gender, family type and work type. Thus there is no variation in physiological problems experienced by the respondents with their age, marital status, education level, number of family members and work experience.

However, the psychosocial problems experienced by the respondents vary with their gender i.e. male and female respondents and it also varies with the type of family to which they belong i.e. nuclear and joint family. Thus the null hypothesis was rejected for these variables.

The results also indicated that the null hypothesis for work type was also rejected. Thus it can be concluded that at least one paired group of the work type varied significantly in terms of psychosocial problems. For this purpose, post hoc test Dunn's Multiple Comparison Test was computed to get the results.

Table 43: Dunn's Multiple Comparison Test showing the difference in Psychosocial Problems experienced by comparison groups for Work Type

Sr. No.	Comparison Groups for Work Type	n	p-value	Level of significance
1	Athpel Work ~ Girdle Rounding	500	0.000	0.05
2	Athpel Work ~ Mathala Work		0.000	0.05
3	Girlde Rounding ~ Mathala Work		0.000	0.05
4	Athpel Work ~ Table Work		0.000	0.05
5	Girdle Rounding ~ Table Work		0.001	0.05
6	Mathala Work ~ Table Work		0.002	0.05
7	Athpel Work ~ Talia Bottom Work		0.022	0.05
8	Girdle Rounding ~ Talia Bottom Work		0.000	0.05
9	Mathala Work ~ Talia Bottom Work		0.065	N.S.
10	Table Work ~ Talia Bottom Work		0.000	0.05

Note: N.S.= Not Significant

From the Dunn's Multiple Comparison Test results computed for work type it can be concluded that there is a difference in the psychosocial problems faced by the respondents among all the comparison groups. However, it was observed that there is no difference in the psychosocial problems among the mathala work and talia bottom work respondents.

Section V

4.5 Suggesting Coping Strategies

The process of diamond polishing can be a physically and mentally demanding work that requires accuracy, precision and close attention to detail. Based on results of the information collected and also personal observation, the researcher has suggested the following coping strategies that will be beneficial in reducing the physical as well as mental stress of the diamond polishers and maintain productivity in their work.

Strategies to deal with Physiological problems:

- In order to prevent and cure chronic diseases at an early stage, the workers must get regular health checkups done. For this the employer should take medical policies for the permanent employees.
- To avoid problems related to being allergic to pollution, the design of the working unit must be such that it has good ventilation. Cross ventilation is ideal for such workspaces, but in a place where that is not possible, artificial ventilation techniques like providing exhaust fans at strategic locations will be beneficial.
- For the workers who experience shortness in breath, breathing exercises before, during and after the completion of their work can prove to be very useful.
- Since the majority of the workers experienced fatigue, regular short breaks throughout the day will bring a significant reduction in this problem. For a work shift of 8-10 hours, half an hour breaks twice a day is recommended while a 4-5 minute break must be taken after every 11/2 hour or as and when needed by the worker.
- Diamond polishers are sitting in static posture for a long time and also bend a little towards the polishing machine. This may result in bent backs which can be extremely painful and in the long run may also lead to irreversible posture distortion. The employers must train and make the employees aware of the correct postures to maintain through their work hours. Putting up posters of such reminders may also be helpful. Regular exercises and making exercise a part of a daily regime can also have a preventive as well as curative impact on

this problem. Simple exercise including back and shoulder stretches during the breaks will contribute significantly to resolving this problem.

Strategies to deal with Psychosocial problems:

- The data revealed that many of the workers felt that there was poor communication between the coworkers. The workers must be encouraged to keep an open communication among them. A culture of good interpersonal skills should be developed and the employer must play a pivotal role in doing so. Effective grievance handling, unbiased supervision and pay parity are some of the ways in which this can be achieved.
- The employees also felt that the work hours were not flexible and again the role of the employer becomes important here. Policies that provide time flexibilities to the workers should be made for the convenience of the workers.
- Monotony in the work being performed was another problem experienced by the workers. Playing light instrumental/devotional music and adequate breaks in between will help in refreshing the workers to perform their work.
- The workers also reported that not enough training was being provided to them. The employer must design a suitable induction training program for new employees and sometimes also for those with previous experience. Such programs will contribute significantly in improving the performance of the workers and will also motivate them to achieve their goals.

Other Coping Strategies:

1. Staying Hydrated: Consuming enough liquids throughout the day can help in increasing focus and alertness of the workers, which in turn will reduce errors and increase productivity.
2. Eating Healthy: Eating healthy, nutritious and hygienically prepared food will have a positive impact on the overall health of the workers and reduce problems faced by them at the workplace. Eating healthy does not only mean the inclusion of nutritious food but also means following proper eating schedules and portion control.
3. Restraining from substance abuse: Drinking alcohol, smoking cigarettes, consuming tobacco or other forms of drugs will not only have a detrimental

impact on the health of the workers but can also be a leading cause of problems related to psychosocial work environments.

4. Meditating: Including any form of meditative activity like yoga, reading spiritual books, listening to light music etc. can be made a part of daily routine. Such activities increase mindfulness which aids in increasing concentration and also reduces stress. It also helps in building a positive attitude that makes the interpersonal work relations and the overall work environment positive.
5. Adopting appropriate postures: Sitting for long hours in wrong postures will not only reduce productivity but may also cause irreparable damage to the body causing extreme pain and discomfort. Thus the workers must consciously try to maintain correct postures of the back, shoulders, neck etc. to reduce the strain on the respective muscles.
6. Using protective equipment: While working in an industry, it is advisable to use protective equipment to safeguard oneself from the hazard that the industry possesses. In diamond polishing some simple protective devices can be used; like wearing a uniform made of lightweight cotton breathable fabric that will provide relief from the hot humid conditions of the small setups. Similarly using back support as well as ear plugs to protect from the constant humming sound of the industry can also prove to be beneficial.
7. Maintaining positive attitude: A positive attitude can go a long way in providing the much needed job satisfaction at work. Sometimes the workplace can become monotonous and stressful leading to negative impact on the work as well as interpersonal relations at work. If a person is capable of maintaining a positive perspective and drive towards work, then it can bring about a huge impact.
8. Seeking support: Talking about problems and issues at the workplace to seniors/employers and colleagues can prove to be very rewarding as a number of difficulties and obstacles can be nipped in the bud itself. Sorting out differences through open dialogue can prove to be very healthy for the work environment as well.
9. Wearing comfortable and well fitted garments made of cool fabrics will maintain a comfortable body temperature at all times.

Guidelines for the Employer

1. Provide training to the workers for their specific activity
2. Use sound absorbing material in the interior space in order to muffle the noise produced by the machines
3. Create awareness regarding safety at workplace and adopting correct postures by talking to the workers and also creating awareness through the use of posters
4. Provide adequate duration of breaks to the workers so that they may relax their tired muscles
5. Provide basic facilities like drinking water and clean toilets inside the premises

Section VI

4.6 Developing Comfort Enhancing Products

4.6.1 Ergonomic Floor Seat

The workers polishing the table facet of the rough stone, sit on the floor cross legged in order to do their work. They often complain of pain in their buttock and legs and also develop a bent back. It was observed that they either sit directly on the floor or else sit on a thin cloth piece that does not do much to support them. Thus the researcher developed and suggested an ergonomic floor seat, which is thick enough to provide adequate support to the workers. Its special inclined top provides the much needed support to the back of the polishers.

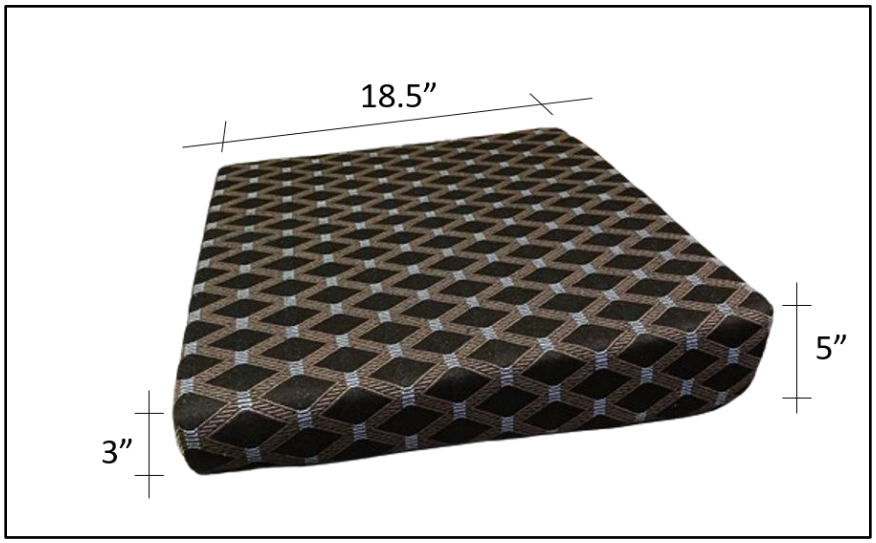

Plate 28: Floor Seat for ‘Table’ Polishers

Key Features:

- Soft, padded seat to ensure comfort
- Durable thick furnishing cover
- Large area (18.5” x 18.5”)

  Unique inclined design to provide a gentle lift to the back and facilitate a straight posture (Front height- 3” and back height- 5”)
- Light Weight
- Stackable and easy to store
- Cost- Rs. 300/- approximately

4.6.2 Detachable Padded Seat with Backrest for Stools

The workers polishing the talia, athpel and mathala facets of the diamonds were the ones who reported the maximum musculoskeletal related complaints especially in the ‘back’ ‘buttock’ and ‘bottom’. They sit on high tools which are without back rest and thus the awkward posture along with long duration of polishing activity and constantly bent neck worsens the situation. Thus the researcher designed a detachable padded seat with backrest that can be attached to any type of tool that is without backrest. This seat provides cushion at the bottom as well as at the back. The seat is detachable and can be attached easily as and when required.

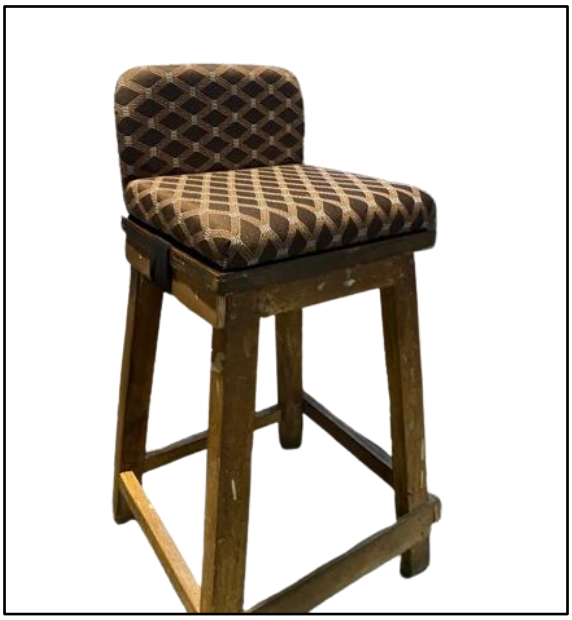

Plate 29: Detachable padded seat with backrest

Key Features:

- Soft, padded seat to ensure comfort
- Durable and thick cover
- Suitable size to fit any stool top (13” x 14”)
- Attached backrest of 7.5” height to support back
- Broad velcro to attach it firmly on the stool and avoid slipping
- Detachable and light weight
- Cost- Rs. 550/- approximately

4.6.3 Ear Muffs

One of the problems faced by the workers in the diamond polishing industry was that of ear irritation. Although the noise recorded at these units were within the permissible limits, the shrill sound produced by the stone rubbing against the wheel was causing ear irritation in the workers. Thus the researcher created a simple ear muff that can be worn on the ears and it helps in flattening the sound so that it does not hurt the ears. It was made on a plastic base with a sponge on either side covered with a soft breathable cloth.

Plate 30: Ear Muffs

Key Features:

- Can be made easily with simple material
- Soft, breathable fabric
- Washable
- Cost- Rs. 50/- approximately

4.6.4 Foot rest

It was observed that the workers were keeping their legs in uncomfortable positions since there was no place to keep their feet comfortably. This was causing them pain and numbness in the legs as well as calf muscles. Thus the researcher developed and suggested a foot rest when sitting on stools in order to support their feet.

Plate 31: Uncomfortable Position of the Feet

Plate 32: Foot Rest

Key Features:

- Easy to develop
- Durable and easy to maintain
- Stackable and easy to store
- Cost- Rs 160/- approximately

4.6.5 Informative Posters

Due to the constant nature of their work the polishers complained of tired and watery eyes. Thus the researcher suggested keeping eye exercise posters in the unit so that the polishers can be guided and reminded to follow these relaxing exercises on a regular basis. The posters were developed in the vernacular languages also. They are easy to understand and follow. Performing these quick eye exercises will help the polishers to relieve their eye stress to a great extent.

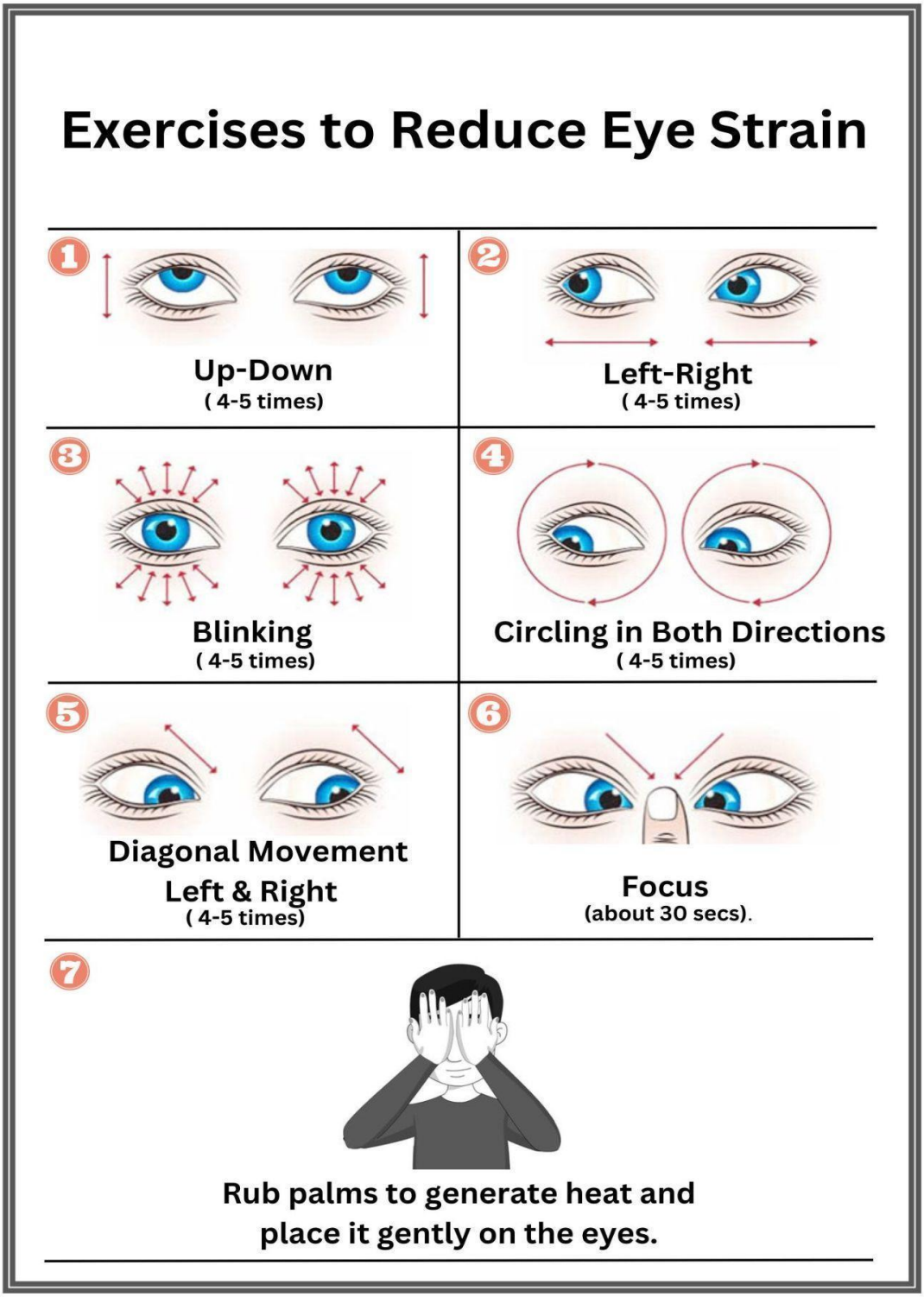

Plate 33: Eye Exercise Poster (English)

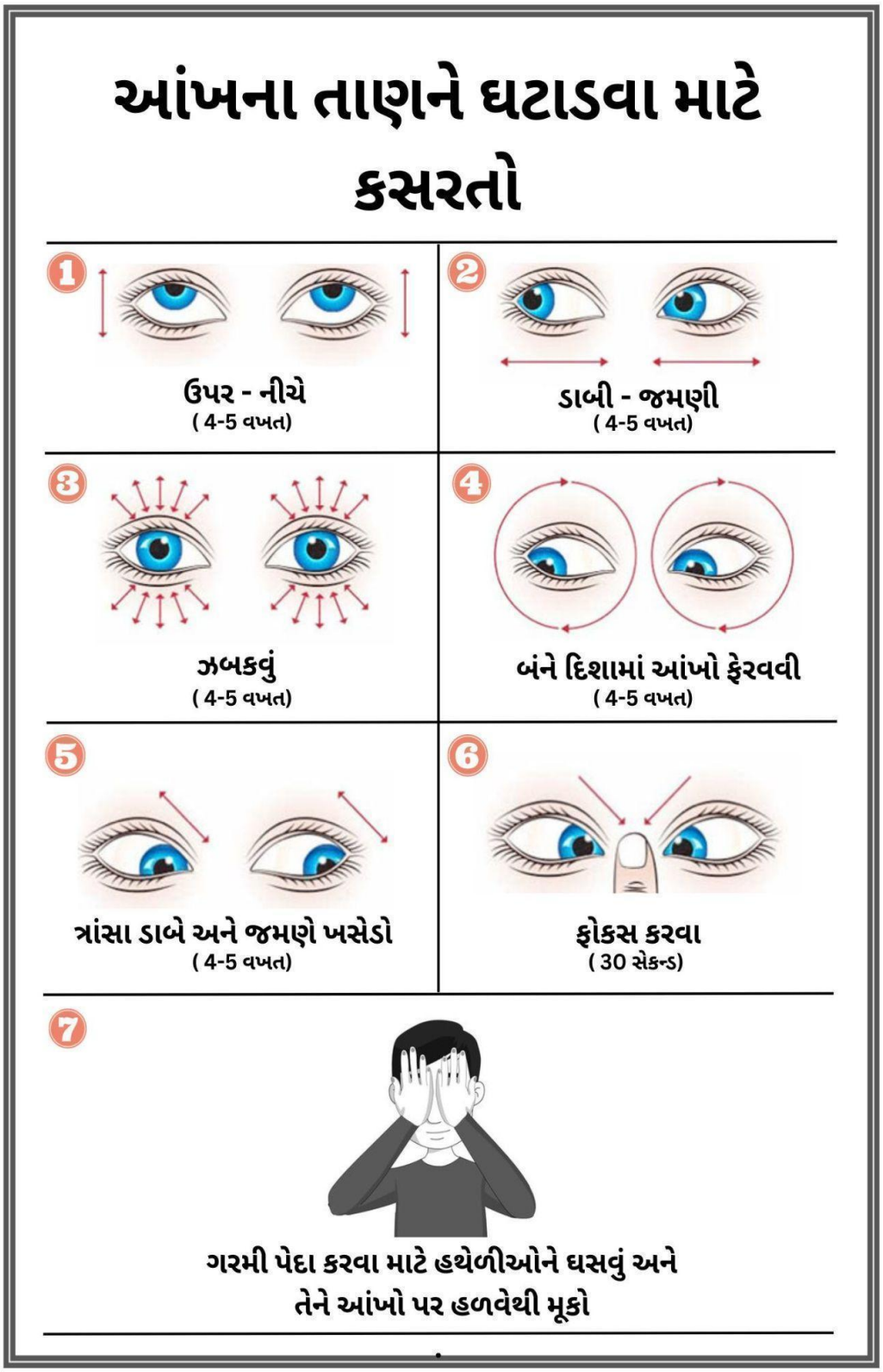

Plate 34: Eye Exercise Poster (Gujarati)

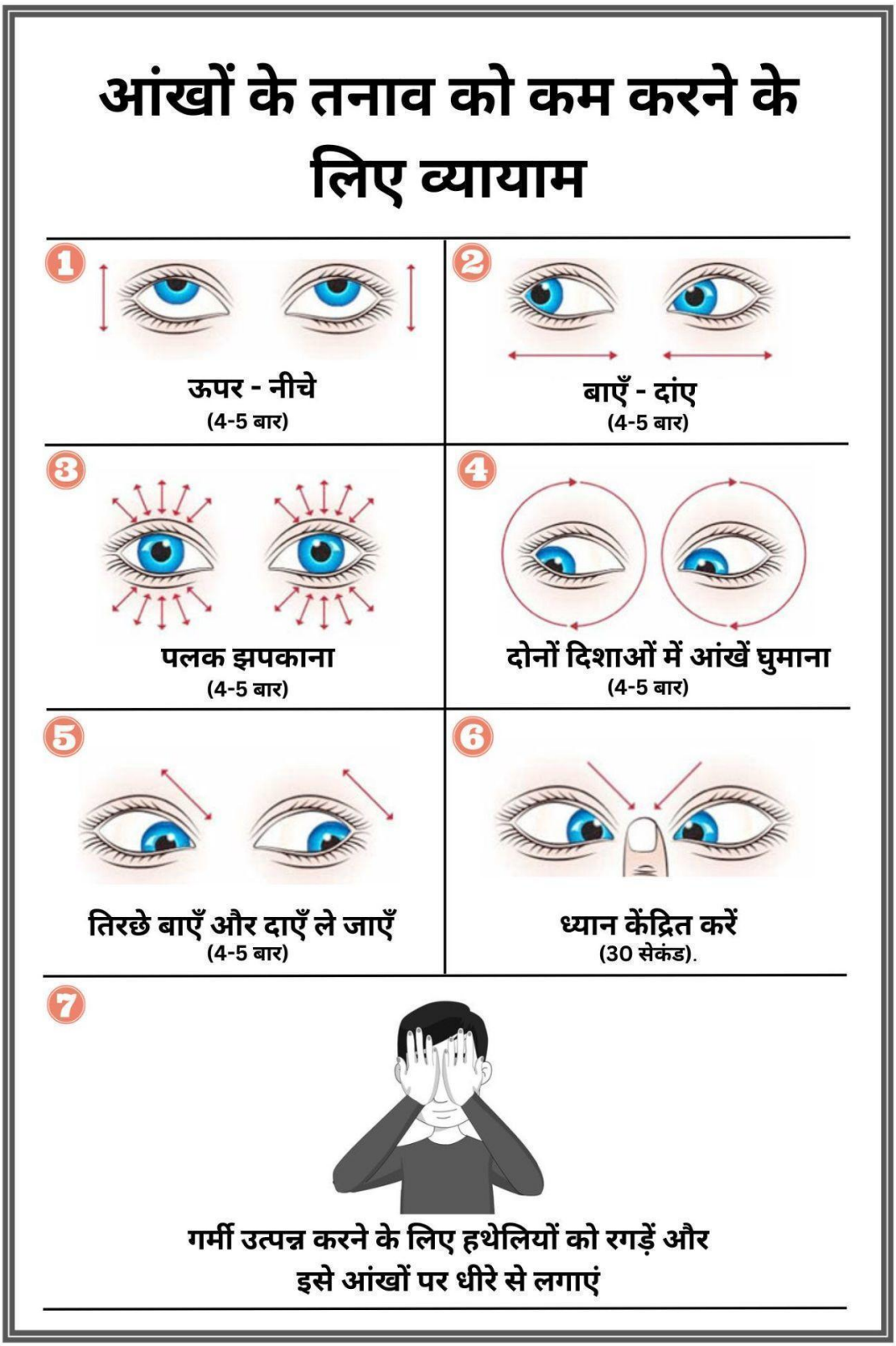

Plate 35: Eye Exercise Poster (Hindi)

Section VII

4.7. Feedback on the Comfort Enhancing Products

The comfort enhancing products were provided to the diamond polishers to be used during different polishing activities.

4.7.1. Ergonomic floor seat was provided to 10 table polishers who sat on the floor cross legged to polish the table facet of the diamond. They used it for a week after which they showed great satisfaction towards the product. They stated that they felt much relief in their back due to the special design of the seat.

4.7.2. Detachable padded seat with backrest was provided to the talia, athpel and mathala polishers who sat on wooden or plastic tools which were without backrest and therefore experienced extreme lower back pain. The 30 workers (10 each from the talia, athpel and mathala work) were very satisfied upon using the product provided by the researcher. The polishers stated that they felt comfortable not only due to receiving support to the lower back but also to their bottom and buttock.

4.7.3. Ear Muffs were provided to all the 50 workers (10 from each of the 5 polishing activities). Most of them reported that they found the ear muffs comfortable to use on a day to day basis and it also resulted in significantly reducing ear irritation and headaches.

4.7.4. Foot Rest was provided to the 30 workers doing talia, athpel and mathala polishing work since they sat on tools and got no foot support. The polishers reported that by using the foot rest the pain in their legs and calf muscles were much less as compared to not using the foot rest.

4.7.5. Informative posters based on simple and quick eye exercise were placed in 3 units as the polishers reported tired eyes due to their work. Most of the polishers reported that the posters reminded them to perform these exercises during break time and also as and when their eyes felt tired. The exercises proved to be beneficial for them in reducing the problem related to tired eyes. The workers also agreed that if they continued to perform these exercises on a regular basis then it would bring about significant improvements.

Overall, the polishers were satisfied with the comfort enhancing products provided by the researcher. They agreed that if these products are used for longer duration then it will significantly improve their overall physical health and also contribute to their mental wellbeing.