

# Association of Asthenopia, Pre-presbyopia and Refractive Errors in Workers Involved in Hand Crafting

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**Purpose:** To determine the impact of hand crafting on different types of refractive errors and to check if there is any relationship of asthenopia and pre-presbyopia with this work.

**Study Design:** Case Series Study (stratified sampling study).

**Place & Duration of Study:** Kot Qaisrani, Tehsil Taunsa District Dera Ghazi Khan and a Local Bazaar, Hussaina Gahi, in Multan from Jan 2017 to Jun 2017.

**Material and Methods:** 100 individuals were selected for this study having age 16-35 years. Visual acuity, Retinoscopy, Torch light examination, Ophthalmoscopy and Pencil push-up test was done of every person. A questionnaire was also filled with the information given by the person after an informed consent.

**Results:** Total 100 patients, 50 males and 50 females were selected in this study aging 16-35 years to check if there is any eye strain, headache, decrease in near vision before 35-40 years and if any type of refractive error is present in sample or not. There were 70% patients having near visual acuity of N6, 17% had N8 and 13% had between N10-N12. There were 74% emmetropes, 17% myopes and 9% hyperopes in this study. Out of N6 group, 40 (57.1%) had eye strain and 44 (62.8%) had headache. Out of N8 group, 15 (88.2%) had eye strain and 16 (94.1%) had headache. Out of N10-N12 group 9 (69.2%) had eye strain and 12 (92.3%) had headache.

**Conclusion:** There is a weak relationship of refractive errors and pre presbyopia but strong association of asthenopia in workers of hand crafting.

**Key Words:** Asthenopia, pre presbyopia, refractive errors.

Eye is the most important human body organ which is responsible for the sense of vision. We see the world with the help of our eyes<sup>1</sup>. Accommodation is a naturally occurring phenomenon in the human eye. An increase in the dioptric power of the crystalline lens occurs when we see from distance to some near object. This increase in power occurs because lens becomes more convex during accommodation. When ciliary muscles constrict, they release the tension on the zonular fibers of the crystalline lens and shape of the lens becomes more curved. This accommodative ability of the eye

decreases with age. It is called presbyopia<sup>2,3</sup>. When a person is young the lens of his eye is more elastic. Ciliary muscles around the crystalline lens stretch and relax for the phenomenon of accommodation. With increasing age lens progressively loses its ability to accommodate. With increasing age blurring of vision at near is a very common problem internationally. It almost happens to everyone. It is called presbyopia<sup>4</sup>. Asthenopia is actually a combination of headache, eye strain and sometimes nausea. It is commonly associated with near work. A person who does excessive near work will face asthenopia. It is also

defined as stress on the eyes associated with headache due to extra use of eyes<sup>5</sup>. Convergence Insufficiency is a main cause of visual fatigue, eye strain and headache. In this problem our eye converges less than it is required to see a near object. As a result after sometime of near work the person feels strain on the eyes and visual fatigue<sup>6</sup>.

According to a study which is done by Amitabha and his group on jewelry workers who do near work and related it to VDT operators and to graduate students. It was stated that excessive near work and extra usage of convergence can result in different type of visual disturbance which causes stress on the eyes. This study was done on 215 young males. The results showed that jewelry workers had more problems because they use their vision more than remaining two departments<sup>4,7</sup>.

Rafael did his research on 87 people aging from 18 to 31 years. He performed his research either on students or office workers. The purpose of that study was to check the relationship between asthenopia and accommodation due to near work. Visual status of the sample was 6/9 to 6/6. Results of this study suggested that we should take separate relations. Near work time had negative relation with accommodative facility but had positive relation with asthenopic symptoms<sup>8-10</sup>. But many people suffered with condition of blurred vision and double vision due to near work and their accommodation reduced too<sup>11,12</sup>.

Rationale of this study is find the role of refractive error in different type of near work. The Objective of study is to determine the impact of hand crafting on different types of refractive errors and to check is there any relationship of asthenopia and pre-presbyopia with this work.

## MATERIAL AND METHODS

This study was carried out in a village named Kot Qaisrani Tehsil Taunsa District Dera Ghazi Khan and a local bazaar in Multan named Hussaina Gahi Bazaar from Jan 2017 to Jun 2017. Patients of 16 – 35 years of age having any kind of refractive errors with asthenopic symptoms were included in this study. Presbyopic patients were also included in this study. Both male and female were included in this study. All those patients who had cataract, amblyopia, low vision, nervous disorder, glaucoma, allergies and infections, any other disease which cause hazy media and less than 15 years of age were excluded from this study<sup>5</sup>.

Males and females who were involved in hand crafting were studied. We wanted to study the association of asthenopia, refractive errors, convergence insufficiency and pre-presbyopia with near work. People involved in hand crafting do more near work and they have more chances to develop such problems.

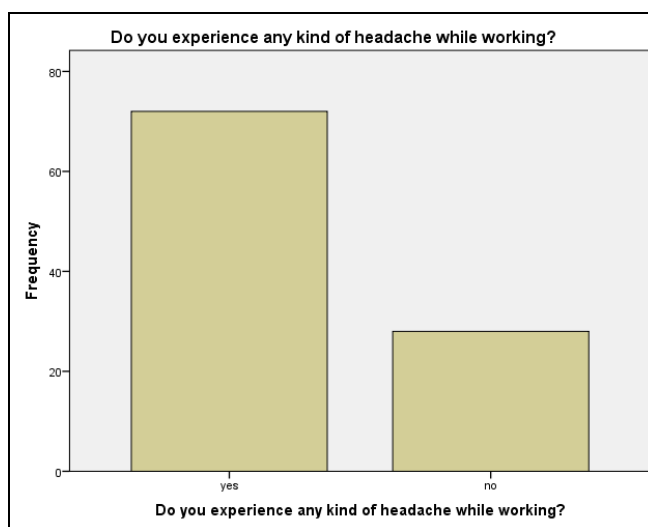
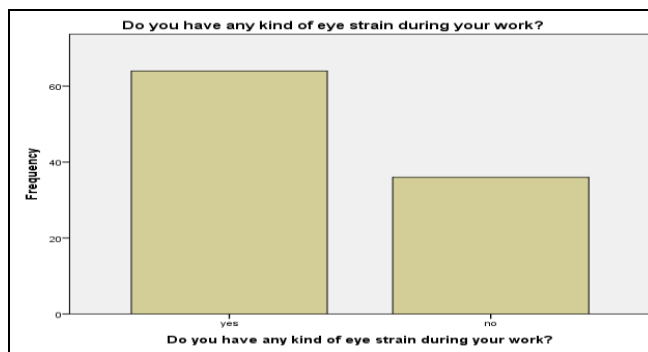
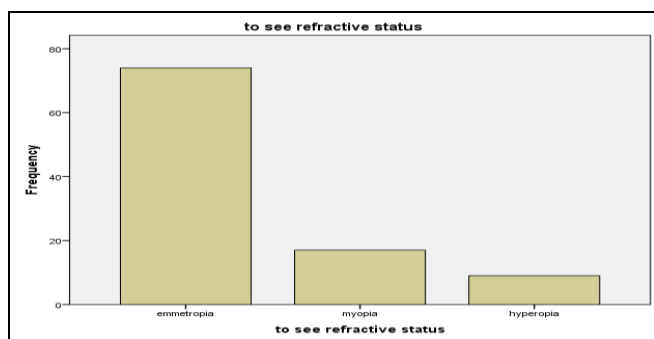
Our study design was case series with stratified sampling. Stratified Sampling is a type of sampling in which the researcher divides the objects to be examined in groups. After selection of these groups which are called strata, the researcher draws the probability sample from every single group. For example the group we studied were men in hand crafting and females of a village who were doing hand crafting in their homes. We selected 100 subjects. 50 of them were males and 50 were females.

First of all informed consent from the patients was taken. Examination was started by taking personal history of patients in which they were asked about diabetes, hypertension, smoking or any other disease which may be affecting vision. After that drug history was taken, History of trauma, past medical surgeries was also taken and then their Visual acuity was measured with the help of LogMAR Chart at distance and near respectively at 4 m and 25 cm to check if the patients had any refractive error or they had developed pre presbyopia after doing near work. After that torch light examination was done to see the anterior structures of eye to exclude the patients who were in the exclusion criteria of our study. Retinoscopy was performed to find the type of refractive error. Ophthalmoscopy was done to see the Bruckner's reflex. Patients were checked digitally for glaucoma to exclude them from our study. A proforma was filled with the information given by the patient. A questionnaire was filled at the end to see if the patients had any headache, eye strain or nausea. Patients with pre-presbyopia were prescribed the glasses. Patients with asthenopia were asked to take short breaks during their work, convergence insufficiency was dealt with pencil push up exercises.

## RESULTS

Total 100 patients were included in this study with age range of 16-35 years. Out of 100 people, 70% had near visual acuity of N6. 17% had N8 and 13% had N10-N12. Statistical studies showed that the mean was 0.433, Standard deviation was 0.71428 and variance was 0.5.100. People who were selected in this study were mostly were emmetropes 74%, 17% were myopic

and 9% were hyperopic. Eye strain was the main variable of this study. Out of 100 people the percentage of people having eye strain was 64%. There were 40% with visual acuity N6, 15% with visual acuity N8 and 9% having visual acuity 9%. And 34% didn't have any eye strain. The percentage was 30%, 2% and 4% respectively with visual acuity N6, N8 and N10-12. So eye strain is associated with near work. Pearson Chi-Square showed ( $p = 0.052$ ) significant results. Headache was also associated with asthenopia. There were 44% patients who experienced headache during near work having visual acuity N6 and 26% didn't have any complain of headache. There were 16% patients with visual acuity of N8 suffering from headache and only 12% having visual acuity from N10-N12 suffered from headache. Pearson Chi-Square showed (0.008) significant results.



**Table 1:** Refractive status.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Emmetropia	74	74.0	74.0	74.0
	Myopia	17	17.0	17.0	91.0
	Hyperopia	9	9.0	9.0	100.0
	Total	100	100.0	100.0	

**Table 2:** Eye strain.

		Do You Have any Kind of Eye Strain during Your Work?		Total
		Yes	No	
Near visual acuity	N6	40	30	70
	N8	15	2	17
	N10-N12	9	4	13
Total		64	36	100

**DISCUSSION**

Excessive near work leads to some problems in our eyes for example refractive errors, Pre-presbyopia,

asthenopia, convergence insufficiency. Sometimes IOP is also raised when a person does excessive near work. Purpose of our study was to evaluate the association

of near work with these problems. According to this study near work has a strong association with asthenopia which includes eye strain, headache etc. More than 60% patients had eye strain due to near work and almost 70% people had headache due to near work. Refractive status showed that 20% people were myopic and 10% people were hyperopic. We considered the patients above the age of 30 years pre-presbyopic. Almost 26 people were above 30 and 13 of them were pre-presbyopic which means that 50% of the people were pre-presbyopic who were involved in near work. More than 48% people were having convergence insufficiency. More than 45% people were working in improper light illumination. In the study by Amitabha et al, he discussed asthenopia due to near work in jewelry workers. He described that the workers were working for long hours and they had low light illumination. Subjects of our study were people who were involved in hand crafting and were doing near work for 12-14 hours consecutively. We also checked the environment in which they were working and almost 45% were working in low illumination. Amitabha recommended his patients on follow up to increase the light illumination in which they were working. On follow-up when he studied them. They had improved their asthenopic symptoms when illumination was increased. We also recommended out patients to work in increased illumination<sup>4,7</sup>.

Study by Unimanon et al describes that illumination, distance at which the worker is working and continuous near work causes eye strain. Our results are also similar regarding the effects of near work. We also recommended the patients to work at more than 25 cm to 40 cm, illuminate the work environment and not to work continuously for 12-14 hour. We also prescribed them the 20-20 exercises (after every 20 minutes of near work look away for 20 seconds to relieve the eye strain)<sup>5,13,14</sup>. Unimanon in his study suggested a break for 10 minutes after every two hours of near work. His research had positive outcomes on follow-up. Improving the work environment illumination, decreasing the working time and taking short breaks improved the situation<sup>15-17</sup>.

Wholffsohn in his study discussed that eyes which work more are more prone to develop eye strain and visual problems. Main purpose of our study was to address the problems that developed due to excessive near work<sup>18-20</sup>. The subjects of our study who were working for 12-14 hours had greater chances to

develop eye problems due to near work and they had positive symptoms of asthenopia, refractive errors, pre-presbyopia and convergence insufficiency<sup>13,21</sup>.

It was stated by Shrewin that near work increases the chances to develop immature presbyopia and people in developing countries like Pakistan face cost issues. In our study we also looked at this element but people who were doing near work of hand crafting were earning. They were independent of the cost issue. Almost all of them could afford. If someone cannot afford glasses it increases the risk to develop more eye problems<sup>4,6,20</sup>.

Lee did his study on the effect of near work on the progression or development of myopia. He took some risk factors in general for example age, near work, work status and educational activity. He stated that people spending more time on near work were having more myopic shifts or myopia and in our study 20% people had developed myopia which means that there is a correlation between myopia and near work<sup>2,22</sup>.

In Karachi, Uzma studied 246 patients in the OPD to evaluate which factors are involved in the development of myopia. She studied patients below the age of 40 and we took the patients of 30-35 years for the criteria of pre-presbyopia. We considered this age to make sure that the patients are definitely presbyopic. She concluded that risk factors for pre-presbyopia were financial crisis, social stress and sometimes profession is also a cause. In our study we explain that near work is the risk factor to develop pre-presbyopia<sup>1,3</sup>.

Jaffery cooper studied convergence insufficiency due to excessive near work. In convergence insufficiency one cannot converge his/her eyes properly and as a result patient feels visual discomfort. He said that convergence insufficiency can be related to accommodation. In our study 54% people had convergence insufficiency. In his study 72% people had asthenopia and convergence insufficiency. Our results were also positive but the percentage is less than his results because the working timing of some of our study groups were less and people who were working less had less problems<sup>23</sup>.

We recommended that the patients get treatment for their problems of refractive errors with prescribing glasses, pre-presbyopia with prescribing near add. We also asked them to improve the illumination. We dealt with convergence insufficiency with Pencil push-up exercises. Some of the people were using prednisolone because they had a concept that it cleanses the eye. We

asked them to avoid using self-medication. We recommended them to have regular check-ups.

## CONCLUSION

Near work has a strong association with asthenopia because in our results many patients had headache and eye strain. Refractive errors were also present but not in a huge range. Convergence insufficiency is also seen in these patients.

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