

A CROSS-SECTIONAL STUDY ON MARBLE WORKERS: OCCUPATIONAL EYE HEALTH PROBLEMS AND RISK FACTORS

MERMER İŞÇİLERİ ÜZERİNE KESİTSEL BİR ARAŞTIRMA: MESLEKİ GÖZ SAĞLIĞI SORUNLARI VE RİSK FAKTÖRLERİ

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ABSTRACT

Objective: Occupational health and safety is one of the most important aspects of the workplace. Working in a healthy and safe environment is one of our constitutional rights. In terms of occupational health, which is of the utmost importance, assessing the occupational eye health of marble quarry workers is also critical. The aim of this study was to determine the prevalence of corneal nebula, refraction error, pterygium, and similar ocular surface diseases and the factors affecting these diseases in marble quarry workers.

Material and Methods: A cross-sectional study in a marble quarry was performed. All the marble quarry workers who wished to participate in this cross-sectional study were included. Examinations of 126 workers were done in a large, appropriately lit room using a portable Snellen chart and a portable biomicroscope, and Volk 90D for fundus examination.

Results: Of the total 126 workers, 83 (65.9%) were working in an environment of high-risk in respect to ocular health, and eye disease was determined in 32 (25.4%). Refraction error was determined in 19 (15.1%), pterygium in 11 (8.7%), amblyopia in 2 (1.6%), and corneal nebula in 1 (1.1%).

Conclusions: Pterygium and refraction error were determined at a significantly high rate in marble quarry workers. It is important for workplace doctors to be trained in the early diagnosis of pathologies affecting the ocular surface, such as pterygium, for these workers to be referred early to an ophthalmology specialist. With the measurement and recording of the visual acuity of workers at certain intervals, workplace accidents can be reduced by taking precautions such as the referral to ophthalmology specialists of those determined to have a decrease in visual acuity.

Keywords: Occupational health, pterygium, wounds, and injuries

ÖZET

Amaç: İş sağlığı ve güvenliği çalışma yaşamının en önemli unsurlarından olup, sağlıklı ve güvenli bir ortamda çalışmak anayasal haklarımızdan birisidir. Mermer ocağında çalışan işçilerin mesleki göz sağlığının değerlendirilmesi de önemlidir. Bu çalışmanın amacı, mermer ocağı işçilerinde kornea nebula, kırılma kusuru, pterijyum ve benzeri oküler yüzey hastalıklarının prevalansını ve bu hastalıkları etkileyen faktörleri belirlemektir.

Gereç ve Yöntemler: Mermer ocağında yapılan bu kesitsel çalışmaya katılmak isteyen tüm mermer ocağı çalışanları dahil edilmiştir. Yüz yirmi altı işçinin muayeneleri, portatif bir Snellen eşeli, portatif bir biyomikroskop ve fundus muayenesi için Volk 90D kullanılarak geniş, uygun şekilde aydınlatılmış bir odada yapılmıştır.

Bulgular: Toplam 126 işçinin 83'ü (%65,9) göz sağlığı açısından yüksek riskli bir ortamda çalışmakta olup, 32'sinde (%25,4) göz hastalığı tespit edilmiştir. On dokuzunda (%15,1) kırılma kusuru, 11'inde (%8,7) pterijyum, 2'sinde (%1,6) ambliyopi ve 1'inde (%1,1) kornea nebula tespit edilmiştir.

Sonuç: Mermer ocağı işçilerinde önemli oranda pterijyum ve kırılma kusurları tespit edildi. İşyeri hekimlerinin pterijyum gibi oküler yüzeyi etkileyen patolojilerin erken teşhisi konusunda eğitim almaları, bu çalışanların bir göz hastalıkları uzmanına erken sevk edilmesi için önemlidir. Çalışanların görme keskinliklerinin belirli aralıklarla ölçülmesi ve kayıt altına alınması ile görme keskinliğinde azalma tespit edilenlerin göz hastalıkları uzmanlarına sevk edilmesi gibi önlemler alınarak ileride oluşabilecek iş kazaları azaltılabilir.

Anahtar Kelimeler: İş sağlığı, pterijyum, yaralar ve yaralanmalar

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INTRODUCTION

Turkiye has an important position in the world as a country with high-quality marble quarries (1). There are natural stone reserves in Turkiye of various colors and designs, and marble quarrying has been ongoing since ancient times (2). With increasing exports of marble and stone to China, India, and the United States of America (USA), Turkiye has become the largest exporter of marble in the world (a total of approximately 8 million tons, at a total value of approximately 2 billion USD) (3). The marble industry and stone quarries affect the health of workers in the industry and have a negative effect on those living in the area of the industry, the whole ecosystem, and public health as a whole (4).

As there are many types of procedures in the production process and because of the dangers that these entail, marble quarries were defined as very dangerous according to the workplace danger classifications published in 2017 (5). The possibility of industrial accidents is increased during the process of making large marble blocks portable (cutting, loading, transport, etc.), and this leads to serious outcomes, such as permanent disability (meaning the inability to work) or death (6). Industrial accidents occurring in marble quarries are still a great source of concern for many countries in respect to occupational health and safety (7). In several studies, mining and quarrying have been shown to be one of the most dangerous sectors because of the inherent characteristics, such as exposure to damp, dust, gas, smoke, noise, and mechanical vibration (8-10). In marble quarries, the workers may be working above or below ground. Marble workers above ground are more exposed to climactic conditions, solar radiation, and the reflection of sunlight from marble walls and floors. Consequently, temporary blindness can be seen as the most important occupational risk in these workers, and photokeratitis, dermatitis, and potentially sunstroke in the summer months (11).

The aim of this study was to determine the prevalence of corneal nebula, refraction error, pterygium, and similar ocular surface diseases and the factors affecting these diseases in marble quarry workers.

MATERIAL AND METHODS

The Afyonkarahisar marble quarry, which is one of the most important in Turkiye, has been operational since 1991 (12).

Study subjects

This cross-sectional study was conducted with 156 workers employed at the marble quarry in the town of Şuhut in the province of Afyonkarahisar between 3.9.2021 and 31.12.2021. There was no calculation of sample size for the study and the researcher attempted to reach all the

workers at the marble quarry. All the workers who agreed to participate were included for evaluation, with the only criteria for exclusion being unwillingness to participate. The study was completed with 126 (80.7%) workers who agreed to participate. Marble quarries have workplace features that make them a particularly dangerous type of workplace, necessitating the presence of a regular workplace doctor and nurse. It has been reported by employers that dust measurements in the workplace are done every two years. Nonetheless, there are no records of how many work accidents occurred in the previous year; instead, employers have reported the absence of work accidents verbally.

Data collection

A questionnaire was administered to the workers in face-to-face interviews. The items in the questionnaire included sociodemographic and health-related characteristics (6 items), job description and risks of the working environment (11 items), information about ocular problems originating from the work environment, a form of resolution, and time of most recent presentation to an ophthalmologist.

Examinations lasting 15-20 mins were performed by an ophthalmology specialist (a Member of the Royal College of Surgeons of Edinburgh (UK)), in a large, appropriately lit room using a portable visual acuity chart, a portable biomicroscope (Reichert Inc., NY, USA), and Volk 90D (Volk Optical Inc., USA) for fundus imaging. First, the visual acuity was examined separately in both eyes from a distance of 6 meters. Then, intraocular eye pressure was measured using a portable rebound tonometer (MSLYZ06, Guangdong, China). In cases with visual acuity (VA) <20/20, the pupils were dilated, and examinations were made of the anterior segment with a manual biomicroscope (Portable Slit Lamp, Reichert Inc, NY, USA) and the posterior segment with 90D Volk. Cases who wore spectacles and had VA <20/20, with no pathology determined, were accepted as a refraction error. When any pathology was determined, primarily refraction error, amblyopia, and pterygium in the anterior segment, the findings were recorded.

Permission for the study was granted by the local Ethics Committee (Date: 03.09.2021, No: 2021-KAEK-2).

Statistical analysis

Data obtained in the study were analyzed statistically using the Statistical Package for Statistical Sciences software (SPSS, Version 23.0). In the presentation of descriptive data, continuous variables were stated as mean \pm standard deviation (SD) values, and categorical variables as number (n) and percentage (%). To evaluate the relationships between categorical variables, the Chi-square test and Fisher's Exact test were applied. A value of $p < 0.05$ was accepted as statistically significant.

RESULTS

Of the total 126 subjects participating in the study, 2 (1.6%) were illiterate, 7 (5.6%) had basic literacy, 34 (27%) had an educational level of primary school, 42 (33.3%) had an educational level of middle school, 33 (26.2%) had an educational level of high school, and 8 (6.3%) were university graduates. Diabetes mellitus was present in 3 (2.4%) subjects, hypertension in 3 (2.4%), hyperlipidemia in 2 (1.6%), and asthma in 1 (0.8%), and all of these cases were taking medication for these diseases. No employee had a history of cancer diagnosis and associated drug use. Work experience was determined as mean of 8.7 ± 7.7 years, median of 6.5 years (range, 1-32 years). The working hours per week were determined as mean 56.7 ± 9.1 hours, median 56 hours (range, 40-96 hours).

As a result of the examinations made, the macular disease was determined in 32/126 (25.4%) subjects, recorded as refraction error in 19 (15.1%), pterygium in 11 (8.7%), and amblyopia in 2 (1.6%). Of the total subjects, 72 (57.1%) had never consulted an ophthalmologist, 27 had not had an ocular examination in the last year, and 27 (21.4%) had been examined by an ophthalmology specialist within the last year.

Forty-three (34.1%) workers stated that there was no ocular health risk in the environment in which they worked, and 83 (65.9%) stated that they worked in an environment which posed a risk in terms of ocular health. Of these, 63 (50%) stated that they worked in a dusty environment, 12 (9.5%) that they worked in an environment where metal and similar fragments could be dispersed, and 8 (6.3%) that they were exposed to extremely high temperatures. Exposure to flying metal slivers, glass fragments, wood shavings, or soil particles while working was reported by 30 (20.8%) workers. In the work processes, 57 (45.2%) workers reported that they used machines/tools with colored signals/warning lights. Welding machines were used by 13 (10.3%) workers, of which 9 (7.2%) stated that they used protective equipment, and 4 (3.2%) that they did not use protective equipment while using welding machinery. Protective goggles or visors were reported to be used by 77 (61.1%) workers.

A problem in the eyes related to the working environment (heat, light, dust, or foreign body) was reported to have been experienced by 37 (29.4%) workers. Of the 7 who were treated because of the problem, 5 (4%) went to their family doctor, 1 (0.8%) to the workplace doctor, and 1 (0.8%) used eyedrops on his own initiative.

For 31 (24.6%) of the study participants the place of work was in the offices and for 95 (75.4%) it was in the field. Of those working in the offices, no ocular disease was determined in 19 (61.3%), refraction error was present in 6 (19.4%), pterygium was present in 4 (12.9%), and ambly-

opia was present in 2 (6.5%). No ocular disease was observed in 75 (78.9%) of those working in the field, refraction error was present in 13 (13.7%), and pterygium was present in 7 (7.4%). In 1 (1%) of the workers with refraction error, multiple nebulae were determined associated with previous foreign body trauma to the cornea. This was photographed and recorded (Figure 1). Amblyopia was not determined in any of the workers in the field.

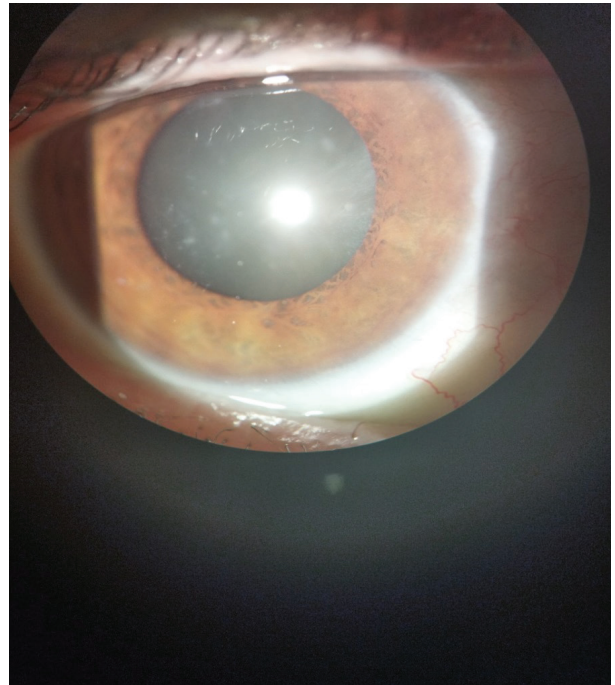


Figure 1: Multiple nebulae formed because of a stone fragment striking the cornea

No correlation was determined between the ocular diseases determined and the risk status in terms of eye health of the environment in which they were working ($p=0.202$) (Table 1).

No visit to an ophthalmologist was reported by 15 (48.4%) of the office workers and by 58 (61.7%) of those working in the field. No statistically significant difference was determined between the areas of work in respect of having consulted an ophthalmologist ($p=0.257$). Of the 58 (61.7%) workers who had not been to an ophthalmologist, refraction error was determined in 7 (7.4%), pterygium in 6 (6.3%), and amblyopia in 1 (1%). In all these cases, the disorder was diagnosed for the first time by a specialist in the examinations made for this study.

No significant difference was found between the determination of ocular disease and the use of protective goggles and educational level ($p=0.535$, $p=0.124$, respectively). There was determined to be a statistically significantly

Table 1: Eye diseases determined in the marble quarry workers, the units where they worked, the environmental conditions, and visits to an ophthalmologist

	None (n=94)	Pterygium (n=11)	Refraction error (n=19)	Amblyopia (n=2)	p value
Unit where employed n (%)					
Office	19 (61.3)	4 (12.9)	6 (19.4)	2 (6.5)	0.044
In the field	75 (78.9)	7 (7.4)	13 (13.7)	0 (0)	
Risk status n (%)					
None	27 (62.8)	4 (9.3)	10 (23.3)	2 (4.7)	0.202
Dust	51 (81.0)	5 (7.9)	7 (11.1)	0 (0)	
Hot environment	5 (62.5)	2 (25.0)	1 (12.5)	0 (0)	
Dispersion of particles (metal, soil, splinters, etc.)	11 (91.7)	0 (0)	1 (8.3)	0 (0)	
Exposure to particles in the air of the workplace, such as metal shavings, glass fragments, wood chippings, or soil dust n (%)					
No	71 (74.0)	9 (9.4)	14 (14.6)	2 (2.1)	1.000
Yes	23 (76.7)	11 (8.7)	19 (15.1)	2 (1.6)	
Use of welding machinery n (%)					
No	85 (75.2)	10 (8.8)	16 (14.2)	2 (1.8)	0.747
Yes	9 (69.2)	1 (7.7)	3 (23.1)	0 (0)	
Wearing protective goggles when using welding machinery n (%)					
No	2 (50.0)	0 (0)	2 (50.0)	-	0.471
Yes	7 (77.7)	1 (11.1)	1 (11.1)	-	
Use of protective goggles or face visor n (%)					
No	35 (71.4)	3 (6.1)	10 (20.4)	1 (2.0)	0.490
Yes	59 (76.6)	8 (10.3)	9 (11.6)	1 (1.2)	
Problems experienced related to the working environment (heat, light, dust) n (%)					
No	63 (70.8)	8 (9.0)	16 (18.0)	2 (2.2)	0.458
Yes	31 (83.7)	3 (8.1)	3 (8.1)	0 (0)	
Eye injury due to foreign body in the workplace n (%)					
No	90 (75.6)	9 (7.6)	18 (15.1)	2 (1.7)	0.274
Yes	4 (57.1)	2 (28.5)	1 (14.2)	0 (0)	
The treatment method for problems experienced related to the working environment (heat, light, dust) n (%)					
My eye was not injured.	90 (75.6)	9 (7.6)	18 (15.1)	2 (1.7)	N/A
I used eye drops myself.	1 (100)	0 (0)	0 (0)	0 (0)	
I went to the workplace doctor.	0 (0)	1 (100)	0 (0)	0 (0)	
I went to my family doctor.	3 (60)	1 (20)	1 (20)	0 (0)	
Previous visit to an ophthalmologist (apart from this examination)					
I have not seen an ophthalmologist.	58 (80.6)	6 (8.3)	7 (9.7)	1 (1.4)	0.207
I have seen an ophthalmologist.	36 (66.7)	5 (9.3)	12 (22.2)	1 (1.9)	

higher rate of the use of protective goggles in the group working in an environment of high risk to eye health compared to the group at no risk ($p < 0.001$). Protective goggles were used at a statistically significantly higher rate by workers who had previously experienced eye problems related to the working environment compared to those who had not ($p < 0.001$) and by workers who had suffered an eye injury because of a foreign body compared to those who had not ($p = 0.042$) (Table 2).

Among the office workers, there was determined to be a statistically significantly higher rate of the use of protective goggles by those who had previously experienced eye problems related to the working environment compared to those who had not ($p = 0.010^{adj}$). Protective goggles were used by 28 (87.5%) of the 32 workers in the field who had experienced eye problems because of the working environment, and by 37 (58.7%) of the 63 who stated they had not experienced such problems. This difference was determined to be statistically significant ($p = 0.010^{adj}$) (Table 3).

Table 2: Associations between the education level of the workers, eye health, and environmental characteristics and the use of protective eyewear

	Protective goggles		p value
	No, n (%)	Yes, n (%)	
Eye disease			
Absent	35 (37.2)	59 (62.8)	0.535
Present	14 (43.8)	18 (56.3)	
Education			
Middle school or below	37 (43.5)	48 (56.5)	0.124
High school or above	12 (29.3)	29 (70.7)	
Risk status			
None	27 (62.8)	16 (37.2)	<0.001
Present	22 (26.5)	61 (73.5)	
Problems experienced related to the working environment (heat, light, dust)			
No	45 (50.6)	44 (49.4)	<0.001
Yes	4 (10.8)	33 (89.2)	
Eye injury due to foreign body in the workplace			
No	49 (41.2)	70 (58.8)	0.042
Yes	0 (0)	7 (100)	
Previous visit to an ophthalmologist (apart from this examination)			
I have not seen an ophthalmologist.	32 (44.4)	40 (55.6)	0.140
I have seen an ophthalmologist.	17 (31.5)	37 (68.5)	

Table 3: Associations of problems experienced related to the working environment and the use of protective eyewear

Unit	Problems experienced related to the working environment (heat, light, dust)	Protective goggles		p
		No, n (%)	Yes, n (%)	
Office	No	19 (73.1)	7 (26.9)	0.010^{adj}
	Yes	0 (0)	5 (100)	
In the field	No	26 (41.3)	37 (58.7)	0.010^{adj}
	Yes	4 (12.5)	28 (87.5)	

adj: Bonferroni correction

DISCUSSION

Eye injuries occurring in stone quarries and the marble industry are usually to the ocular surface and anterior segment, with a general lifetime prevalence of 4.4%, and age-specific prevalence varying between 2% and 6% (13). After injuries to the hands and feet, eye injuries are the third most common injuries in marble quarries, and therefore it has been reported that ocular health is negatively affected (14). Ocular injuries are a significant preventable cause of blindness, and it has been reported that 55 million ocular injuries per year cause blindness in 1.6 million individuals (15). The most common ocular symptoms range from simple eye fatigue to cornea, lens, and ocular surface degeneration, exposure to foreign bodies, and serious perforating injuries causing blindness (16,17). In the prevention of eye injuries, it is thought that the appropriate identification of workplace risk factors, evaluation of the use of personal protective equipment and training of employees on this subject can provide a cost-effective solution (18).

All the 126 workers in the current study were male, which is understandable when the difficulties of working in stone quarries are considered. In the evaluation of the educational level of the workers, there was seen to be a higher rate of those with primary school, middle school, and high school education compared to university graduates, which was consistent with the distribution seen in previous similar studies (18,19). Although this is associated with the socioeconomic status of the country and education policies, widespread difficult conditions in Türkiye and relatively low-paid work are associated with education level (20).

More than half (57.1%) of the workers in the current study, and the vast majority of workers in a previous study in Ghana, did not visit an ophthalmologist for routine check-ups (19). Moreover, the fact that no difference was determined in the status of visiting an ophthalmologist according to the unit of work (office or in the field) is an important sign of the workers' perception and awareness of health and safety at work. In a study in Nigeria, it was reported that only 52% of the workers in a stone quarry were aware of the ocular dangers in the workplace that could potentially have a negative effect on ocular health (21). In the current study, 43 (34.1%) workers stated that there was no risk to eye health in the environment where they worked and 83 (65.9%) stated that they worked in an environment that constituted a risk to eye health.

While a significant proportion of eye injuries occur in the workplace, ocular trauma continues to be a global preventable cause of morbidity of eye diseases (22). Eye injuries that occur in the workplace are related to the profession and the nature of the work conducted, and therefore some individuals are at a higher risk of eye injuries

because of their occupation (23). Corneal foreign body, globe rupture, lamellar laceration of the cornea and hyphema have been reported in literature as the most frequent forms of ocular injuries (24).

In the current study, 20.8% of the workers were exposed to sudden flying particles of metal, glass, wood, or soil, and 5.5% experienced an eye injury of foreign body origin. However, there were no findings in this study of injuries similar to globe rupture, lamellar laceration, or hyphema in the anterior segment. Khorshed et al. reported that 47.6% of the workers in their study had experienced an ocular foreign body, and 10.8% had suffered an eye injury (25). In a study by Ezisi et al., the general prevalence of work-related eye injuries was determined to be 32.0%, and of those working in stone quarries, there was a higher rate in stone processing workers (26). Koffuor et al. determined the prevalence of eye injuries to be 59.2% in workers in stone and sand quarries, and 43.7% in workers in areas other than mining and quarrying (19). The differences in eye injuries between published studies can be attributed to the laws and investments of countries, the extent of the use of personal protective equipment, training of the workers in health and safety at work, and differences in data collection methods (26).

The use of personal protective equipment is valuable with the aim of being able to prevent injuries in the workplace. In marble and stone quarries, protective goggles with which there can be full and clear vision in the workplace should be worn. It is known that the use of protective eyewear can prevent more than 90% of serious eye injuries (27). However, studies have shown that the use of protective equipment has still not reached high levels (22,28). In a study by Prasa et al., it was reported that 81.0% of workers did not use protective equipment, and in a study examining eye injuries in industrial accidents, Ngo et al. determined that protective eyewear was not used by 78.6% of workers (16,29). In the current study, it was determined that a relatively higher rate of workers used protective goggles or a visor, and the rate of protective goggle use was reported to be higher in those who had experienced ocular health problems and eye injuries because of the working environment ($p < 0.001$, $p = 0.042$). Similar to these findings, there are studies in the literature reporting that the use of protective goggles was associated with having experienced ocular trauma in the past and it had then become a personal habit (21,30). There may be various reasons that the use of protective equipment is not at an adequate level. The reasons most commonly focused on are that the employer does not always provide appropriate protective equipment, unsuitable protective goggles frequently steam up (reducing vision quality), users experience discomfort, and the risk of eye injury can be easily ignored by workers (21,31).

Of the 126 workers included in the current study, ocular disease was determined in 32 (25.4%), refraction error was recorded in 19 (15.1%), pterygium was recorded in 11 (8.7%), and amblyopia was recorded in 2 (1.6%) as a result of the examinations. In a recent study in Egypt, conjunctival hyperemia was seen most in the eye examinations in 59.6% of workers, and in another study that investigated ocular problems in stone quarry workers, pterygium was determined at the high rate of 22.0% (25,32). Similarly, in another study, pterygium, cataract, refraction error, pinguecula, and conjunctival hyperemia were predominant (19,26). That the ocular examination findings were at a lower level in this study compared to previous studies can be said to be related to the sample size. The development of pterygium can be caused by exposure to dust, smoke, and ultraviolet light while working outside (33). There are studies in literature that have reported that long-term exposure to marble dust in the process of producing marble in quarries causes ocular irritation and subsequent conjunctival hyperemia and conjunctivitis (25,34).

To the best of our knowledge, this is the first study which has been conducted by an ophthalmology specialist in stone quarries in Türkiye. In the light of the objective data obtained, reducing the factors threatening ocular health by educating workers in the use of protective equipment, and the workers becoming accustomed to using the protective equipment is important for the protection of the health of workers. Since it is a quarry, the workplace is classified as extremely hazardous, and there is a workplace doctor on site on a regular basis. Despite the fact that the workplace doctor conducts annual general routine checks on employees, no additional ocular examinations have been performed. As a specific specialty, ophthalmology attracts attention, and given that marble workers may have difficulty reaching an ophthalmologist, it is possible that these workers are unaware of their eye health. Our study is significant in this context because it emphasizes the importance of screening marble quarry workers for eye diseases. In addition, along with other studies, it will be beneficial to investigate whether there is a correlation between the ambient dust measurements to be taken in this occupational group and eye diseases. Mines and quarries employ 192,793 people in the Republic of Türkiye, according to data published by the Ministry of Labor and Social Security in 2020 (35). Only three occupational accidents were reported during the inspections of the mines and quarries, which employed 13,063 people. It is unknown if any of them were injured in the eyes. We cannot make any comparisons because we lack reliable data on whether or not an occupational accident occurred in the quarry under consideration.

In addition, workplace doctors can examine the visual acuity of workers at certain intervals with a portable

chart, and by recording the results, workers determined to have a decrease in visual acuity can be referred to an ophthalmology specialist. Taking the time to examine workers with reduced visual acuity is of great importance in respect to preventing potential workplace accidents.

The correct diagnosis by a workplace doctor of eye diseases, which involve the ocular surface, such as pterygium, and which can be determined with light examination, can ensure the referral of workers to an ophthalmology specialist before progression of the disease. Therefore, workplace doctors may need training in this area. Together with the results of future similar studies, the neglect of the ocular health of workers, which is a potential public health problem, can be eliminated.

In this study, cases with visual acuity determined to be lower than normal and with no pathology determined in the examination were accepted as low vision because of refraction error. In future similar studies, it would be appropriate to use a portable autorefractometer. This study was conducted in two randomly selected marble quarries in a specific region. Further multicenter studies in marble quarries in various regions of Türkiye with a greater number of participants could determine more accurate results.

CONCLUSION

It is clear that the working conditions of marble quarries have an undeniable effect on ocular surface diseases. The current study showed a highly significant rate of pterygium and refraction error in the marble quarry workers, and a significant proportion of these were diagnosed for the first time in examinations by the ophthalmologist in the study. Although the use of personal protective equipment was seen to be relatively more than in other studies, the level of use should be independent of personal accident history and should be brought up to an adequate level. Workers and workplace doctors should be given training about eye health. In addition to being able to identify high risks in the workplace in terms of eye health, routine examinations by an ophthalmologist should be provided by the employer. With certain training, workplace doctors can measure visual acuity with a Snellen chart and screen for ocular disorders, primarily pterygium, and refer workers to specialists when necessary. Thus, by minimizing the exposure to working environments that have an effect on eye health, it will be possible to provide early diagnosis and treatment.

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