

ORIGINAL ARTICLE

PREVALENCE OF CATARACT, CLIMATIC DROPLET KERATOPATHY AND EYE LID DISEASES AMONG FISHERMEN IN JAZAN IN SAUDI ARABIA, AND THE ASSOCIATION OF RISK FACTORS

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ABSTRACT

The fishermen in the coastal region of Jazan are subjected to long working hours in the sun where the risk for cataract, climatic droplet keratopathy (CDK) and Eyelid diseases due to solar radiation are high. The objective of this study to determine the prevalence of anterior segment eye disorders, specifically cataract, CDK and eyelid diseases among fishermen in Jazan and examination of its association with the sociodemographic and occupational among fishermen in Jazan. This study employed a cross-sectional design conducted in the Jazan region of Saudi Arabia. A total of 511 fishermen were included in the study. All the respondents were interviewed using a questionnaire and subsequently undergone an eye examination. The prevalence of the cataract was found to be 3.3 %, CDK, 0.4 % and the eyelid diseases affecting 3.2 % of the respondents. A significant association was seen between the prevalence of anterior segment eye disorders ($p < 0.05$). Overall, CDK for fishermen with less than five days of work per week was found to be 75 % while for fishermen with more than five days of work per week the CDK was found to be 25 %. The overall eyelid disease on the other hand was found in all the respondents with over five days of work per week. The overall cataract for the same group of fishermen was however 64.7 % while for fishermen with less than five days of work per week it was found to be 35.3 %. Knowledge and awareness training as well as future research are warranted to assess the health implications of fishermen in Jazan, Saudi Arabia. It is imperative for all involved to take notice of such implications on health with the government implementing regulatory frameworks that can aid these fishermen. Future research is also recommended.

Keywords: CDK, UV, eyes disorders, cataract, eyelid diseases

INTRODUCTION

Ultraviolet (UV) rays can be harmful and its effect on the skin has thus far been adequately recorded. This is evidenced in more than 95% of the global population making the association between UV exposure and skin problems with 85% bearing the common knowledge that prolonged exposure may lead to skin melanoma. However, the understanding of the association between such exposures to eye disorders is lacking in several areas. These areas include how much of sun exposure and for amount of time leads to damage to the skin and eyes. Only about 7% of the global population are aware of the adverse association of UV rays to the eye. It has been stated that after the skin, the organ that is most likely to be affected by prolonged exposure to UV is the eye. A deeper understanding of such issues is therefore required. In view of this, ocular diseases are quite common and have been known to affect a large number of people worldwide (80 million). In the United States alone, a whopping 3.4 million people over the age of forty is said to have some or the other form of visual impairment^{2,3}.

For the region of Jazan, the prevalence of cataract in individuals over the age of 50 was a staggering 58.6%, making cataract the leading

cause of blindness in the region. The second leading cause for blindness was reported to be caused by diabetic retinopathy (37.8%)¹.

In the coastal region of Saudi Arabia, the population are at a higher risk as the major livelihood in Jazan relies on fishing. Fishermen are subjected to extended hours of work in the sun, especially during the peak hours of the day Resnikoff et al. 2004. It has been shown by Congdon et al. 2004 that UV exposure adversely affects their livelihood and in the long run affect their families as well as their monetary status. Examining this issue is pertinent as along with aiding to mitigate the issue, the study can also contribute to implementing a health campaign in order to mitigate the occurrence of such disorders. Therefore the present study objectives were to determine the prevalence of Cataract, CDK and eyelid diseases among fishermen in Jazan and to examine the association of sociodemographic and occupational history with the prevalence of cataract, CDK and eyelid disorders among the fishermen in Jazan.

METHODS

This is a descriptive cross sectional study design conducted in Jazan region of Saudi Arabia. Jazan is located in the southwest region of Saudi Arabia

where the coastal section of Jazan in turn consists of four main distinct regions namely Jazan, Alttuwal, Alshoqaiq and Farasan islands all these four regions of the coastal section of Jazan. This study has been conducted in 2 main distinct regions which are Jazan and Farasan islands and in 2 sub-regions which are Almadhaya, Alsawarmah and Baish. Based on the statistics released by the Ministry of Agriculture (MOA), the total registered population of the fishermen in the entire areas of Jazan were reported to be at 5013 as of 2015. Of these, the fishermen were selected using random sampling method and were administered a screening questionnaire to ensure that the selection criteria were met.

Both Saudi and non-Saudi fishermen were included in this study. All fishermen were 18 years old and above. Fishermen with more than 5 months' work experience were included in the study. Both full time and part time fishermen were considered. Only Fishermen who exhibited symptoms leading to the differential diagnosis of, anterior segment eye diseases such as cataract, eyelid disorders and CDK were included.

Potential participants with underlying medical conditions such as diabetes hypertension and cardiac failure for more than five years were excluded from the study. Patients with a history of posterior segment diseases such as retinitis, uveitis as well as diabetic retinopathy, history of suggestive ocular surface and those with a history of ocular surgery were also excluded. Based on these criteria, the study had included 511 fishermen over duration of 4 months (October 2015 to January 2016). Of the total, 458 fishermen were included from Jazan port region, 5 respondents from Almadhaya, 14 from Baish and 34 from Farasan Islands.

Before the conduct of the study, the Chief of Fishermen as well as the fishermen themselves was explained about the procedure of the study and a written informed consent was obtained from each of the participants. The Chief of fishermen assisted in the selection process of the fishermen based on the selection criteria. For the socio-demographic and occupational aspects of the fishermen, the data was obtained from the screening questionnaire. As for the prevalence of Cataract, CDK and eye lid diseases, physical examination tests were conducted. This involved the use of an investigative form and eye assessment using a portable slit lamp (ELS-700, Eli-Ezer Company, USA). A screen chart was employed for the distance visual acuity assessment (GLC-1, Gerix Inc, Daejeon, Korea).

The questionnaire is mainly divided into socio demographics (age, nationality,) within which is the occupational data history such as number of

years as fishermen and number of hours spent in daylight and finally the status of health condition. The questionnaire was then translated into four languages (Arabic, Tagalog, Tamil and Bengali). Once the questionnaires were administered, a comprehensive eye exam immediately followed. The investigator showed the letter E in different directions to examine the distance visual acuity) and the respondents were asked to identify the letter in each direction those who answered right on the first try were moved down the process to measure the exact visual acuity. After that, the respondents were subjected to the second order of investigation using a slit lamp. The slit lamp is specifically instrument used to investigate the anterior and posterior segment eye disease as well as the outer part of the eye. An investigation form was used in conjunction with the slit lamp to diagnose anterior segment eye diseases which were cataract, CDK and eye lid diseases. The instruments used in this study were calibrated daily by the doctor before usage. Investigation was carried out in both eyes one after the other. The diagnosis was written as the form; right eye, left eye and overall diagnosis. Any of the tests were repeated if necessary, for instance in the cases where results were not obtained. This study was approved by ethical committee from two higher learning institution; Jazan University and Universiti Putra Malaysia. Informed consent from each individual participated in this study were also obtained. Statistical Package for Social Sciences (SPSS) version 22 was used to analyse the data based on the objective. Prevalence was analysed using descriptive statistics while the association were determined using binary logistic regression.

RESULTS

Socio demographic status of Fisherman in Jazan

The socio demographic details as categorised into age, nationality have been depicted below in table 1. The age of the fishermen were categorised in the ages of 21-31 years, 32-41 years, and 42-53 years with 28.4%, 44% and 27.6% in each of the categories respectively. As for the nationality 11.9% of the fishermen were Saudi, 9.4% were Filipino, 13.7% Bangladeshi, 32.1% were Indian, 5.1% Yemeni, 21.9% Egyptian, and 5.9% Srilankan.

Table 1: Socio Demographic Status of Fishermen in Jazan.

| Variables | Categories | Frequency | Percent (%) |
|-------------|-------------|-----------|-------------|
| Age (years) | 21 to 31 | 145 | 28.4 |
| | 32 to 41 | 225 | 44.0 |
| | 42 to 53 | 141 | 27.6 |
| Variables | Categories | Frequency | Percent (%) |
| Nationality | Saudi | 61 | 11.9 |
| | Filipino | 48 | 9.4 |
| | Bangladeshi | 70 | 13.7 |
| | Indian | 164 | 32.1 |
| | Yemeni | 26 | 5.1 |
| | Egyptian | 112 | 21.9 |
| | Sri Lankan | 30 | 5.9 |

N=511

Table 2: Occupational Data.

| Variables | Categories | Frequency | Percent (%) |
|--|------------|-----------|-------------|
| Number of experience years as fishermen | ≤ 10 | 166 | 32.5 |
| | 10-20 | 219 | 42.9 |
| | > 20 | 126 | 24.7 |
| Hours of working in a day | ≤ 8 | 111 | 21.7 |
| | > 8 | 400 | 78.3 |
| The fishermen's knowledge on the effect of UV on the eyes and skin | Yes | 36 | 7.0 |
| | No | 475 | 92.95 |

N=511

Prevalence of some anterior segment eye disorders in fishermen from Jazan

As is known, high exposures to UV rays directly result in the damage to the eyes as well as skin. Within this purview the results of this study are

Occupational Data

For the data on number of years' experience as fishermen, most of the respondents have worked as fishermen for between 11 to 20 years (42.9%); while for hours of working in a day; most of the respondents worked for more than 8 hours a day (78.3%). In terms of the knowledge about whether they have heard about the effect of the UV on the eyes and skin. The table shows that 93% did not know or have not heard about the effect that UV can have on the eyes and skin

depicted here. A frequency analysis has shown that overall corneal disease (CDK) has affected 0.4% of all the respondents. As for overall eyelid diseases, 3.2% has been diagnosed for eyelid disease

Table 3: Prevalence of some anterior segment eye disorders in fishermen from Jazan

| Anterior segment eye diseases | Frequency | Percent (%) |
|-------------------------------|-----------|-------------|
| Overall CDK | 2 | 0.4 |
| Overall eye lid diseases | 16 | 3.2 |
| Overall cataract | 17 | 3.3 |

N=511

Association of working experience and overall Cataract, CDK and eyelid disorders.

For the association of socio- and occupational history along with the prevalence of the anterior segment eye disorders in the respondents, it has been depicted in table 4.

The findings depict that there is a significant association between years of working experiences with the prevalence of anterior segment eye disorders among fishermen in Jazan. The associated diseases have been evidenced as overall cataract (p<0.05) (OR=0.12 95% CI=0.02, 0.95).

Table 4: Association of working experience and overall Cataract, CDK and eyelid disorder

| | | Experience (Years) | | | | X ² | P | OR | 95% CI | |
|-------------------------|-----|--------------------|------|-----|------|----------------|--------|------|--------|-------|
| | | < 10 | | ≥10 | | | | | Lower | Upper |
| | | N | % | N | % | | | | | |
| Overall CDK | Yes | 2 | 50.0 | 2 | 50.0 | 0.56 | 0.453 | 2.09 | 0.29 | 14.98 |
| | No | 164 | 32.3 | 343 | 67.7 | | | | | |
| Overall eyelid diseases | Yes | 6 | 37.5 | 10 | 62.5 | 0.19 | 0.663 | 1.26 | 0.45 | 3.52 |
| | No | 160 | 32.3 | 335 | 67.7 | | | | | |
| Overall Cataract | Yes | 1 | 5.9 | 16 | 94.1 | 5.67 | 0.017* | 0.12 | 0.02 | 0.95 |
| | No | 165 | 33.4 | 329 | 66.6 | | | | | |

N=511

Association of the load of work hours in a day and number of days per week with anterior segment eye disorders.

Table 5 show the association between loads of work hours with anterior segment disorders. No statistically significant associations were seen between the works hours and anterior segment disorders such as CDK, eyelid diseases and cataract. However, in table 6 which shows the association between the days of work per week and the anterior segment eyes disorder, there is

a statistically significant association between overall eyelid diseases and the days of work per week. Furthermore, the overall CDK for lesser than 5 days of work per week was found to be 75% while for over 5 days of working was 25%. The overall eyelid diseases were 100% in fishermen working over 5 years with the overall cataract for the same group was found to be 64.7%. For fishermen working for under 5 days per week cataract was found to be 35.3%.

Table 5: Association of the load of work hours in a day with anterior segment eye disorders.

| | | Working Hour per day | | | | χ^2 | P | OR | 95% CI | |
|-------------------------|-----|----------------------|------|----------|-------|----------|-------|------|--------|-------|
| | | < 8 hours | | ≥8 hours | | | | | Lower | Upper |
| | | N | % | N | % | | | | | |
| Overall CDK | Yes | 0 | 0.0 | 4 | 100.0 | 1.12 | 0.290 | 1.28 | 1.22 | 1.34 |
| | No | 111 | 21.9 | 396 | 78.1 | | | | | |
| Overall eyelid diseases | Yes | 2 | 12.5 | 14 | 87.5 | 0.83 | 0.363 | 0.51 | 0.11 | 2.26 |
| | No | 109 | 22.0 | 386 | 78.0 | | | | | |
| Overall Cataract | Yes | 1 | 5.9 | 16 | 94.1 | 2.60 | 0.107 | 0.22 | 0.03 | 1.66 |
| | No | 110 | 22.3 | 384 | 77.7 | | | | | |

N=511

Table 6: Association of the days of work per week with anterior segment eye disorders

| | | Days of work per week | | | | χ^2 | P | OR | 95% CI | |
|-------------------------|-----|-----------------------|------|-----|-------|----------|---------|------|--------|-------|
| | | < 5 | | ≥5 | | | | | Lower | Upper |
| | | N | % | N | % | | | | | |
| Overall CDK | Yes | 3 | 75.0 | 1 | 25.0 | 1.87 | 0.172 | 4.28 | 0.44 | 41.41 |
| | No | 209 | 41.2 | 298 | 58.8 | | | | | |
| Overall eyelid diseases | Yes | 0 | 0.0 | 16 | 100.0 | 11.71 | 0.001** | 1.75 | 1.62 | 1.89 |
| | No | 212 | 42.8 | 283 | 57.2 | | | | | |
| Overall Cataract | Yes | 6 | 35.3 | 11 | 64.7 | 0.28 | 0.598 | 0.76 | 0.28 | 2.10 |
| | No | 206 | 41.7 | 288 | 58.3 | | | | | |

N=511

DISCUSION

It has been claimed that the outdoor workers such as fishermen are susceptible to high exposure of UV radiation. It is stated that high percentage of the UV radiation throughout the day is absorbed by the anterior segment of the eye, as a result only a small part of the radiation reaches the light sensitive retina Risa et al.⁴ Studies have shown the influence of exposure to UV radiation on the anterior segment of the eye^{5,6}, while some researchers have stated that age and length of time of exposure also constitutes significantly for the effects of UV on anterior segment of the eye⁷.

The findings of the study shown that some of the eye diseases such as CDK showed a low prevalence. The implication of such a finding is in conjunction with previous studies that associated repeated and prolonged UV exposure to anterior segment diseases. To this effect, the data is supported by the International

Commission on Non-Ionizing Radiation Protection (ICNIRP) that expressly associates occupation that requires prolonged outdoor activities such as those of fishermen were more likely to be adversely affected by UV radiation. Other studies have also made the same association as those found of this study⁸⁻¹⁰. Additionally, as with the findings of this study has also shown that anterior segment eye disorders have been associated with prolonged UV exposure⁵. Other studies have also shown that cataract can be termed as the direct result of UV exposure along with the prolonged exposure to sunlight. Therefore the importance of such exposure leading to anterior segment eye disorders has also been emphasized¹¹⁻¹⁴.

Regarding the prevalence of anterior eye segment disorders among fishermen in the Jazan region, no previous studies exist in comparison. However, a very similar study to the present conducted by Suárez et al.¹⁵ in four regions of coastal Argentina, depicted the

prevalence of CDK in one of the regions (El Cuy) to be 20%. The prevalence as found for the other three regions is more parallel to the present study in that the regions (especially Quebrachos) can be considered subtropical. It is comparable to Jazan which is a tropical area. The difference lies in the age ranges found by Suárez et al.¹⁵ which were between 20 years and 88 years while the present study depicted the age ranges at 18-53 years of age. With regards to the prevalence of CDK, the present study depicts 0.4% while several other studies show variances. A study by Keshav et al.¹⁶ showed that 28 out of 188 (14.9 %) respondents had CDK in South Sharqiya in Oman, which is closer to the findings of this study. Another study by Norn¹⁷, conducted in Al-Aqaba (red sea region) found the prevalence of CDK to be 39% whereas in Greenland the prevalence of CDK was projected at 12.3 %. The variance of prevalence can be largely attributed to the geographic location as well as sociodemographic and occupational status of the respondents. One reason for a low prevalence of CDK in this population could be that all fishermen, even those who work at night, were considered for the study. Another factor could be the age ranges that constitute to a lower range of prevalence for corneal impairment.

Years of experience on the other hand does play an important role to the effect of UV on the cornea. While several studies have been conducted on how exactly UV rays constitute to damage to the eyes and what constitutes to protection¹⁸⁻²⁰. It is still concluded that further investigation and similar studies need to be conducted as to the exact manner in which the damage occurs, what causes it and how it can be mitigated. The same can be stated in the case of blepharitis where more studies specific to eyelid lesions need to be carried out. In this study no significant issues were noted with regard to UV exposure and eyelid lesions.

While it has been deemed that the leading cause of blindness is cataract, it has also been causally linked to UV exposure. The present study found a low prevalence of cataract with 2.9 % for nuclear cataract, 0.2 % for posterior subcapsular cataract (PSC) and 0.2 % with other abnormalities. The main implication of such a finding is that especially in the finding of PSC is that the sun (and hence UV radiation) does not cause cataract²¹⁻²³. As for the prevalence of nuclear cataract, this studies offers limited evidenced as to the causal relation.

It can therefore be stated that the findings of the study corroborate that increased exposure to UV radiation is directly correlated to eye-related effects such as CDK, eyelid lesion and cataract. It is also evident that factors such as age, years of experience, knowledge of UV

effects, and length of time of exposure can lead to impairments in the anterior segment of the eye. While the individual associations were non-significant, further evidence is warranted to further explore association of UV exposure to CDK, eyelid lesions and cataract.

The findings of the studies may not be generalizable to other coastal regions even though there is a conceptual overlap. The findings of the study are more specific to the region of Jazan. Another limitation that had hindered achieving a broader outcome is the large number of fishermen who refused to participate in the study as they were very busy preparing to go fishing. What was more challenging is the fact that the fishermen would be at sea for days (range of two to six days) and even on their return were extremely busy. It was hence challenging to communicate with the fishermen. Furthermore, the answers provided by all participants cannot assume to be truthful. This may attributed to the lack of understanding leading to information bias.

Even though the study is of a quantitative nature, the global generalizability of the findings may not be applicable. This is because the findings are restricted to the coastal regions of Jazan only wherein the influence of confounding factors such as coastal climate and natural setting may adversely affected the generalizability. Several Bengali fishermen who did not speak any other language were unfortunately excluded from the study due to a resource limitation in sourcing a Bengali interpreter.

CONCLUSION

A strong association between the exposure to harmful rays and working outdoors for a prolonged period of time coupled with the prevalence of anterior segment eye disorders was noted. It is therefore imperative for government as well as other stakeholders such as the healthcare sector to take notice and conduct further investigations. From this legal and regulatory frameworks may be implemented to protect the health of fishermen that have adverse outcomes owing to their professions. Knowledge and awareness training need to be administered to the fishermen, in order for them to carry out their activities safely and healthily henceforth. Future research is warranted to look into the health concerns of these fishermen in the Jazan region of Saudi Arabia.

CONFLICT OF INTEREST

The author and the respective declare that no conflict of interest is involved in the conduct and publication of this study.

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