

THE APPLICATION OF DISPOSABLE CONTACT LENSES IN THE NAVY

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ABSTRACT

With the recent advent of disposable contact lenses, many of the problems which have been hindering the military application of contact lenses have been overcome. Fifty-five myopic naval personnel with no previous contact lens experience were put through a three-week study using these contact lenses. The aim was to test the feasibility of supplying bespectacled myopic seamen with contact lenses at the outset of operational missions. Seven developed conjunctival injection which caused them to discontinue contact lens wear. Of the remaining 48, however, a vast majority showed preference for contact lenses when compared to spectacles in the work environments that they were exposed to. With contact lenses, 95.8% had comparable or better vision during the day and 85.4% during the night. No serious ocular complications were noted and only minor findings were detected in the 96 eyes at the end of three weeks of contact lens wear.

Keywords: Disposable contact lenses, myopia, military application, conjunctival injection, operational environment.

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INTRODUCTION

Singapore is a small country with 3 million people. The majority of the population (78%) are Chinese in origin. There is a high myopia rate amongst the Chinese (81%), making the wearing of spectacles and contact lenses a necessity.

The military is not spared the problem of personnel using spectacles in frontline vocations. Soldiers frequently face problems with specialised equipment like goggles, protective gear, binoculars, scopes and the helmet mounted displays. Often the problem is compounded in the Naval situation where there is the problem of rain, sea spray, dust, sweat and condensation which cause the spectacle user to have poor vision.

Contact lenses can overcome some of the problems of interfacing with various equipment. However, they are not immune to problems, especially that of hygiene, eye infections, problems of fitting and movement. In the context of the aviator, G-forces, altitude corneal hypoxia, bubbles from decompression are the main concerns. However, in Naval Seamen, the frequent long overseas sorties and the relative lack of fresh soap and water result in problems of maintenance of daily use contact lenses. Contact lens wear has been previously evaluated by several investigators in the Military context⁽¹⁻⁶⁾. They have shown that in some cases, up to one-third of personnel experienced one or more ocular conditions, requiring at least a temporary suspension of contact lens wear⁽⁶⁾. However, these studies did not evaluate the use of disposable contact lenses in the field situation.

With the recent advent of disposable extended wear contact lenses, many of the problems which have been hindering the military application of contact lenses have been overcome.

These include especially the problem of the periodic removal of the lenses for cleaning, the inconvenience of the cleansing routine and the inadequacy of performing this routine in a combat situation. The sequelae of improper cleaning leads to a higher incidence of ocular infections and other contact lens related complications.

With the disposable contact lenses, the serviceman has merely to put on the lenses and then these lenses can remain in situ for a week without having to be cleaned. At the end of the week they are simply removed and discarded and a new pair put in.

Having overcome the problem of daily handling of the contact lens, a study was undertaken to determine the advantages, if any of disposable extended wear contact lenses over spectacles in a naval environment. Specifically, we wanted to determine the feasibility of issuing, with minimal training, such disposable contact lenses to bespectacled myopic seamen with no previous contact lens experience at the outset of an operational mission and to study the success rates of wearing such extended wear contact lenses in the Naval environment. The study also attempts to determine the effect of the new contact lenses on ocular tissue, the acceptability of wear and care and the impact on military job performance.

STUDY COHORT AND RESEARCH METHODOLOGY

Fifty-five servicemen participated in this study. The 110 eyes had degrees of myopia ranging from -1.25D to -8.00D. The degree of astigmatism ranged from -0.25D to 1.50D.

Ninety-nine of the eyes had visual acuities of 6/6 with glasses, while the remaining 11 eyes were best correctable to 6/9.

They were given ocular examinations prior to inclusion in the study. Each individual had contact lenses put in for one week's duration, after which they were removed and replaced with a new pair. This was done for three weeks (3 pairs of contact lenses each). A final examination was conducted and a questionnaire was filled up by each of the participants at the end of the three weeks.

FINDINGS

Clinical Examination

On the initial screening, prior to the commencement of the study, 97 of the 110 eyes had no abnormalities. Six had a few areas of superficial punctate keratitis, 2 eyes had faint old corneal opacities and 5 had tarsal follicles.

During the course of the study, 7 cases developed conjunctival injection severe enough for them to be removed from the study. All subsequently recovered without sequelae.

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At the end of three weeks contact lens wear, 54 of the remaining ninety-six eyes showed no abnormalities, 42 eyes had developed mild signs which were asymptomatic to the wearer. Table I shows the breakdown of the findings.

Subjective Findings

Over the whole day, 9 subjects found that contact lens wear was extremely comfortable with no lens sensation. Thirty-eight subjects had mild discomfort on and off. This was relieved by

Table I
Clinical findings after 3 weeks of contact lens wear

	Trace	Mild	Moderate	Severe
1. Oedema	0	0	0	0
2. Neovascularization	7	2	0	0
3. Staining	2	0	0	0
4. Injection	21	0	0	0
5. Tarsal abnormalities	2	11	0	0
6. Other abnormalities	6	0	0	0

NB:

- 7 cases of conjunctival injection excluded
- 54 eyes completely normal.
- 42 eyes had mild abnormalities as distributed above (some eyes had more than one abnormality).

the use of lens lubricant. One subject had to adopt a limited daily wear routine (8 hours or less) due to increasing discomfort as wearing time lengthened during the day. No subjects were unable to wear the lenses due to poor lens comfort.

In terms of vision with contact lenses as compared to glasses, 95.5% of subjects had similar if not better vision in the day and 85.4% had similar if not better vision during the night (see Table II).

When comparing contact lenses to glasses in certain naval related environment the vast majority of the subjects found the use of contact lenses to be at least similar to if not better than their glasses. The figures range from 77.27% to 100% (see Table III).

Table II
Comparison of vision with contact lens to that with glasses

	Much better with contact lenses	Same	Worse	% with contact lens vision comparable if not better than glasses
Vision during the day	28	18	2	95.8
Vision during the night	24	17	7	85.4

CONCLUSIONS

The findings of the study show that the use of disposable contact lenses in a naval environment is a feasible option.

The drop out rate due to contact lens related problems (ie. conjunctival injection in all the cases in this study) amounted

Table III
Comparison of contact lenses to spectacles in certain naval related environments

Results Environment	Very much better	Much better	Same	Worse	% who find contact lens similar if not better than glasses	% who find contact lens better than glasses	% who find glasses better than contact lenses
1. Glare	03	15	20	07	84.4	40	15.6
2. Sea spray/splash	12	17	06	01	97.2	80.6	2.8
3. Rain	18	18	08	-	100	81.8	0
4. Engine room	06	08	06	03	86.9	60.9	13.1
5. Workshop environment	08	06	11	-	100	56	0
6. Kitchen	13	10	17	01	97.6	56.1	2.4
7. Vibration on board ship	14	09	07	02	93.7	40.6	6.3
8. Dusty environment	11	10	13	10	77.3	47.7	22.7
9. Smoky environment	10	10	15	04	89.7	51.3	10.3
10. When using optical instruments	10	12	04	-	100	84.6	0
11. When using visual display units	08	14	09	03	91.2	64.7	8.8
12. When using radar	06	05	02	-	100	84.6	0

to 12.7%. However, all these recovered without sequelae. These figures need to be interpreted in the light of:

- (1) the lack of previous contact lens experience.
- (2) the minimal instruction provided.
- (3) the harsh naval environment.

The remaining servicemen involved reported that in the respective naval environment tested, the contact lenses were in many situations better than glasses. This was especially so in the rain, when exposed to sea spray and when using optical instruments and radar.

In terms of subjective vision (day and night) the majority reported having vision better than glasses.

There was a high percentage of cases which developed trace to mild clinical signs after 3 weeks of contact lens wear (the 7 cases of conjunctival injection excluded). However, all patients were asymptomatic and vision was not affected.

It was also noticed on interview, that for contact lens comfort, a large proportion of the study cohort found the use of lens lubricant useful in keeping their eyes comfortable while wearing the lenses.

Therefore the option to supply disposable contact lens in mass prior to military operations, to enhance individual performance at sea is a viable one.

The drop out rate of 12.7% although appearing initially large is understandable and acceptable in the light of the protocol and study requirements and the harshness of the naval operational environment.

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