Exploring the Efficacy of Warm Compression versus Cold Compression in Alleviating Dry Eye Syndrome Symptoms

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Abstract

Introduction: Dry eye syndrome is a common ocular disorder in India, with escalating prevalence and the potential to become an epidemic, posing significant public health challenges. This study aims to compare the effectiveness of warm compress and cold compress interventions on clients with dry eye syndrome in selected areas of Puducherry. The condition not only affects vision but also disrupts the overall quality of life, making it imperative to identify effective interventions to alleviate its burden and improve the well-being of those affected. Materials & Methods: A quasi-experimental research design with a two-group pre-test and post-test approach was adopted for this study. The study population comprised clients suffering from dry eye syndrome, and 60 samples were purposively selected. Data collection involved structured questionnaires and the standardized Canadian Dry Eye Assessment Scale to assess dry eye levels before and after the interventions. Results: Prior to the intervention, the mean dry eye level was 13.43 in group I (warm compress) and 15.73 in group II (cold compress). After the intervention, the mean dry eye level significantly reduced to 4.83 in group I and 9.32 in group II. The t-test values for group I and group II were 4.099 and 3.832, respectively. These findings indicate a greater reduction in dry eye syndrome in the warm compress group compared to the cold compress group, suggesting the effectiveness of the warm compress in managing dry eye syndrome. Conclusions: As the incidence of dry eye is expected to escalate in the coming years, implementing warm compress interventions could be a valuable approach to alleviate the burden of this condition and enhance the well-being of those affected. Further research and long-term assessments may be warranted to strengthen these conclusions and inform evidence-based practices in dry eye management.

Keywords: Dry eye syndrome, Warm compress, Cold compress, Quality of life.

1. Introduction

The human eye is an intricate sensory organ responsible for the crucial sense of sight, enabling individuals to perceive the world around them and engage in various tasks. Vision, also known as sight, involves a complex process that intricately connects the eye, nervous system, and brain. When an individual gazes at an object, the light reflected or emitted by the object enters the eye, passing through the lens and eventually reaching the retina. Within the retina, specialized light-sensitive cells, called rods and cones, convert these light waves into nerve signals that travel through the optic nerve to the brain, allowing the perception of images. Safeguarded within the bony socket of the skull, the eye is further protected by the vigilant eyelids, which blink approximately once every six seconds, contributing to the cleansing and moistening of the eye's surface through tear secretion [1].

The human eye exhibits distinctive features that contribute to its remarkable ability to facilitate vision. The iris, the coloured part of the eye, adeptly controls the amount of light entering the eye. Positioned at the front of the eye, the transparent cornea acts as a fixed lens, allowing light to freely pass through. The pupil, a dark aperture within the iris, efficiently regulates the amount of light entering the eye by dilating or constricting based on lighting conditions. The tough, white sclera envelops the entire eyeball except for the cornea, providing essential support and attachment for various eye muscles. Inside the eye, the retina stands as a critical component housing light-sensitive cells, which play an indispensable role in converting light into neural signals. Tears, produced by the lacrimal gland, serve a pivotal function in maintaining the eye's cleanliness and moisture, with basal tears continuously bathing the cornea to protect its surface[2]. Nonetheless, changes in tear production and composition, a natural part of the ageing process, can give rise to eye health issues, particularly among individuals who spend prolonged periods using electronic gadgets. These changes heighten the risk of various eye diseases, including age-related macular degeneration (AMD), cataracts, diabetic eye disease, glaucoma, dry eye, and low vision [3].

Dry eye syndrome, a prevalent disorder, occurs when there is an imbalance in the tear film, which consists of three layers: the oily, watery, and mucus layers. These layers function to protect and nourish the eye's front surface. Deficiencies in any of these tear layers can lead to the development of dry eye symptoms. Keratoconjunctivitis sicca (KCS) or dry eye syndrome represents the most common form of dry eye, characterized by an insufficient water layer in tears [4]. Numerous prevalence studies on dry eye disease have demonstrated varying rates globally, ranging from 5% to 50%. In the United States, approximately 6.8% of the adult population, accounting for around 16.4 million people, have received a diagnosis of dry eye disease, with higher rates observed among older individuals and women. Patients with autoimmune diseases, affecting around 8% of the population, are also at an elevated risk for dry eye, particularly post-menopausal women and the elderly, with prevalence rates ranging from 7.4% to 33.7%. Studies conducted in the Beaver Dam population-based study have shown a prevalence rate of 14% in adults aged 48 to 91 years, with a higher occurrence among women[5]. In Australia, the prevalence of dry eye disease is approximately 7.4%, with a significant increase in occurrence observed among older patients and decreased tear protection in women aged 50 to 59 years. In Indonesia, the prevalence of dry eye is even higher at approximately 27.5%, associated with factors such as age, cigarette smoking, and the presence of pterygium [6].

In India, a large-scale, hospital-based study involving over 1.45 million patients revealed an incidence of dry eye disease at 1.46%. Alarmingly, projections indicate that by 2030, the prevalence of dry eye disease in the urban population of India will reach approximately 40%, significantly surpassing the global average ranging from 18.4% to 54.3% [7]. Given the escalating prevalence of dry eye syndrome, there is an urgent need for effective management options. Warm and cold compress therapies have demonstrated promising results in reducing inflammation and providing comfort to patients with dry eyes. However, the lack of a comprehensive eyewear device capable of delivering both warm and cold compressions for managing dry eye syndrome remains a significant gap in the current treatment options. Therefore, this study aims to design an innovative eye wear device that can offer comprehensive care (warm and cold compression) to individuals suffering from dry eye syndrome [8].

2. Statement of the Problem

A Comparative Study to Assess the Effectiveness of Warm Compress vs Cold Compress on Clients with Dry Eye Syndrome in Selected Areas of Puducherry.

3. Objectives

To assess the level of dry eye syndrome among the clients during the pre-test.

To evaluate the effectiveness of warm compress and cold compress on dry eye syndrome during the post-test.

To compare the effectiveness of warm compression vs cold compression on dry eye syndrome.

To determine the association between the levels of dry eye syndrome among the clients and selected demographic variables.

4. Material and Methods

In this study, a quantitative research approach and a quasi-experimental research design were utilized to assess the effectiveness of warm compression versus cold compression on clients with dry eye syndrome. The independent variable was the type of compress used (warm compression and cold compression), while the dependent variable was the level of dry eye syndrome experienced by the clients. The study was conducted in two settings: The Ophthalmic OPD of MGMCRI at Pillaiyarkuppam, Puducherry, and UCO Bank and Indian Bank at Bahour, Puducherry. The population of the study consisted of clients with dry eye syndrome who were residents of Puducherry. The sample was selected using a purposive sampling technique, with both male and female clients affected by dry eye syndrome, and who were willing to participate in the study, meeting the inclusion criteria. Exclusion criteria included clients who had undergone eye surgery, had foreign bodies in the eye, or used artificial tears and external lenses.

The tool used in the study comprised two parts. Part A collected socio-demographic variables such as age, sex, religion, occupation, family income, smoking and alcohol habits, hobbies, gadget usage, radiation exposure, use of contact lenses, and medical conditions or previous medical history. Part B involved the use of the Canadian Dry Eye Assessment Scale (CDEAS) to assess the severity of dry eye syndrome, scored on a scale ranging from "Not at all" to "Very severe."

The content validity of the tool was ensured by obtaining opinions from three nursing experts, considering the relevance, accuracy, and appropriateness of the items. The reliability of the tool was established to measure the consistency of the attribute it assessed. Data collection occurred over a one-week period after obtaining the necessary permissions. The procedure involved collecting demographic variables through an interview schedule, conducting a pre-test assessment of dry eye syndrome using CDEAS, implementing the intervention (warm compress for Group I and cold compress for Group II), and performing a post-test assessment. Data analysis encompassed organizing the data in a master sheet, calculating frequencies and percentages for baseline variables, and determining the mean, median, and standard deviation of pre-test and post-test scores. Inferential statistics, such as the chi-square test and paired t-test, were utilized to analyze the data and test research hypotheses.

5. Results

The data analysis and interpretation were conducted based on findings from 60 samples affected by dry eye syndrome. The results are presented in the following sections:

Section -A: Frequency and Percentage Distribution of Demographic Variables

The frequency and percentage distribution of demographic variables among clients affected by dry eye syndrome in Group I and Group II. The demographic variables include age, sex, religion, occupation, and family income. Additionally, the table depicts the distribution of clients based on their hobbies, types of gadgets used, and exposure to radiation. The data was collected from a total of 60 samples during the study period. The table provides insights into the distribution of clients across various demographic categories and aids in understanding the characteristics of the study population.

Section B: Assess the Level of Dry Eye Syndrome among Clients in Pre-Test and Post-Test Using the Canadian Dry Eye Assessment Scale

Table 1 presents the scores and descriptions of the level of dry eye syndrome among clients in the pre-test and post-test, categorized based on the Canadian Dry Eye Assessment Scale (CDEAS). In the pre-test, for Group 1 (warm compression), there were no clients with a score of "Not at all" or "Severe," and 25 clients (83.3%) had a "Mild" level of dry eye syndrome. Additionally, 5 clients (16.7%) were in the "Moderate" level. Similarly, in the pre-test for Group 2 (cold compression), there were no clients with a score of "Not at all" or "Severe," and 26 clients (86.7%) had a "Mild" level of dry eye syndrome. Additionally, 4 clients (13.3%) were in the "Moderate" level. In the post-test, for Group 1 (warm compression), 18 clients (60%) showed no symptoms of dry eye syndrome ("Not at all"), 12 clients (40%) had a "Mild" level of dry eye syndrome, and there were no clients with "Moderate," "Severe," or "Very severe" symptoms. For Group 2 (cold compression), 3 clients (10%) showed no symptoms of dry eye syndrome ("Not at all"), 27 clients (90%) had a "Mild" level of dry eye syndrome, and there were no clients with "Moderate," "Severe," or "Very severe" symptoms. The results indicate that warm compression and cold compression were both effective in reducing the severity of dry eye syndrome, as there was a decrease in the number of clients with symptoms in the post-test compared to the pre-test for both groups. Furthermore, all clients with "Moderate" symptoms in the pre-test improved to either "Mild" or "No symptoms" in the post-test after receiving warm or cold compression treatment.

Table 1: Level of Dry Eye Syndrome among Clients in Pre-Test and Post-Test Using the Canadian Dry Eye Assessment Scale

Score	Description	Pre-test		Post-test	
		Group 1 Warm	Group 2 Cold	Group 1 Warm	Group 2 Cold

		Compression		Compression		Compression		Compression	
		F	**P**	**F**	**P**	**F**	**P**	**F**	**P**
1	Not at all	0	0	0	0	18	60	3	10
2 – 4	Mild	25	83.3	26	86.7	12	40	27	90
5	Moderate	5	16.7	4	13.3	0	0	0	0
6 – 9	Severe	0	0	0	0	0	0	0	0
10 - 12	Very severe	0	0	0	0	0	0	0	0

Section C: Effectiveness of warm compression and cold Compression on Dry Eye Syndrome during Pre and Post Test.

Table 2 provides the mean and standard deviation of dry eye syndrome scores for both Group I (treated with warm compression) and Group II (treated with cold compression) during the pre and post-tests. It also includes the results of the paired t-test and the corresponding p-values for each group. The mean dry eye syndrome score for Group I significantly decreased from 13.43 in the pre-test to 4.83 in the post-test. The paired t-test resulted in a highly significant value of 20.494 ($p<0.001$), indicating that warm compression was highly effective in reducing dry eye syndrome symptoms. Similarly, for Group II, the mean dry eye syndrome score decreased from 15.73 in the pre-test to 9.23 in the post-test. The paired t-test yielded a highly significant value of 12.493 ($p<0.001$), showing that cold compression was also highly effective in reducing dry eye syndrome symptoms. The results demonstrate the significant effectiveness of both warm compression and cold compression as interventions for managing dry eye syndrome in the respective groups. The statistically significant findings support the use of these treatments as viable options for alleviating dry eye symptoms

Table 2: Effectiveness of warm compression and cold Compression on Dry Eye Syndrome during Pre and Post Test

Group	Test	Mean	Standard Deviation	Paired t Test	P Value
Group I Warm Compression	Pre-test	13.43	4.099	20.494	<0.001
	Post-test	4.83	2.817		
Group II Cold Compression	Pre-test	15.73	3.832	12.493	<0.001
	Post-test	9.23	3.794		

Statistically significant at p<0.001 level

Section D: Comparison of pre and post-test mean levels of dry eye syndrome between Group I (warm compression) and Group II (cold compression).

Figure 1 indicate that both warm compression (Group I) and cold compression (Group II) were effective in reducing the mean levels of dry eye syndrome from the pre-test to the post-test. However, Group I (warm compression) showed a greater reduction in mean levels compared to Group II (cold compression), as evident from the lower mean value in the post-test. The paired t-test values for both groups were highly statistically significant at $p<0.001$ level, indicating that the reductions in mean levels of dry eye syndrome were not due to chance but were indeed a result of the interventions (warm and cold compressions). Overall, the findings suggest that both warm and cold compressions can be beneficial in managing dry eye syndrome, with warm compression showing a slightly more pronounced effect in reducing symptoms.

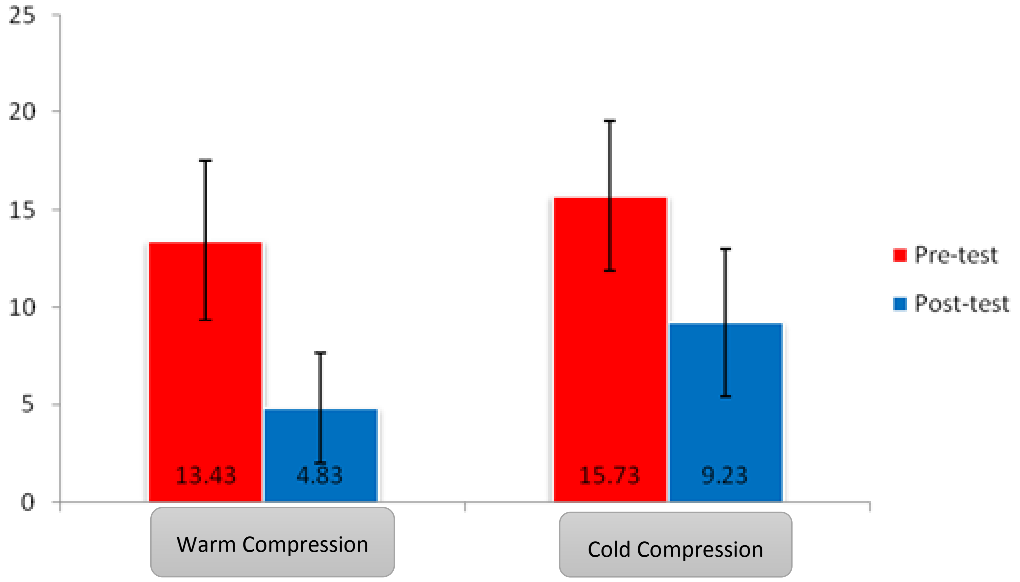

Figure 1: Comparison of pre and post-test mean levels of dry eye syndrome between Group I (warm compression) and Group II (cold compression).

Section D: Association between the pre-test level of dry eye syndrome among clients with selected demographic variables

In Table 3 age emerged as a significant factor influencing dry eye symptoms ($p < 0.05$). Notably, the pre-test level of dry eye symptoms varied significantly across different age groups. Clients in the 25-35 age range exhibited a notably lower mean pre-test level of dry eye symptoms (11.64) compared to those in the 55 and above age group, who had a higher mean level (17.75). Secondly, gender was found to be significantly associated with the pre-test level of dry eye symptoms ($p < 0.05$). Male clients had a mean pre-test level of 13.71, whereas female clients had a higher mean level of 15.8, indicating a notable gender-based difference in dry eye symptom severity. Regarding hobbies, there was a marginally significant association with the pre-test level of dry eye symptoms ($p < 0.10$). Although the p-value did not reach conventional significance levels, it is still worth mentioning. We observed some variation in the pre-test level of dry eye symptoms among clients with different hobbies, such as TV viewing, reading books, listening to music, and gardening. However, no significant associations were found between pre-test dry eye symptoms and other demographic variables, including religion, occupation, income, habits of smoking, habits of alcoholism, and types of gadgets.

Table 2: Association between the pre-test level of dry eye syndrome among clients with selected demographic variables.

S. No	Demographic Variables	No of Clients	Pre-test level of Dry Eye			Chi-Square Value	P Value
			Mean	Median	SD		

1	Age	25 - 35	14	11.64	11	2.21	18.149	0.0004*
		35 - 45	14	16	16	4.71		
		45 - 55	20	15	15	3.97		
		55 and above	12	17	17	2.3		
2	Sex	Male	35	13.71	14	4	18.149	0.0004*
		Female	25	15.8	16	4		
3	Hobbies	TV	38	14.08	14.5	4.33	3.76	0.0525*
		Books	3	15	17	4.36		
		Music	7	13.71	15	1.98		
		Gardening	12	16.58	16	3.99		

6. Discussion

In this study, we aimed to evaluate the effectiveness of warm compress versus cold compress on clients with dry eye syndrome in Puducherry. The first objective was to assess the level of dry eye syndrome among the clients. Before the intervention, most clients in both groups had mild-stage symptoms, with a few experiencing moderate-stage symptoms. After the warm compress intervention, the majority of clients in Group I showed no symptoms, while a small percentage had mild-stage symptoms. In Group II (cold compress), most clients still had mild-stage symptoms, with a few reporting no dry eye symptoms. This indicates that both warm and cold compressions were effective in reducing dry eye symptoms. The second objective was to evaluate the effectiveness of warm compress and cold compress during the post-test. The pre-test mean value for Group I was 13.43, which significantly decreased to 4.83 after warm compression ($p < 0.001$). Similarly, for Group II, the pre-test mean value was 15.73, which decreased to 9.23 after cold compression ($p < 0.001$). Both warm and cold compressions were highly effective in reducing dry eye symptoms. The third objective was to compare the effectiveness of warm compression versus cold compression. The post-test mean value for Group I (warm compression) was significantly lower than that of Group II (cold compression), indicating that warm compression was more effective in reducing dry eye syndrome. A similar study in Chandigarh among elderly clients also found warm compress to be effective in relieving dry eye symptoms and increasing tear levels. Warm compress improved tear secretion and reduced tear evaporation. The findings align with our study, supporting the effectiveness of warm compress for dry eye syndrome. The fourth objective aimed to find associations between dry eye syndrome levels and selected demographic variables. Chi-square tests revealed a significant association between dry eye syndrome and age, gender, and hobbies. However, no significant associations were found with religion, occupation, income, habits, or types of gadgets. These findings provide valuable insights into the demographic factors influencing dry eye syndrome.

7. Limitations & Recommendations

The study period was restricted to only one week. A longer study duration might have provided more comprehensive insights into the effectiveness of warm compress in reducing dry eye symptoms over an extended period. The sample size was limited to 60 participants, with 30 in the experimental group and 30 in the control group. A larger sample size would enhance the statistical power and improve the generalizability of the results to a broader population. The study population was restricted to individuals attending the Ophthalmic OPD in MGMCRI and nearby bank employees. As such, the findings may not be applicable to other populations or settings, limiting the external validity of the study. Further studies should be conducted to explore the effectiveness of different complementary and alternative modalities in managing dry eye syndrome. Investigating additional treatment approaches can contribute to a more comprehensive and tailored approach to ophthalmic care. Conducting comparative studies to evaluate the effectiveness of warm and cold compression techniques can provide valuable insights into their relative benefits for managing dry eye symptoms. Comparing these modalities may aid in optimizing treatment recommendations.

8. Conclusion

In conclusion, warm and cold compressions both proved effective in reducing dry eye symptoms. Warm compression showed greater effectiveness compared to cold compression. The study contributes to the understanding of non-invasive interventions for managing dry eye syndrome, offering potential benefits to clients in Puducherry and beyond. Further research in this area could help refine treatment approaches and improve the quality of life for individuals with dry eye syndrome.

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