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EXPLORING THE TRADITIONAL THERAPY FOR CATARACT BASED ON THE MALAY MEDICAL MANUSCRIPT: A SCOPING REVIEW

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ABSTRACT:

In the ancient medical manuscripts, there were many medical remedies and ingredients used to treat certain diseases. However, the presence of *materia medica* in medical manuscripts to treat cataract is still intriguing and has not been fully explored. This review aims to identify the most common material medica and its formulation in treating cataract in the Malay medical manuscript as well as to identify its published scientific support.

Method: This study involves a qualitative descriptive analysis on Malay Medical Manuscripts and articles of scientific journals to obtain data, based on a scoping review.

Results: The common *materia medica* in cataract treatment stated in the Malay Medical Manuscripts are citrus and biles. The frequency of both ingredients being mentioned in the manuscripts are 3 times each across 6 Malay Medical Manuscripts, which contain 10 formulations on cataract.

Conclusion: The commonly mentioned material medica in the manuscript such as citrus and biles may become a potential material for further scientific investigation in treating cataract.

KEYWORDS: *Cataract, Malay Medical manuscripts, Citrus, Biles.*

1. INTRODUCTION

Manuscript is an old book or handwritten document on various topics in the times before printing was invented to record the findings, lifestyle and historical events then. Manuscripts are also proof of the achievements of one civilization. Malay manuscripts are proof of the achievements of Malay civilization and one important document to be explored is the Malay Medical Manuscripts (MMM).

According to the World Health Organization (2021), cataract is one of the leading causes of vision impairment and blindness with 94 million people diagnosed globally. Mohamad Aziz Salowi et al. (2015) mentioned that cataract is one of the leading causes of blindness in Malaysia with 39% in prevalence. Chew et al. in 2018 suggested that the percentage of getting blind due to untreated cataract in Malaysians who are more than 50 years old is 58.6%.

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As specified by the World Health Organization (2022), cataract is a clouding of the lens of the eye that normally affects vision and commonly causes blindness and visual impairment. The current sole treatment for this condition involves surgery where the cataractous lens is removed and replaced with an artificial intraocular lens. However, not all cataract patients are suitable to undergo such surgical procedure especially those with high risk of post-surgery complication such as pseudoexfoliation in Somalia and India, onchocerciasis in Sudan, and angle-closure glaucoma in Asia (Gogate & Wood 2008). Furthermore, there is no alternative or non-surgical treatment provided for treating cataract at present. Hence, the objective for this review is to identify the commonly stated *materia medica* in treating cataract from MMM and also to identify the published scientific proof to support the usage of the said material medica in treating cataract through scoping review.

2. MATERIALS AND METHODS

Qualitative descriptive analysis was employed as a study design with comparative analysis conducted through scoping review. Scoping review is a method used to synthesize research evidence and categorize existing literature in a certain field in terms of its nature, features, and other categories.

Selection of Malay Medical Manuscript for data extraction

The selection of the manuscript was based on its readability, physical condition, and completeness. Readability refers to the handwriting and condition of ink which indicates whether the text is readable. Physical condition refers to the manuscript's physical state in which a frail manuscript may not be included. Completeness refers to the continuation of the text from a page to a page that ensures the pages' correct order with no missing text. Based on the above-mentioned criteria, *jawi* written "Kitab Tib. MS 747", MSS 3136 and "*Pelbagai Azimat dan Perubatan 58 Hal Lengkap*", were selected. In addition, translated books on the MMM by Mohd Affendi Mohd Shafri namely "*Kitab Perubatan Melayu Sari Segala Ubat: Tabib Dirajja Kesultanan Pontianak*", "*Kitab Perubatan Melayu Al-Rahmah Fi Al-Tibb Wa Al-Hikmah: Abbas Kuta Karang Aceh Dar Al-Salam*" and "*Kitab Perubatan Melayu Tayyib Al-Ihsan Fi Tibb Al-Insan Pembukaan Mata Hati pada Bicara Mengubati: Wan Ahmad Ibn Wan Muhammad Zayn Al-Fatani*" were also chosen.

The word "*Fasal ini*", indicates different chapters and diseases in the manuscript. The phrase "*Sebagailagi*" represents other formulations for the same disease. Therefore, the formulation mentioned in the manuscript was extracted, tabulated, and numbered using the Fx format. The F refers to the formulation while x refers to the number of the formulation (depicted in the table of results). The common ingredients were chosen based on the frequency of the ingredient being mentioned in the manuscripts.

Comparative analysis through scoping review

After the extraction of data, each plant, animal, and mineral scientific name was identified through the Google search engine. The comparative analysis was accomplished by using Google Scholar, PubMed, ResearchGate, and ScienceDirect where the keywords including "plant scientific name", "animal scientific name", “mineral scientific name”, "cataract" and "eye" were used to identify the relevant articles. The resulting articles were screened by their title at first and then by their abstract, before being further analysed, regardless of the types of studies and not excluding ethnopharmacology study or an empirical experiment, as long as the articles were related to the mentioned ingredients as a treatment of cataracts.

2.1. RESULT

Data extraction

Based on the MMM, the most common ingredients to treat cataracts are citrus and biles. Five thousand articles were displayed by the search engine using the respective keywords. However only 5 of them studied the relation between citrus and cataract and hence chosen to be discussed in this review. While for bile, only one research relates it to cataracts. There are 10 formulations with 29 ingredients mentioned across six MMM for the treatment of cataracts. There are a total of ten formulations identified, with one single formulation and 9 compounded formulations from the Malay medical manuscript.

1. Translation of the formulations

Table 1 Translation of the formulations.

Formula	How to use	References
F1	Take fruits of moringa, roots of *keremak* and the rhizome of turmeric. Burn the items on a piece of dulled machete and mix with nutmeg and key lime juice. Rub on the eyelid, and let it seep into the eye bit by bit. *Ambil buah kelor, akar keremak, ibu kunyit bakar bersama parang puting kemudian diasah dengan buah pala dan air limau dan sapukan kepada mata biar masuk sedikit demi sedikit ke dalam mata.*	Mohd Shafri (2021)

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Formula	**How to use**	**References**
F2	Peeled the Buffalo eye citron and cut it into three pieces and mixed it with three pieces of coarse salt. The mixture is boiled and left overnight outside. The mixture is to be used as eyewash in the morning. *Sebagai lagi ubat mata kabur ambil limau kerbau kupas kulitnya belah tiga bubuh garam tiga buku maka rebus setelah masak maka embunkan kemudian pagi-pagi basuhkan pada mata biar masuk pada mata itu sedikit jika berselaput sekalipun baik juga, insyā Allāh Ta'ālā mujarāb.*	Mohd Shafri (2021)
F3	To make the eyeliner: mix the *tutiya* that has been broken into pieces with the juice from kaffir lime and a quarter of piper. After that, blend everything with "*pheut* kakap". Apply it as eyeliner or blow it into the eye. Stop applying the medication if pain occurs for two to three nights until the pain goes away. Then, continue using it as eyeliner. *Diperbuat celak ini: diambil tutiya dipecah-pecah akan dia dengan air buah limo yakni buah mentul dan satu rubu dirham lada. Setelah itu maka dipipis semuanya dengan pheut kakap, kemudian maka dibubuh akan celak atau dihambur pada matanya. Dan apabila hasil daripadanya sakit atau bertikam-tikam yang sangat dalam dua mata, maka hendaklah dinanti jangan dibubuhi akan dia sekira-kira qadar dua malam atau tiga malam hilang sakitnya. Setelah itu maka diulangi pakai bercelak dengan dia hingga sembuh, in shaa Allah Taala.*	Mohd Shafri, and Muhammad Yahya (2017)

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Formula	**How to use**	**References**
F4	Fill in the goat's bile with seven white pepper seeds, then neatly tied and placed at the center of the house ridge for seven days. One white pepper seed is to be crushed with water and used as an eyedrop. This is to be performed one seed per day, both morning and evening, and shower with it twice a day until day seven. *Masukkan 7 butir lada sulah ke dalam hempedu kambing kemudian gantung pada tulang bumbungan rumah sampai 7 hari kemudian lumatkan lada sulah dan tambahkan sedikit air kemudian titikkan pada mata. Apabila sampai tujuh hari ambil lada sulah itu sebutir pirik lumat-lumat beri air sedikit maka titikkan pada mata itu pagi dan petang sebutir sehari dan mandinya dua kali sehari hingga tujuh hari mujarāb.*	Mohd Shafri (2021)
F5	Pound *lu'lu* or *aqiq* stone. Use it as eyeliner every morning and evening 5 days in a row or use *misk* or *kulit gewang* that has been "grilled" and pounded then use it as eyeliner or use rooster blood or its biles that are put in the eyeliner case that is made of silver or with *qatuna* seed that is finely pounded for one dirham then mixed it with one dirham of sukkar or quince seeds and peeled cotton seed and finely pound the sukkar stone and mixed it altogether or with *anzarut* for children's eyes. Use it as eyeliner. *Apabila dicelakkan mata itu dengan lu'lu yang ditumbuk atau; dengan batu 'aqiq yang ditumbuk, dicelak pada tiap-tiap pagi dan tiap-tiap petang lima kali di dalam lima hari berturut-turut atau; dengan misk atau; dengan kulit gewang yang dibakar dan ditumbuk, dicelak dengan dia padahal ia panas beberapa kali atau; dengan darah ayam jantan beberapa atau; hempedunya yang dibubuh di dalam bekas pencelak daripada perak atau' dengan biji qatuna iaitu biji aling lengkuk yang ditumbuk halus-halus satu dirham dan dicampur dengan sukkar satu dirham; atau dengan biji*	Mohd Shafri (2019)

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Formula	**How to use**	**References**
	safarjal; dan biji kapas yang dikobek kulit keduanya dan sukkar batu ditumbuk sekaliannya halus-halus dan dicampur dan dicelak dengan dia dan ini mujarab sahih atau; dengan anzarut pada mata kanak-kanak yang tumbuh nescaya memberi manfaat sekaliannya itu	
F6	Take kulit lawang and chew. Take a thin piece of cloth and patch it on the eyelids. Blow the chewed kulit lawang from outside with one full blow. Repeat the steps until the cataract is gone. *Maka ambil kulit lawang, mamah, ambil kain yang nipis, maka tampalkan pada kelopak mata. Maka hembus dari luar dengan kulit lawang yang dimamah itu sehabisnya nafas kita sehingga hilanglah maka berhenti. InsyaAllah ta'ala 'afiyat olehNya.*	Nadzirin (2021)
F7	Take a fistful of "kayu kelumpang" root about the size and length of a finger. Then, take white incense, keep in mouth, and blow the kayu kelumpung root to the affected eyes for seven days. When the eye clouding becomes thinner, do not stop until it vanishes. *Sebagailagi ubat mata bular maka ambil akar kayu kelumpang kira-kira besar jari dan panjang segenggam. Maka ambil kemenyan putih, kulum kemenyan, maka hembus akar kelumpang itu kepada bular mata itu barang tujuh hari. Apabila ada nipis sedikit, jangan khali sehingga hilanglah, maka sudah. InsyaAllah ta'ala.*	MSS 3136 (no date). [Kitab Tib]. Pusat Kebangsaan Manuskrip Melayu (MSS 3136). Perpustakaan Negara Malaysia, Malaysia.
F8	Take dill and false daisy, and blend them with milk from a breastfeeding woman with a child that has not grown teeth yet. Then squeeze it into the affected eyes. *Atau ambil adas manis dan bunga urang-aring yang gugur, maka pipis. Airnya air susu kanak-kanak yang belum tumbuh gigi. Maka perahkan pada mata itu. InsyaAllah ta'ala 'afiyat olehNya.*	Nadzirin (2021)

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Formula	**How to use**	**References**
F9	This is the remedy for cataracts. Take aloe vera, peel off the skin, then slice into seven parts. Wash seven times, seven more slices, then wash them and pour water together with a bit of alum. Put it on the affected eyes. Do not hope for a speedy recovery and do not give up. InsyaAllah will be granted recovery. *Sebagailagi ubat bular. Bahawa ambil lidah buaya, maka kupas buang kulitnya, kemudian hiris tujuh hiris, maka basuh 7 kali lagi, 7 hiris 7 kali lagi, dibasuh kemudian bubuh air pula, maka bubuh tawas sedikit kepada mata yang tumbuh itu dan jangan menghendak segeranya hilang hingga jangan jemu daripada berubat. InsyaAllah ta'ala 'afiyat olehNya.*	Nadzirin (2021)
F10	Take the skin of a young chelated banana, used it as eyedrop. After that, take "pegaga kelusak" leaves also used it as eyedrop. *Ambil kulit pisang kelat yang muda titikkan pada mata itu setelah sudah maka ambil daun pegaga kelusak perahkan pada mata itu pula akan penawarnya sebagai lagi hikmah akannya.*	MS 747 (no date). [Kitab Tib]. Pusat Kebangsaan Manuskrip Melayu (MS 747). Perpustakaan Negara Malaysia, Malaysia.

2. Comparative analysis

Out of the plant-based, animal-based and mineral-based ingredients mentioned in the formulations for cataract, only four material medica have scientific evidence related to cataract, namely *Moringa oleifera, Curcuma domestica Loir*, *Citrus hystrix* and *Lates calcifier*. Each ingredient was further analysed in comparison with contemporary studies.

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Table 2 List of ingredients for the most common ingredients and their pharmacological actions found in contemporary studies that are related to cataract.

Disease	Formulation number	Ingredients			Type of study	References
		Vernacular name	Part	Scientific name		
Cataract	F1	*Kelor* (Moringa)	Fruit	*Moringa oleifera*	Used to delay hydrogen peroxide induced cataract formation (in vitro) Used for anticataract in glucose induced cataract.	Qi et. al (2019) Kurmi et. al (2014)
		Keremak (Morning glory)	Roots	*Ipomea digitata*	No evidence	-
		Kunyit (Turmeric)	Rhizome	*Curcuma domestica Loir*	Therapeutic potential of curcumin in eye diseases (Review)	Radomska-Leśniewska et. al (2019)
		Buah pala (Nutmeg)	Fruits	*Myristica fragrans*	No evidence	-
		Limau nipis (Key lime)	Juice	*Citrus aurantifolia*	No evidence	-
	F2	*Limau kerbau* (Buffalo eye citron)	Fruit	*Citrus medica*	No evidence	-

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Disease	Formulation number	Ingredients			Type of study	References
		Vernacular name	Part	Scientific name		
		Garam (Salt)	-	*Sodium chloride*	No evidence	-
	F3	*Tutiya*	-	*Copper sulphate*	No evidence	-
		Buah limo/ limau purut (Kaffir lime)	Juice	*Citrus hystrix*	Used as antidiabetic, and anti-cataract (in vivo)	Umran et. al (2020)
		Lada - cannot be identified as the authors did not mention the specific type of "lada".	Fruit	*Piper*	No evidence	-
		Ikan kakap (Snapper)	Biles	*Lates calcifier*	Therapeutic uses of animal biles in treating various eye diseases (Review)	Wang and Carey (2014)
	F4	*Kambing* (Goat)	Biles	*Lates Capra aegagrus hircus*	No evidence	-

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Disease	Formulation number	Ingredients			Type of study	References
		Vernacular name	Part	Scientific name		
		Lada sulah (White pepper)	Fruit	*Piper nigrum*	No evidence	-
	F5	*lu'lu* (Pearl)	-	-	No evidence	-
		Batu aqiq (Quartz)	-	*Silicon dioxide*	No evidence	-
		Misk (cannot be identified)	-	-	No evidence	-
		Kulit gewang/ siput Mutiara) (Pearl oysters)	Shells	*Pinctada maxima*	No evidence	-
		Ayam jantan (Rooster)	Blood	*Gallus gallus*	No evidence	-
		Ayam jantan (Rooster)	Biles	*Gallus gallus*	No evidence	-
		Qatuna	Seed	*Plantago ovata*	No evidence	-
		Safarjal (Quince)	Seed	*Cydonia oblonga*	No evidence	-

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Disease	Formulation number	Ingredients			Type of study	References
		Vernacular name	Part	Scientific name		
		Kapas (Cotton)	Seed	*Gossypium hirsutum*	No evidence	-
		Anzarut		*Astragalus sarcocolla*	No evidence	-

3. DISCUSSION

Based on the MMM, there are several ingredients that have been used to treat cataract with citrus and biles as two most commonly mentioned. Only six MMM were available when this review was conducted. Due to this limitation, citrus and biles that are repeated three times each in the MMM become the most common ingredients mentioned in the respective manuscripts. There are three types of citrus that have been mentioned which are *Citrus aurantifolia*, *Citrus medica*, and *Citrus hystrix*. Citrus fruits have long been valued as part of a nutritious diet which is a rich source of nutrients that contains higher amounts of vitamin C, citric acid, minerals, and flavonoids (Baghurst, 2003). According to Turner and Burr (2003), "Citrus fruits contain a variety of vitamins, minerals, fibre, and phytochemicals such as carotenoids, flavonoids, and limonoids, which appear to have biological activities and health benefits."

Kulkarni et. al (2017) suggested that the ethanolic extract from orange peel possessed antioxidant and anticataract activity due to the presence of flavonoids. The scientific name of an orange is *Citrus aurantium.* The study was conducted by incubating the isolated goat lenses in artificial aqueous humor and divided into four experimental groups. The photographic evaluation was done to measure the incubation lens opacity. The authors found that there was significant inhibition of cataractogenesis of the lens with the presence of orange peel extract. This study suggested that the ethanol extract of orange peel possesses anticataract activity.

A study by Nakazawa et. al (2019) showed that an extract of α-glucosyl hesperidin from citrus plant significantly reduced the severity of selenite-induced cataracts in a rat. Hesperidin is a natural flavonoid with powerful antioxidant properties. In this experiment, the α-glucosyl hesperidin was dissolved in the phosphate-buffered saline and later fed to the rats via a feeding tube. The authors believed that oral consumption of α-glucosyl hesperidin was able to delay the onset of selenite-induced cataracts as the hesperidin could significantly reduce the number of cells undergoing apoptosis in the lens epithelial cells. Furthermore, hesperidin-standardized *Citrus hystrix* leaf flavonoids-rich extract (CLE) had also shown a significant reduction in diabetic cataract development (Umran et. al 2020).

According to Kaur et. al (2017), a diet rich in antioxidants, Aldose Reductase Inhibitors, antiglycation agents, and inhibitors of lens epithelial cell apoptosis can prevent the formation

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of cataracts. Citrus is one of the fruits that contain all the dietary phytochemicals that have been mentioned. From this literature review, the authors believed that oral administration of citrate has the potential to delay the development of cataracts.

The Blue Mountains Eye Study (BMES) by Tan et. al (2008) suggested that the higher intakes of antioxidants such as vitamin C or the combined intake of antioxidants such as vitamins C and E, beta-carotene, and zinc had long-term protective associations against the development of nuclear cataract in the older population. BMES is a population-based cohort study of vision, common eye, and systemic conditions in a population aged 49 years old and above. After 5 and 10 years, the surviving participants attended follow-up examinations to answer questionnaires regarding self-administered food frequency and have detailed eye examinations including retinal and lens photography to collect medical and demographic history.

The next common material medica that has been mentioned in the MMM is biles. There are three types of animal biles which are fish bile, goat bile, and chicken bile. According to Wang and Carey (2014), biles contain bile acids, bile pigments such as bilirubin and biliverdin, cholesterol, proteins, and also antioxidants such as bilirubin, glutathione, vitamin E, and melatonin. From their research of Chinese *materia medica*, it is reported that fish bile is effective to treat cataracts. The author also mentioned that the patient will take the medication in the form of pills. Specifically, the mentioned fish in the Chinese *materia medica* is the black carp fish. Modern research on animal biles for the treatment of cataracts is still limited. Only one article is found that relates biles to the treatment of cataracts.

There are dissimilarities between the traditional and contemporary suggested cataract treatment. Generally, the formulations in MMM involve more than a single ingredient whereas the contemporary formulation requires only a single ingredient. Therefore, the extraction methods are different. Due to current advances in technology, researchers can conduct experiments on one single ingredient and even focus on only one single molecule extraction, which allows the researchers to focus on the effect and benefits of a specific ingredient. In contrast, during ancient times, researchers were experimenting with many ingredients to determine the best formulation for the best result. Route of medication is also different between them where the MMM mostly suggested for topical application and not orally as mostly suggested in the contemporary medication, since oral consumption has the most effective effect on the improvement. Nevertheless, oranges, *Citrus aurantifolia* and other types of citruses do share similar phytochemical between them and the most important one for cataracts is named flavonoid.

4. CONCLUSION

At present, there is no article mentioning the side effects of citrus and biles as a treatment for cataracts. In this modern era, it is highly recommended for scientists to conduct more research on these two ingredients, especially clinical trials on humans to identify the effectiveness of these ingredients on cataract treatment.

The aim of this review is to identify the common material medica and its formulation in treating cataract in the MMM as well as to identify its published scientific support. Perhaps

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the pharmacological aspects would be further investigated in subsequent studies. The findings from this study may become the first important step in identifying and recognizing natural resources in treating cataracts.

There are still no other options for the treatment of cataracts apart from surgery. Based on the MMM, the most common ingredients to treat cataracts are citrus and biles. Out of 5000 papers related with citrus and cataracts, only five papers were chosen to be discussed in this review. While for bile, only one research relates it to cataracts. There are 10 formulations with 29 ingredients mentioned across six MMM for the treatment of cataracts. Continuous studies are highly recommended to investigate the effectiveness of these two ingredients in non-surgical cataract treatment.

REFERENCES

Baghurst, K. (2003). The health benefits of citrus fruits. Horticulture Australia.

Bujarborua, D. (2015). Ophthalmology in ancient india, Sushruta's time and the modern era. Eye News, 22(2).

Chan, E., Mahroo, O. A., & Spalton, D. J. (2010). Complications of cataract surgery. Clinical and Experimental Optometry, 93(6), 379-389.

Kamarudin, S. P. (2016). *Minimally Invasive Surgery for Congenital Cataract*. Congenital Cataract.

Kaur, A., Gupta, V., Christopher, A. F., Malik, M. A., & Bansal, P. (2017). Nutraceuticals in prevention of cataract–An evidence based approach. Saudi Journal of Ophthalmology, 31(1), 30-37.

Kulkarni, A. S., Nimbalkar, V. V., Zameeruddin, M., Khan, H. N., Bundel, S. S., & Thoke, S. T. (2017). Investigation of Orange Peel Ethanolic Extract as an Anticataract Agent. World journal of Pharmacy and Pharmaceutical Science, 7(2), 1025-1033.

Kurmi, R., Ganeshpurkar, A., Bansal, D., Agnihotri, A., & Dubey, N. (2014). Ethanol extract of Moringa oliefera prevents in vitro glucose induced cataract on isolated goat eye lens. Indian journal of ophthalmology, 62(2), 154.

Malay Medical Manuscripts: Heritage from the Garden of Healing (pp.19-33). Publisher: Akademi *Jawi* Malaysia and The Islamic Manuscript AssociationEditors: Mohd. Affendi Mohd. Shafri, Intan Azura Shahdan.

Mohd Shafri, M. A. (2019). Kitab Perubatan Melayu Sari Segala Ubat Tabib Diraja Kesultanan Pontianak. Akademi *Jawi* Malaysia.

Mohd Shafri, M. A., and Muhammad Yahya, H. (2017). Kitab Perubatan Melayu Al-Rahmah Fi al-Tibb Wa A-l-Hikmah: Abbas Kuta Karang Aceh Dar Al-Salam. Akademi *Jawi* Malaysia.

Mohd Shafri, M. A. (2018). Kitab Perubatan Melayu Tayyib Al-Ihsan Fi Tibb Al-Insan: Pembukaan Mata Hati pada Bicara Mengubati Wan Ahmad Ibn Muhammad Zayn Al-Fatani (2nd ed.). Akademi *Jawi* Malaysia dengan kerjsama Khazanah Fathaniyah.

Mohd Shafri, M. A. (2021). Treatments of Eye Diseases in Malay Medical Manuscript Ramuan Obat EAP153/9/4. Journal of Al-Tamaddun, 16(1), 27-45.

MSS 3136 (no date). [Kitab Tib]. Pusat Kebangsaan Manuskrip Melayu (MSS 3136). Perpustakaan Negara Malaysia, Malaysia.

MS 747 (no date). [Kitab Tib]. Pusat Kebangsaan Manuskrip Melayu (MS 747). Perpustakaan Negara Malaysia, Malaysia.

Nadzirin, I. A. (2021). Analysis of Malay Medical Manuscript MSS 3136 and Remedies for Eye-Related Diseases. *International Journal of Allied Health Sciences*, *5*(5), 2407-2415.

Nakazawa, Y., Aoki, M., Ishiwa, S., Morishita, N., Endo, S., Nagai, N., ... & Tamura, H. (2020). Oral intake of α-glucosyl-hesperidin ameliorates selenite-induced cataract formation. Molecular Medicine Reports, 21(3), 1258-1266.

O'Brien, K. K., Colquhoun, H., Levac, D., Baxter, L., Tricco, A. C., Straus, S., ... & O'Malley, L. (2016). Advancing scoping study methodology: a web-based survey and consultation of perceptions on terminology, definition and methodological steps. BMC health services research, 16(1), 1-12.

Qi, L., Zhou, Y., Li, W., Zheng, M., Zhong, R., Jin, X., & Lin, Y. (2019). Effect of Moringa oleifera stem extract on hydrogen peroxide-induced opacity of cultured mouse lens. *BMC complementary and alternative medicine*, *19*(1), 1-9.

Radomska-Leśniewska, D. M., Osiecka-Iwan, A., Hyc, A., Góźdź, A., Dąbrowska, A. M., & Skopiński, P. (2019). Therapeutic potential of curcumin in eye diseases. Central European Journal of Immunology, 44(2), 181-189.

Rosales, G. R. O. (2013). Medicinal uses of Melipona beecheii honey, by the ancient Maya. In Pot-Honey (pp. 229-240). Springer, New York, NY.

Salowi, M. A., Goh, P. P., Lee, M. Y., Adnan, T. H., & Ismail, M. (2015). The Malaysian Cataract Surgery Registry: profile of patients presenting for cataract surgery. The Asia-Pacific Journal of Ophthalmology, 4(4), 191-196.

Sheikh Abdul Hakim (1234H, Ramadhan). [Pelbagai Azimat dan Perubatan]. Pusat Kebangsaan Manuskrip Melayu (MSS 3084). Perpustakaan Negara Malaysia, Malaysia.

Tan, A. G., Mitchell, P., Flood, V. M., Burlutsky, G., Rochtchina, E., Cumming, R. G., & Wang, J. J. (2008). Antioxidant nutrient intake and the long-term incidence of age-related cataract: the Blue Mountains Eye Study. The American journal of clinical nutrition, 87(6), 1899-1905.

urner, T., & Burri, B. J. (2013). Potential nutritional benefits of current citrus consumption. Agriculture, 3(1), 170-187.

Umran, N. S. S., Mohamed, S., Lau, S. F., & Mohd Ishak, N. I. (2020). Citrus hystrix leaf extract attenuated diabetic-cataract in STZ-rats. *Journal of food biochemistry*, *44*(8), e13258.

https://doi.org/10.31436/ijiok.v1i1.3

Wang, D. Q., & Carey, M. C. (2014). Therapeutic uses of animal biles in traditional Chinese medicine: an ethnopharmacological, biophysical chemical and medicinal review. World journal of gastroenterology: WJG, 20(29), 9952.

World Health Organization. (2022). Cataract. World Health Organization. Retrieved from http://www.emro.who.int/health-topics/cataract/#:~:text=Cataract%20is%20a%20clouding%20of,is%20often%20related%20to%20ageing.