WORLD WIDE JOURNAL
OF MULTIDISCIPLINARY RESEARCH
AND DEVELOPMENT

Hom

ISSN: 2454-6615

WORLD WIDE JOURNAL OF MULTIDISCIPLINARY RESEARCH AND DEVELOPMENT

VOLUME 9 ISSUE 7

July 2023

Open

Editor-in-Chief

Prof.(Dr.) P. K. Upadhyay

drpku.2010@yahoo.com, dr.prempku@gmail.com, dean.agri@madhavuniversity.edu.in
M.Sc., Ph.D, FISGPB, FIBS, FSRDA, FSSR, FISGBRD & FSBSRD, Former Head Genetics and Plant Breeding RBS College (DrBRA University Agra) Presenty working as Professor & Dean College of Agriculture, Madhav University, Rajasthan, India

Associate Editors

Rahul Mishra

rahul.mishra@alliance.edu.in
Assistant Professor of Law, M.A(English Literature.),LL.B, (General Laws from HPU), LL.M (Corporate Laws with International Business from NALSAR), Course Co-ordinator, SWAYAM, Alliance University, Central Campus, Chandapura-Anekal Road,

Dr. Ogori Akama Friday

ogorifaraday@gmail.com
Faculty of Agriculture Department of Home science Federal University Gashua PMB1005, Gashua, Nigeria

Dr. Lakshmi Narayan Mishra

lakshminarayan.mishra@vit.ac.in, lakshminarayanmishra04@gmail.com
Dept of Mathematics, VIT University, Vellore, TN, India

Prof. Mohamed Ahmed Abdel fattah El-Esawi

elesawi2005@yahoo.com
Lecturer and researcher of Plant Genetics, Genomics and Molecular Biology at Botany Department, Faculty of Science, Tanta University, Tanta, Egypt.

Prof. Dr. Shiv Datt Sharma

shivdutt1957@gmail.com
Associate Professor, Head of Deptt of Hindi Govt. College Dhaliara Kangra, India

Asst. Prof. Dr. Vishnu Narayan Mishra

vnm@igntu.ac.in
B.Sc.(Gold Medalist),M.Sc. (Double Gold Medalist), Ph.D. (I.I.T. Roorkee), YSA, Associate Professor of Mathematics, Department of Mathematics, Indira Gandhi National Tribal University, Lalpur, Amarkantak, Anuppur, Madhya Pradesh 484 887, India

Prof. Dr. H. M. Srivastava

harimsri@math.uvic.ca
Professor Emeritus, Department of Mathematics and Statistics, University of Victoria, Victoria, British Columbia V8W 3R4,, Canada

Dr. Deepmala

deepmaladm23@gmail.com
Visiting Scientist, SQC & OR Unit, Indian Statistical Institute, Barrackpore, Kolkata, India

Asst. Prof. Ekachai Chukeatirote

ekachai@mfu.ac.th
Microbiology, school of Science, Mae Fah Luang University, Chiang Rai, Thailand

Prof. Ubaldo Comite

ubaldo.comite@libero.it
Professor of Budget and Business Organization at the Faculty of Economy, Department of Business Sciences, University of Calabria, Cosenza, Italy

Dr Pankaj Thakur

dr_pankajthakur@yahoo.com
Head Department of Mathematics, Associate Professor, Mathematics, IEC University Badii, Distt Solan, India

Dr. Pardeep Kr. Rana

pardeepkrana@yahoo.com
Assistant Professor, Department of Mathematics Moradabad Institute of Technology, Moradabad, Uttar Pradesh, India

Dr. Amit Sharma

drakshar ma5477@gmail.com
Assistant Professor, Department of Physics, Bharatividyapeeth's college of Engineering, New Delhi, India

Dr. Pramod Kumar Singh

drpksingh101@gmail.com
Professor & Head, P.G. Deptt. of English, S.P. Jain College, Sasaram Rohtas, Bihar, India

Dinesh Kumar

dineshkumarmat@gmail.com
Assistant Professor, Department of Mathematics, Dhanalakshmi Srinivasan Engineering College, Tamilnadu, India

Dr. Rabindra Kayastha

rkayastha8@hotmail.com
Associate Professor Department of Natural Sciences School of Science Kathmandu University Dhulikhel, Nepal

David Ackah

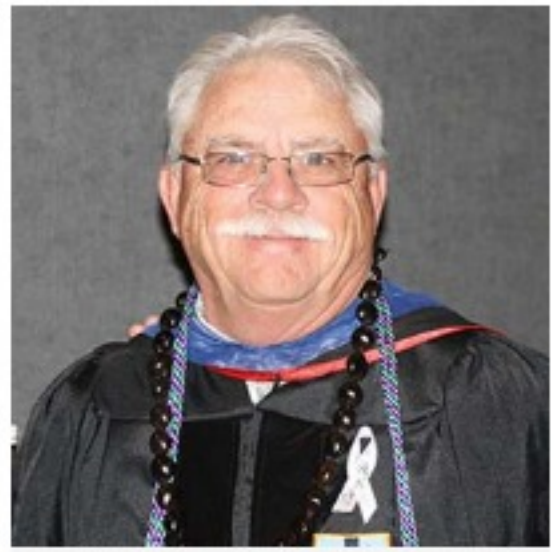
drdavidackah@gmail.com
(Ph.D. Candidate) (MSc./BSc/Dip - Economist) Lecturer - School of Business Golden Sunbeam University of Science & Technology, Ghana, West Africa

Gaurav Kumar Roy

gauravkxj62@gmail.com
Cyber Security, Computer Science, Research Scholar in Lovely Professional University, Phagwara, Punjab

Dr. A.C. Lal Kumar

lalkumareducation@gmail.com
M.Sc., M.A., M.A., M.Ed., M.Phil., Ph.D., D.Litt., Assistant Professor for M.Ed., G.E.T. B.Ed M.Ed College of Education, VS Puram Village, Paradarami Post, Gudiyattam Taluk,

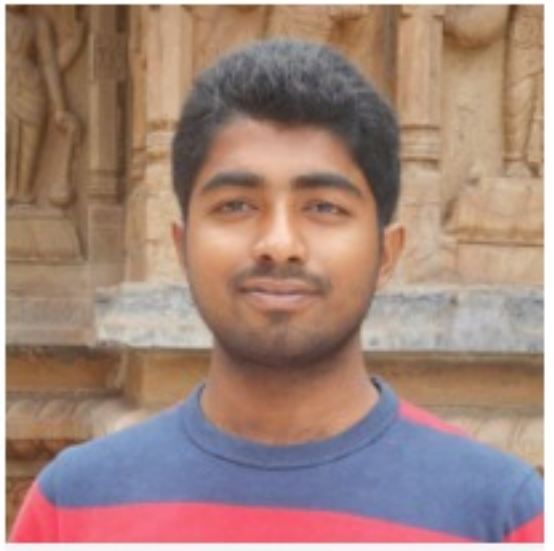


T. F. McLaughlin

tim.mclaughlin6@comcast.net
Professor, Department of Special Education, School of Education, Gonzaga University, Spokane, WA, USA

Dr.Gayathri Rajaraman

Gayathri_Rajaraman@yahoo.co.in
M.E.,M.B.A.,PhD (Electrical Engg)., Assistant Professor of ECE, Dept of Electrical Engineering, Annamalai University. Chidambaram



Dr.Harinath Palem

haributterfly.yvu@gmail.com
Senior Research Fellow Dept. of Zoology School of Life sciences Yogi Vemana University Kadapa - Andhra Pradesh, India

Dr. Fidèle Suanon

officielsuanon@yahoo.com
Faculty of Sciences and Techniques, Laboratory of Physical Chemistry, University of Abomey-Calavi, Republic of Benin

Dariusz Jacek Jakobczak

Dariusz.Jakobczak@tu.koszalin.pl
Assist. Prof., Ph.D. Department of Electronics and Computer Science, Koszalin University of Technology, Sniadeckich 2, 75-453 Koszalin, Poland

Rudrarup G

rudrarupgupta21@gmail.com
Commercial Manager of Multifarious Projects Group India and Overseas Editor/ Reviewer of American Institute of Science, USA

Dr. Manoranjan Tripathy

manoranjan.tripathy@dsvv.ac.in
(Assistant Professor) Department of Psychology Dev Sanskriti Vishwavidyalaya Haripur Kalan, Motichur Range Haridwar, Uttarakhand, India

Narendra Kumar Ahirwar

narendra87.ahirwar@gmail.com
(PhD, MSc, NET) Senior Researcher (Microbiology) Department of Biological Sciences Faculty of Science and Environment Mahatma Gandhi Chitrakoot Gramodaya Vishwavidhyalaya Chitrakoot, Satna, MP, India

Dr. Ho Soon Min

soonmin.ho@newinti.edu.my
(Ph. D, LMIC, MWRA, STRA) Professor at Centre for Green Chemistry and Applied Chemistry, INTI International University, Putra Nilai, Negeri Sembilan, Malaysia

Mahmoud Magdy Abbas

drmahmoudmagdy2013@yahoo.com
Plant Nutrition Dept.,National Research Centre,31 El Behoos Street, 12622 Dokki,Giza, Egypt

Dr. Osama Mohamed Anwar Nofal

nofalosama@hotmail.com
Professor in Plant Nutrition Dept., National Research Center, El-Tahrir St. Dokki, Giza, Egypt

Mr. K.Kumaravel

kumaravk@srmist.edu.in
Head, Department of French Faculty of Science and Humanities SRM Institute of Science and Technology Kattankulathur, Tamil Nadu, India

Dr. Shashank Tiwari

shashank6889@gmail.com
Director, JP College of Pharmacy & Nursing, Lucknow, Uttar Pradesh

Dr. Nalla Bala Kalyan

kalyankumar.n@svcolleges.edu.in, drnallabala@gmail.com
Associate Professor Department of Management Studies Sri Venkateswara College of Engineering Tirupati, Andhra Pradesh, India

Dr. Mothukuri Anjaiah

m.anjaiah@dravidianuniversity.ac.in, anjaiahlib@gmail.com
Assistant Professor, Political Science & Public administration, Library & Information Science Programmes, Methodology in Social Sciences, Conducted, University Central Library Dravidian University, Kuppam, Andhra Pradesh, India

Dr.S.Mohan

smohan@klu.ac.in, smoha001@gmail.com
Associate Professor of English, Kalasalingam Academy of Research and Education, (Deemed to beUniversity), Krishnankoil, Srivilliputhur, Virudhunagar (Dt), Pin-626 126. Tamilnadu, India.

Dr. J. Gajendra Nidu

profnaidugn@gmail.com
Head of the Department Faculty of Commerce & Business Administration, Gaborone University, Gaborone. Botswana, Gaborone, Botswana

Dr. M M Bagali

dr.mmbagali@gmail.com
Professor of Management and Human Resources Head, Department of Management, MBA program Acharya Institute Karnataka, India

Dr Selvakumar Kandaswamy

bennysgod@gmail.com
M.Sc., M.Phil., Ph.D., MBA (HM)., Clinical Biochemist, Research Scholar, Department of Endocrinology, University of Madras, Chennai, Tamil Nadu, India

Asmaa Shaker Ashoor Alzubaydi

asmaa@uobabylon.edu.iq
Computer Science, Security of Operating Systems, Iraqi Commission for Computers and Informatics, Networks Security, information technology, University of Babylon Iraq

Nargiza Ismatullayeva

ismatullayeva.nargiza@gmail.com
ismatullayeva.nargiza@yandex.ru
Department of Translation Studies and International Journalists, "Lacuna's Occurrence in Chinese and Uzbek Languages" Tashkent State University of Oriental Studies, Tashkent, Uzbekistan

Dr Meetkamal

meetk_dwi@yahoo.co.in
Associate professor Department of Chemistry Christ Church College, Kanpur(UP) , India

Dr. PATITA PABAN MOHANTY

patitamohanty@soa.ac.in
Assistant Professor School of Hotel Management Faculty of Hospitality and Tourism Management S O A (Deemed to be University) Odisha, India.

HERBERT D. VERTUCIO

tucio@yahoo.com
Philosophy in Educational Management Professor Lecturer 1 Arellano University, Philippines
Research Coordinator 2015-2017 Arellano University, Philippines

KOMAL TAHILIANI

komaltahiliani@yahoo.com, komaltahilianii1982@gmail.com
Associate Professor in Computer science Department Sagar Institute of Research and Technology, Bhopal, MP, India

Ignatius Nnaemeka Onwuatuegwu PhD

frig2014@gmail.com
Philosophy Department, Faculty of Arts, Nnamdi Azikiwe University Awka, Anambra state, Nigeria

Dr. Kandi Kamala

kamala.ranu@gmail.com
Asst. Professor Dept. of Political Science, M.A., Bed. NET, SET., Ph.D. Government Degree College for Women Autonomous Begumpet, (Affiliation) of Osmania University, Hyderabad, Telangana State, India

Dr. Kishore Mukhopadhyay

Kishore.km2007@gmail.com, principaluctc@rediffmail.com
Associate Professor in Physical Education, Union Christian Training College, Berhampore, Murshidabad, West Bengal, India

Dr. Gedam Kamalakar

kamalakarou@gmail.com
M.A, B.Ed., LLM, SET, PhD Dept. of Political Science, Osmania University, Hyderabad, Telangana, India.

Norfariza Ab Wahab

norfariza@utem.edu.my
PhD Senior Lecturer, Department of Manufacturing Engineering Technology, Faculty of Mechanical & Manufacturing Engineering Technology, Universiti Teknikal Malaysia.

Kaveh Ostad Ali Askari

ostadaliaskari.k@of.iut.ac.ir, kaveh.oaa2000@gmail.com
Ph.D, Civil Engineering, Research Assistant, Department of Water Engineering, College of Agriculture, Isfahan University of Technology (IUT), Isfahan, Iran.

Dr. Ambreen Safdar Kharbe

ambreenkharbe72@gmail.com, askharbe@nu.edu.sa
Ph.D. (English), M.A (English Literature), M.A (Applied Linguistics), MBA (HR & Marketing) Assistant Professor, College of Language and Translation, Najran University, Saudi Arabia (Indian, have recently joined - 18th February 2020 Najran University)

July 2023

World Wide Journal of Multidisciplinary Research and Development

Sr. No.	Title and Authors Name
1	**Suspected Waterborne Disease Outbreak Investigation in JNU in response to a Media Scanning Alert** **Ray Laskar A** Country : India Subject : Community Medicine View Details
2	**A Marca Pessoal Como Vantagem Competitiva No Mercado De Trabalho: Um Estudo Sobre a Realidade das Instituições De Ensino Superior Em Luanda** **Guiomar Hebo João Guilherme Zebedeu** Country : Angola Subject : Marketing and Advertising View Details
3	**The Treatment Period for Pediatric COVID-19 Patients is Reviewed from the Use of Antibiotics** **Irma Yanti Rangkuti** Country : Indonesia Subject : Pharmacology View Details
4	**Indicators for Management in Universities a comparative study of indicators in Korean and Brazilian universities** **Arole Joseph** Country : Philippines Subject :

5

The Modern Picture of the World

Leo Georgy Sapogin

Country : Russia

Subject : Physics

View Details

6

Issues and Challenges facing Islamic Universities: A Case Study of Nigeria

Yusuf Sani Abubakar

Country : Brunei

Subject : Shariah and Law

View Details

7

Determinant Sustainability Business Perspective of The Tri Hita Karana (THK) Concept for MSMEs in Bali

Ni Wayan Sitiari

Country : Indonesia

Subject : Economics and Business

View Details

8

Overcoming Academic Anxiety and Depression Using Yoga Prana Vidya Healing Protocols: A detailed case study

Leelavathi Nayak

Country : India

Subject :

View Details

9

Medical countermeasures for the COVID-19 pandemic management in India

Balaji More

Country : India

Subject : Pharmacology

View Details

10 **In-Vitro Evaluation of Anti- Alzheimer Activity of Alternanthera brasiliana Leaf Extract**

Riyama Shirin V. K

Country : India

Subject : Pharmacognosy and Phytochemistry

View Details

11 **A Influência da Marca Na Decisão De Compra: Um Estudo Sobre a Realidade Do Mercado Do 30 E A Rede De Lojas da Bricomat**

Marcelina Gomes da Silva Coimbra

Country : Angola

Subject :

View Details

12 **Marianne Wanjiru Mureithi, Kefa Okongo Bosire, Gracelyn Portia Anthony Doss, Antony Otinga Oteng'o**

Kemboi Willy

Country : Kenya

Subject : Medical Microbiology

View Details

13 **The Online Undergraduate Thesis Guidance during the Covid-19 Pandemic, Indonesia**

Ahmad Helman Hamdani

Country : Indonesia

Subject : Geology

View Details

14 **Dry eye disease and its risk factors in rural and urban areas in Indonesia**

Noviani Prasetyaningsih

Country : Indonesia

Subject : Medicine

View Details

15 **Prevalence of Dry Eye Syndrome and its Relationship with Blood Sugar (HbA1C) Levels in the Elderly**

Husnun Amalia

Country : Indonesia

Subject : Ophthalmology

View Details

16 **Trend of Foreign Direct investment in Nepal**

Thakur Digbijay Singh

Country : India

Subject :

View Details

17 **Effect of Electronic Payment System on Economic Growth in Nigeria**

SULEIMAN, Haruna

Country : Nigeria

Subject : Banking & Finance

View Details

18 **Library Collection, Facilities and Services of P P Savani University Library, Surat: A Survey**

Dr. Paresh Ilasariya

Country : India

Subject :

View Details

19 **The Pattern, Presentation and Outcomes of Surgical Management of Traumatic Acute Subdural Hematoma in Bauchi, Nigeria**

Olabisi Oluwagbemiga. Ogunleye

Country : Nigeria Subject : Surgery

View Details

20 **Oil Price Volatility and Sustainable Output Growth in Nigeria**

OLALERE, Sunday Shina

Country : Nigeria Subject : Economics

View Details

21 **Primary Burkitt's Lymphoma of The Stomach Presenting with Complete Dysphagia - Case Management**

Mannar Mannan

Country : India Subject :

View Details

WWJMRD 2023; 9(07): 00-00
www.wwjmrd.com
International Journal
Peer Reviewed Journal
Refereed Journal
Indexed Journal
Impact Factor SJIF 2017: 5.182 2018: 5.51, (ISI) 2020-2021: 1.361
E-ISSN: 2454-6615

Husnun Amalia
Department of Ophthalmology, Faculty of Medicine, Universitas Trisakti, Jakarta, Indonesia.

Anggraeni Adiwardhani
Department of Ophthalmology, Faculty of Medicine, Universitas Trisakti, Jakarta, Indonesia.

Ida Effendi
Department of Microbiology, Faculty of Medicine, Universitas Trisakti, Jakarta, Indonesia.

Nashita Amira Zaina, Farah Mufidah, Chikita Nur Mustika Rahmaditya,
Medical Study Program, Faculty of Medicine, Universitas Trisakti, Jakarta, Indonesia.

David Tjahyadi
Department of Histology, Faculty of Medicine, Universitas Trisakti, Jakarta, Indonesia.

Emad Yousif
Department of Chemistry, College of Science, Al-Nahrain University, Baghdad-Iraq.

Correspondence:
Husnun Amalia
Department of Ophthalmology, Faculty of Medicine, Universitas Trisakti, Jakarta, Indonesia.

Prevalence of Dry Eye Syndrome and its Relationship with Blood Sugar (HbA1C) Levels in the Elderly

Husnun Amalia, Anggraeni Adiwardhani, Ida Effendi, Nashita Amira Zaina, Farah Mufidah, Chikita Nur Mustika Rahmaditya, David Tjahyadi, Emad Yousif

Abstract
Dry eye syndrome (DES) is an eye disorder that occurs in the elderly and has a risk of decreased vision and interference with daily activities. Risk factors are age over 40 years, female sex and diabetes mellitus. Currently, the incidence of DES is very high in the elderly, and based on research, there is a relationship with diabetes mellitus. Hence, researchers are interested in research to assess the prevalence of DES, risk factors and its relationship with blood sugar levels (HbA1C). This study will determine the prevalence and risk factors that influence the incidence of DES and analyze the relationship between DES and HbA1C levels. The results of this study will likely be an effort to prevent the occurrence of dry eyes in people with risk factors. The study was carried out in a cross-sectional in three hospitals in Jakarta and Bekasi from March to April 2022. The study subjects consisted of 104 respondents with no history of Steven Johnson Syndrome (SSJ), Sjogren's Syndrome, or chronic disorders such as scars due to trauma to the conjunctiva or cornea, history of chemical burns and trauma to the eye area. Analysis was performed univariately and bivariate using the Chi-Square statistical test and Fisher's test with a significance value <0.05. The result is HbA1C levels did not show a significant relationship with DES (p=0,681). There was no significant relationship between DES risk factors, HbA1C levels and DES.

Keywords: Dry Eye Syndrome, DES, Risk factors, HbA1C.

1. Introduction

Dry eye syndrome (DES) or dry eye is a tear film disorder due to a lack of tears or excessive tear evaporation. This causes damage to the surface of the eye inter palpebra and is associated with symptoms such as eye discomfort.[1,2] Complaints from DES are in the form of a foreign body sensation in the eye; the eye feels dry, irritated, itchy, to blurred vision.[1,3] This condition will have a risk of decreasing visual function and interference with daily activities.[4] The prevalence of DES is influenced by age and gender.[3,5] Yazdani et al. found that most studies show that individuals over 40 have a higher risk than younger individuals.[5,6] Increasing a person's age causes changes in all organs, including the eyes. Decreased vision in older people will impact their quality of life and independence.[3,7]

Research in 2018 in India showed that age 63.25±6.95 is a risk factor for severe DES.[8] Syanti et al. conducted research in 15 countries in 2016-2017 and found the highest prevalence of DES at age>45 years.[9] So, there can be a decreased quality of life due to dry eyes, especially in older people.[7,10] Septivianti R. et al. reported that the incidence of dry eyes at the age of > 60 reached 26.2%.[11] The prevalence of DES was reported to be higher in women than in men.[1] The incidence of DES in women is around 1.33 to 1.74 times higher than in men.[5]

Dry eye syndrome is also influenced by systemic risk factors, namely diabetes mellitus (DM).[7,12] The reported prevalence of DES in DM sufferers is around 15-33% at the age of over 65 and increases with age. In DM sufferers, DES is 50% more common in women than men. The incidence of DES correlates with the level of glycated hemoglobin, the higher the level of glycated hemoglobin, the higher the incidence of DES.[5]

With the high incidence of DES in the elderly and associated with DM at this time, researchers are interested in research to assess the prevalence of DES and its relationship with age, sex and HbA1C levels.

2. Materials and methods

The research was carried out from September 2021-July 2022 in 3 hospitals in Jakarta and Bekasi, Indonesia. The research design was cross-sectional, with the sampling technique being consecutive non-random sampling. The number of samples in this study was 104 people, the inclusion criteria were age >40 years, and the exclusion criteria were a history of Steven Johnson syndrome, Sjogren's syndrome, chronic disorders such as scars due to trauma to the conjunctiva/cornea, eye area burns, chemical trauma to the eye area.

The research instrument was a questionnaire for demographic data and a DEQ5 questionnaire for establishing a diagnosis of DES. An ophthalmological examination was performed to exclude exclusion criteria. A laboratory examination was carried out to assess HbA1C levels. The data analysis method is presented in the table, and coding is then given to test the data normality of all variables using the Kolmogorov-Smirnov test. A parametric test will be used if the data is normally distributed, while a non-parametric test will be used if it is not normal. Data will be analyzed univariately and bivariate using the SPSS program with the Chi-Square test with a significance value <0.05.

Ethical Clearance was obtained from the Research Ethics Committee of the Faculty of Medicine, Universitas Trisakti, with number 033/KER/FK/III/2022.

3. Results & Discussion

Table 1: Characteristics of Respondents (n=104).

Variable	Frequency (n)	Percentage (%)
Gender		
Male	49	47,1
Female	55	52,9
Age		
< 65-year-old	63	60,6
≥ 65-year-old	41	39,4
DES		
Yes	40	38,5
No	64	61,5
HbA1C level		
Normal (<6 %)	24	23,1
Pre-Diabetes Mellitus (6-6,4 %)	12	11,5
Diabetes Mellitus (>6,4 %)	68	65,4

Characteristics of the respondents in this study were that the majority of respondents were women (52.9%), aged <65 years (52.9%). In this study, 61.5% of respondents did not suffer from DES, and 65.4% had HbA1C levels >6.4%, which was classified as a diagnosis of Diabetes Mellitus.

Table 2: The relationship of DES risk factor and DES.

Variable	*Dry Eye Syndrome*		p
	Yes (n (%))	No (n (%))	
Age			0,924*
<65-year-old	24 (38,1)	39 (61,9)	
≥65-year-old	16 (39,0)	25 (61,0)	
Gender			0,641*
Male	20 (40,8)	29 (59,2)	
Female	20 (36,4)	35 (63,6)	
HbA1C level			0,681*
Diabetes Mellitus (>6,4%)	9 (37,5)	15 (62,5)	
Pre DM (6,0-6,4%)	6 (50,0)	6 (50,0)	
Not DM (<6,4%)	25 (36,8)	43 (63,2)	

* Chi-square test

Based on the results of the study showed that high HbA1C levels showed that most were not diagnosed with DES (62.5%) and did not show a significant relationship between DES and HbA1C levels with a p-value = 0.681.

Age and DES

The incidence of DES in the elderly in this study reached 38.5%. This is a higher number when compared to research by Farrand et al. reaches 2%.[13] Morthen et al. reported the prevalence of DES at age > 50 years, namely 72% compared to age < 50, with a total of 78,165 respondents.[3] Rouen PA et al. states that the prevalence of DES at the age of 40 years reaches 75%.[14] Our study showed no significant results for the two age groups (p=0.924) because the division of the age groups was not based on the classification of young age. All respondents were aged > 40 years. In contrast to the study of Farrand et al. which had respondents from adolescents and classified them into two age groups, namely 18-49 and > 50 years.[13]

Syanti et al.[9] also found a significant relationship between age and DES (p=0.001). This is also because this study has respondents with a wide age range, namely 18-90 years and divides them into three age groups (18-25 years, 26-45 years, and > 45 years). This age grouping difference can

cause significant differences.

The incidence of DES according to age based on its pathophysiology will increase in prevalence with age with an odds ratio of 1.2x (1.1-1.3) at each additional ten years of age.[15] The prevalence of symptomatic dry eye is reported to increase progressively with age. The frequency of DES is 8.4% at ages <60 years, 15% at 70-79 years and 20% at ages>80 years. This can be caused because, in old age, the frequency of blinking decreases, the quality of the meibomian glands also decreases, involutional palpebral malposition, horizontal lid laxity, and eyelid malposition lead to corneal exposure, poor tear film distribution and abnormal tear outflow with induce joint eye dryness.[16]

Gender and DES

In our study, gender was not a risk factor for DES (p=0.641). A different thing was reported by Syanti et al.[9], which showed a significance level of p=0.001 with an odds ratio of 0.524. This difference could be because the study had a wide age range and a large number of samples and was carried out in a multi-centre manner in 15 countries, so it had excellent sample variations.

Stapleton F. et al.[15] also stated minimal and inconsistent relationships in gender relations with DES. At the age above 50, there is a relationship between the incidence of DES based on gender. With increasing age, women show a higher prevalence of DES. Whereas in men, an increased prevalence of meibomian gland dysfunction was found.

Malet F. et al.[17] also showed an association between DES diagnosis and female gender, as females have a 1.5 times higher risk of developing DES than males. This finding could be explained by the use of hormones for contraception or infertility in the younger women age group and the impact of these hormones on the female's lacrimal gland, goblet cell function, Meibom Gland and ocular surface sensitivity that may contribute to dry eye symptoms. In women in the older age group, lower levels of estrogens and androgens may lead to inadequate lacrimal gland secretion associated with aqueous deficient DES.[18]

The impact of gender on the development of DES varies across studies. Consistent with the current study, most studies reported that DES occurs more likely among females.[19]

HbA1C levels and DES

High HbA1C levels indicated that most were undiagnosed with DES (62.5%). This is different from the theory, which states that the incidence of dry eye correlates with the level of glycated hemoglobin, the higher the level of glycated hemoglobin, the higher the incidence of dry eye syndrome.[5] The prevalence of DES at HbA1C levels >6.4% is 8.6%. This result is lower than the study by Lukandy A. et al.[5], which stated that the prevalence reached 15-33%.

This study showed no relationship between DES obtained using the DEQ5 questionnaire and HbA1C levels with p=0.681. This is different from several studies that state a relationship between DES and Diabetes Mellitus. Goebbels stated a significant difference in the Schirmer examination in the diabetes mellitus group and without diabetes mellitus (p=0.001), and reflex tearing was demonstrated to be significantly decreased.[20] Moreover, their tear protein composition differs from that of healthy subjects. In long-lasting diabetes, damage to the lacrimal gland's microvasculature and autonomic neuropathy might impair lacrimation. Diabetic sensory neuropathy of the cornea can also play a role in decreased tear secretion.[21]

The results in our study were similar to those found in the study of Olanian SI et al.[22], which stated that there was no relationship between dry eye and HbA1C levels in people with diabetes in Nigeria (r=0.086, p=0.239). Control of HbA1C levels also affects dry eye; in our study, we did not evaluate this. So that it can lead to meaningless results in this study, we recommend that controlling HbA1C levels be assessed in future studies. Poor glycemic control is associated with microvascular complications of the lacrimal gland, impairs lacrimal gland function, causing dry eye among people with diabetes.[22]

The prevalence of dry eye in people with diabetes mellitus is 37.5%, which is not much different from research by Olaniyan SI et al.[22], who found a prevalence of 21.7% and Kaiserman et al.[21] 20.6%. The longer duration of diabetes mellitus has been documented to correlate with an increase in the prevalence of dry eye among patients (p=0.01).[23]

4. Conclusions

Our research showed there was no significant relationship between DES risk factors, HbA1C levels and DES. However, the prevalence of DES is higher in women and people with diabetes mellitus based on HbA1C measurements.

5. Acknowledgments

Thank you to Masmitra Bekasi Hospital, Rawa Lumbu Bekasi Hospital and Jakarta Mitra Afia Hospital who are willing to be the research site.

6. Funding

Universitas Trisakti

7. Conflict Of Interest

The authors declare no competing interests.

References

1. Legoh CGF, Setiono KW, Cahyaningsih E. Hubungan lama menderita diabetes dengan dry eye pada penderita diabetes melitus tipe ii di RSUD Prof. Dr. W. Z. Johannes kupang. Cendana medical journal 2019;18(3):364-70.
2. Clayton JA. Dry Eye. Longo DL, ed. N Engl J Med. 2018;378(23):2212-2223. doi:10.1056/NEJMra1407936.
3. Morthen MK, Magno MS, Utheim TP, et al. The physical and mental burden of dry eye disease: A large population-based study investigating the relationship with health-related quality of life and its determinants. Ocul Surf. 2021 Jul;21:107-117. doi: 10.1016/j.jtos.2021.05.006
4. Gomes JAP, Santo RM. The impact of dry eye disease treatment on patient satisfaction and quality of life: Review. The Ocular Surface 2019.;17(1): 9-19. doi :https://doi.org/10.1016/j.jtos.2018.11.003
5. Lukandy A, Albar MY. Prevalensi dry eye pada pasien Diabetes Melitus tipe 2 di RS Mata Mencirim 77 Kota Medan. Intisari Sains Medis 2020; 11(3):1193-7. DOI :10.15562/ism. v11i3.643
6. Yazdani M, Elgstøen KBP, Utheim TP. Eye Make-up Products and Dry Eye Disease: A Mini Review. Curr

Eye Res. 2022;47(1):1-11. doi: 10.1080/02713683.2021.1966476.
7. Rahmawati I, Dwiana D, Effendi, Reko. Hubungan katarak dengan tingkat kemandirian Lansia di Balai Pelayanan dan Penyantunan Lanjut Usia (BPPLU) Provinsi Bengkulu. Jurnal Ners Lentera 2020; 8(1). 17-24.
8. Shilpy N, Patel DB, Prevalence of dry eye disease in western India. IJMR. 2019;6(7):G10-12. DOI: http://dx.doi.org/10.21276/ijcmr.2019.6.7.37
9. Shanti Y, Shehada R, Bakkar MM, et al. Prevalence and associated risk factors of dry eye disease in 16 northern West bank towns in Palestine: a cross-sectional study. BMC Ophthalmol. 2020;**20**(26):1-8. Doi: https://doi.org/10.1186/s12886-019-1290-z
10. Saad MMAI, Shehadeh AB, Ryalat SASA, Amer AA, Mihyat H. Evaluation of dry eye after cataract surgery. Bahrain Med Bull 2020; 42(1); 40-43
11. Septivianti R, Triningrat AAMP. Karakteristik pasien dry eye syndrome di Desa Tianyar Timur, Kecamatan Kubu, Kabupaten Karangasem. E-Jurnal Medika Udayana 2018;7(3):113-116.
12. Zeng X, Lv Y, Gu Z, et al. The Effects of Diabetic Duration on Lacrimal Functional Unit in Patients with Type II Diabetes. J Ophthalmol. 2019;2019(974):1-11. doi:10.1155/2019/8127515
13. Farrand KF, Fridman M, Stillman IÖ, et al. Prevalence of Diagnosed Dry Eye Disease in the United States Among Adults Aged 18 Years and Older. Am J Ophthalmol. 2017;182:90-98. doi:10.1016/j.ajo.2017.06.033
14. Rouen PA, White ML. Dry Eye Disease: Prevalence, Assessment, and Management. Home Healthc Now. 2018;36(2):74-83. doi: 10.1097/NHH.0000000000000652.
15. Stapleton F, Alves M, Bunya VY, et al. TFOS DEWS II Epidemiology Report. Ocul Surf. 2017;15(3):334-365. doi: 10.1016/j.jtos.2017.05.003.
16. Barabino, S. Is dry eye disease the same in young and old patients? A narrative review of the literature. BMC Ophthalmol. 2022; **22**(85):1-6. Doi: https://doi.org/10.1186/s12886-022-02269-2
17. Malet F, Le Goff M, Colin J, et al. Dry eye disease in French elderly subjects: the Alienor Study. Acta Ophthalmol. 2014;92(6):e429-36. doi: 10.1111/aos.12174.
18. Sharma A, Hindman HB. Aging: a predisposition to dry eyes. J Ophthalmol. 2014;2014:781683. doi: 10.1155/2014/781683.
19. Alhamyani AH, Kalakattawi RMN, Kalakattawi AMN, et al. Prevalence of dry eye symptoms and its risk factors among patients of King Abdulaziz Specialist Hospital (Taif), Saudi Arabia. saudi J health sci. 2023;6(3):140-4. DOI: 10.4103/sjhs.sjhs_90_17
20. Goebbels M. Tear secretion and tear film function in insulin dependent diabetics. Br J Ophthalmol. 2000;84(1):19-21. doi: 10.1136/bjo.84.1.19.
21. Kaiserman I, Kaiserman N, Nakar S, Vinker S. Dry eye in diabetic patients. Am J Ophthalmol. 2005;139(3):498-503. doi: 10.1016/j.ajo.2004.10.022.
22. Olaniyan SI, Fasina O, Bekibele CO, et al. Relationship between dry eye and glycosylated haemoglobin among diabetics in Ibadan, Nigeria. Pan African Med Journal. 2019;33(14):1-9. DOI: 10.11604/pamj.2019.33.14.14074
23. Manaviat MR, Rashidi M, Afkhami-Ardekani M, et al. Prevalence of dry eye syndrome and diabetic retinopathy in type 2 diabetic patients. BMC Ophthalmol. 2008;8(10):1-5. doi: 10.1186/1471-2415-8-10.