



Source details

Indian Journal of Forensic Medicine and Toxicology

Scopus coverage years: from 2008 to 2021

(coverage discontinued in Scopus)

Publisher: Medico Legal Society

ISSN: 0973-9122 E-ISSN: 0973-9130

Subject area: Social Sciences: Law Medicine: Pathology and Forensic Medicine

Pharmacology, Toxicology and Pharmaceutics: Toxicology Environmental Science: Health, Toxicology and Mutagenesis

Source type: Journal

CiteScore 2020

0.1



SJR 2020

0.115



SNIP 2022

0.163



[View all documents >](#)

[Set document alert](#)

[Save to source list](#) [Source Homepage](#)

[CiteScore](#) [CiteScore rank & trend](#) [Scopus content coverage](#)

i Improved CiteScore methodology



CiteScore 2020 counts the citations received in 2017-2020 to articles, reviews, conference papers, book chapters and data papers published in 2017-2020, and divides this by the number of publications published in 2017-2020. [Learn more >](#)

CiteScore 2020

$$0.1 = \frac{387 \text{ Citations } 2017 - 2020}{3,509 \text{ Documents } 2017 - 2020}$$

Calculated on 05 May, 2021

CiteScore rank 2020

Category	Rank	Percentile
Social Sciences		
└ Law	#639/722	11th
Medicine		
└ Pathology and Forensic Medicine	#183/191	4th
Pharmacology, Toxicology and	#118/122	3rd

[View CiteScore methodology >](#) [CiteScore FAQ >](#) [Add CiteScore to your site](#)

SJR
SCImago

SJR
Enter Journal Title, ISSN or Publisher Name

[Home](#) [Journal Rankings](#) [Country Rankings](#) [Viz Tools](#) [Help](#) [About Us](#)

Indian Journal of Forensic Medicine and Toxicology

Discontinued in Scopus as of 2020

<p>COUNTRY</p> <p>India</p> <div style="background-color: #333; color: white; padding: 2px; margin-bottom: 5px;"> Universities and research institutions in India </div> <div style="background-color: #333; color: white; padding: 2px;"> Media Ranking in India </div>	<p>SUBJECT AREA AND CATEGORY</p> <p>Environmental Science └ Health, Toxicology and Mutagenesis</p> <p>Medicine └ Pathology and Forensic Medicine</p> <p>Pharmacology, Toxicology and Pharmaceutics └ Toxicology</p> <p>Social Sciences └ Law</p>	<p>PUBLISHER</p>	<p>H-INDEX</p> <p style="font-size: 2em; font-weight: bold;">15</p>
<p>PUBLICATION TYPE</p> <p>Journals</p>	<p>ISSN</p> <p>09739122, 09739130</p>	<p>COVERAGE</p> <p>2008-2021</p>	<p>INFORMATION</p> <p>Homepage</p> <p>How to publish in this journal</p> <p>editor.ijfmt@gmail.com</p>

SCOPE

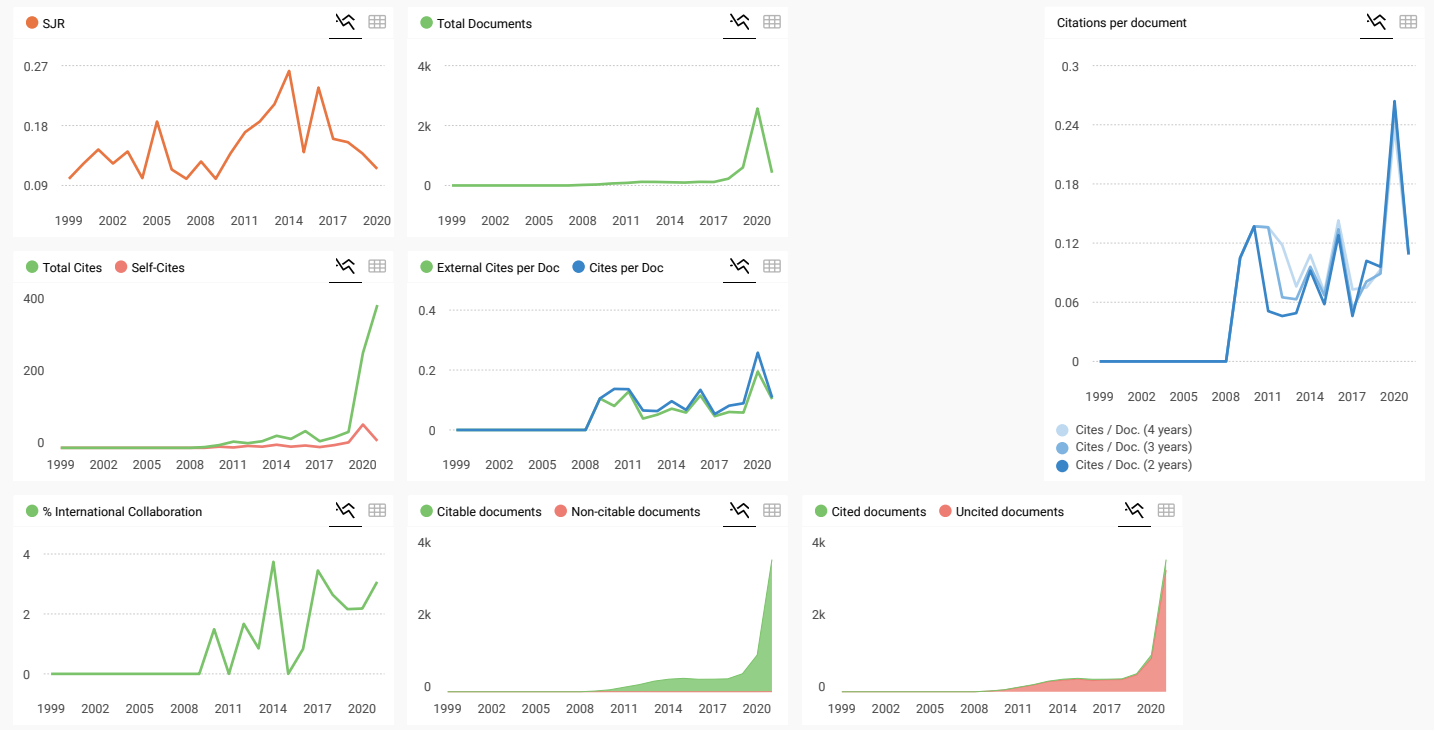
"Indian Journal of Forensic Medicine & Toxicology" is a double-blind peer reviewed international journal. The frequency is quarterly. It deals with Forensic Medicine, Forensic Science, Toxicology, DNA fingerprinting, sexual medicine, environmental medicine, Forensic Pathology, legal medicine and public health laws.

Join the conversation about this journal

Quartiles

FIND SIMILAR JOURNALS options

1 Medico-Legal Update IND	2 International Journal of Medical Toxicology and Legal IND	3 Journal of Indian Academy of Forensic Medicine IND	4 Journal of Punjab Academy of Forensic Medicine and IND	5 Journal of the Nepal Medical Association NPL
--	--	---	---	---



Indian Journal of Forensic Medicine and Toxicology

← Show this widget in your own website

Not yet assigned quartile

SJR 2022: 0

powered by scimagojr.com

Just copy the code below and paste within your html code:

``

SCImago Graphica

Explore, visually communicate and make sense of data with our **new data visualization tool.**

Metrics based on Scopus® data as of April 2023



Dr. Wiaam 1 year ago

Dear sir,

What is the impact factor of the Indian Journal of Forensic Medicine

← reply



Melanie Ortiz 1 year ago

SCImago Team

Dear Dr. Wiaam, thank you very much for your comment. SCImago Journal and Country Rank uses Scopus data, our impact indicator is the SJR (Check it on our website). We suggest you consult the Journal Citation Report for other indicators (like Impact Factor) with a Web of Science data source. Best Regards, SCImago Team

[Home](#) / [Archives](#) / Vol. 14 No. 3 (2020): Indian Journal of Forensic Medicine & Toxicology

Vol. 14 No. 3 (2020): Indian Journal of Forensic Medicine & Toxicology

DOI: <https://doi.org/10.37506/ijfmt.v14i3>

Published: 2020-08-14

Articles

Determination of Sex by Osteometry of Third Metatarsal

Arthy1 , Rohit Goel2 , Sreenivas M3

1-6

 Pdf

Incidence of Tuberculosis in Unidentified Dead Bodies amongst Autopsy Conducted at Government Stanley Medical College and Hospital, Chennai

A.Gokulakrishnan1 , S.Praveen1

7-11

 Pdf

Study of Lip Print Pattern among Young Individuals in Bangalore City

Chandru K1 , Naveena Preethi2

12-15

 Pdf

Effectiveness of Educational Intervention on Knowledge & Attitude about MTP Act 1971 among Apparently Healthy Reproductive Age Group Population Visiting A Tertiary Care Centre, Puducherry

Fathima S1 , James Rajesh J 2 , Jothi Marie Feula3 , Siva Reddy4

16-21

 Pdf

(Parasetamol + NSAID + PCA OPIOID)

Wayan Dhea Agastya¹ , Arie Utariani² , Dedi Susila²
2247-2252



Pdf

Coal Dust Exposure and Gingival Lead Line in Coal Miners

Widodo¹ , Sahdhina Rismawati¹ , Eko Suhartono² , R. Darmawan Setijanto³
2253-2257



Pdf

Deleted

Wigit Kristianto¹ , Irwanto¹ , Kharisma Nindya Hapsara¹
2258-2263



Pdf

Associaton between Blood Total Testosterone Levels and Consolidated Memory on Eldery Men at Veterans Institution

Muhammad Hamdan¹ , Raini Wisnujono¹ , Yudha Haryono¹ , Abdulloh Machin² , Euginia Putri Permata P.²
2264-2268



Pdf

The Analysis of Workload and Safety Communication Against Burnout Syndrome in Inpatient Nurses

Yulia Purnawati¹ , Tri Martiana² , Rachmat Hargono³ , Firman Suryadi Rahman⁴
2269-2273



Pdf

Effectiveness of Garra Rufa Care Toward Pruritus Elderly Who Live in Indonesian Village

Zagad Budhi Dharma¹ , Joni Haryanto² , Elida Ulfiana²
2274-2279



Pdf

Effectiveness of Audio-Visual Media in Health Education about Fruits and Vegetables Consumption in Early Adolescents at Palangka Raya Elementary School

Untung Halajur¹
2280-2284

Hepatoprotective Effecton Acetaminophen Induced Liver Damage

Zaid Abd Al Salam Alsamarrai1 , Abdulsalam Tawfeeq Alsamaraian2 , Rafah Razooq Al-Samarrai3
2740-2745



Pdf

Studying Some of Immunological Parameters of dogs that Toxocara Infections in Saladin province

Alaa Mohammed Awwad
2746-2750



Pdf

Deleted

Selman Hussain Faris1 , Fatma Makee Mahmood2, Ali Kareem Khudhair3
2751-2755



Pdf

Association of Serum Myeloperoxidase Level with Risk of Coronary Artery Disease in Patients with Type 2 Diabetes

Huda S. Abdulghani1 , Sura A. Abdulsattar2 , Essam N. Salman3
2756-2763



Pdf

Correlation of Toxoplasmosis Seroprevalence and Serum Level of Interleukin-10 in Iraqi Breast Cancer Women

Maysoon Abdul-zahra Merdaw1 , Zeina Anwar Jaffar2 , Zahraa Mohammed Ali3 , Heba Hashim Khalil4
1973-1978



PDF

Current Issue

ATOM 1.0

RSS 2.0

RSS 1.0

[Make a Submission](#)

Browse

[Open Journal Systems](#)

Information

[For Readers](#)

[For Authors](#)

[For Librarians](#)

Platform &
workflow by
OJS / PKP

[Home](#) / [Editorial Team](#)

Editorial Team

Editor in Chief

Prof S K Dhattarwal

Forensic Medicine, PGIMS, Rohtak, Haryana

E-mail: editor.ijfmt@gmail.com

EDITORIAL ADVISORY BOARD

1. Prof Sudhir K Gupta, Head, FMT. AIIMS, New Delhi , India
2. Prof Mete Gulmen ,Cukurova University, TURKEY
3. Prof. Leandro Duarte De Carvalho , Minas Gerais, Belo Horizonte, BRAZIL
4. Dr. Valery Gunas, National Pirogov Memorial Medical University,Vinnytsya, UKRAINE
5. Dr. Rahul Pathak Forensic Science, Dept of Life Sciences ,Anglia Ruskin University, Cambridge, UNITED KINGDOM
6. Prof Emilo Nuzzalese, University of Turin , Italy
7. Dr Noha A. Magdy Elrafie, Forensic Toxicology, Ain Shams University, Cairo, EGYPT
8. Dr Rituja Sharma, Associate Prof, Law, Banasthali Vidyapeeth Jaipur
9. Dr Shankar Bakkanwar (*Associate Professor*) Forensic Medicine, Kasturba Medical College, Manipal, Karnataka
10. Dr K. Ravikumar , Raksha Shakti University, Ahmedabad, Gujrat.
11. Dr C. Behera (*Addl. Prof*) Dept of FMT, AIIMS, New Delhi
12. Dr. Kanak Lata Verma, Deputy Director, Toxicology ,RFSL, Chanakyapuri New Delhi
13. Dr. Asha Srivastava (*Senior Scientific Officer*) Forensic Psychology,Central Forensic Science Laboratory, CBI, Delhi
14. Dr. Raghvendra Kumar Vidua, (Associate Prof), FMT, AIIMS Bhopal
15. Dr. Vaibhav Saran (*Asst.Prof.*) School of Forensic Science, Sam Higginbottom Institute of Agriculture Technology & Sciences,Allahabad
16. Ms Aparna R. Asst. Prof. Forensic Serology & Biology, Jain University, Bengaluru
17. Dr. Deepali Jain, Asst Prof, Forensic Science ,BB Ambedkar University, Lucknow
18. Prof. NK Aggrawal Forensic Medicine, UCMS, Delhi
19. Prof. Manoj Kumar Mohanty, Forensic Medicine, AIIMS, Bhuvneshwar, Odisha
20. Prof. Amar Jyoti Patowary, Forensic Medicine, NEIGRIHMS, Shillong, Meghalaya
21. Prof S. Venkata Raghava , Forensic Medicine, Banglore Medical College, Bengaluru

22. Prof. Shalini Gupta Oral Pathology and Microbiology, Faculty of Dental Sciences, King George Medical University, Lucknow
23. Prof. Virender Kumar Chhoker Forensic Medicine, Santosh Medical College, Ghaziabad, UP
24. Prof. Dayanand G Gannur , Forensic Medicine , Shri BM Patil Medical College, Hospital & Research centre, Bijapur, Karnataka
25. Prof Praveen Arora, Forensic Medicine, SAIMS, Indore, MP
26. Prof Barkha Gupta , Saraswathi Institute of Medical Sciences Hapur, Uttar Pradesh India
27. Prof M Prashant Apollo Medical College Hyderabad
28. Prof Dimple Patel , Anatomay, AMC MET Medical College , Ahmedabad , Gujarat
29. Dr Mohammed Nader Shalaby, Associate Professor of Biological Sciences and Sports Health Department, Faculty of Physical Education, Suez Canal University, Egypt

30 Dr. Avinash Harishchandra Waghmode

Professor and Head, Dept of Forensic Medicine and Toxicology, BKL Walawalkar Rural
Medical College Chiplun Ratnagiri

31 Dr. Anita Yadav Assistant Professor Forensic Science, SBAS Galgotias University, Greater
Noida, UP

32 Dr. Risha Jasmine Nathan *Lecturer in Forensic Chemistry Anglia Ruskin University*

East Road, Cambridge, CB1 1PT England, United Kingdom

Current Issue

ATOM 1.0

RSS 2.0

RSS 1.0

[Make a Submission](#)

Browse

[Open Journal Systems](#)

Association between Blood Total Testosterone Levels and Consolidated Memory on Elderly Men at Veterans Institution

Muhammad Hamdan¹, Raini Wisnujono¹, Yudha Haryono¹, Abdulloh Machin², Euginia Putri Permata P.²

¹Lecturer in Department of Neurology, Faculty of Medicine, Dr. Soetomo Teaching Hospital, Universitas Airlangga, Surabaya, East Java, Indonesia, ²Department Student of Neurology, Faculty of Medicine, Dr. Soetomo Teaching Hospital, Universitas Airlangga, Surabaya, East Java, Indonesia

Abstract

Background: Decreased total testosterone levels in the blood will disrupt memory consolidation. In this phase, one could still function normally even though it is difficult to recall the information that has been learned.

Methods: The subjects were taken consecutively and conducted by interview, generalist, and neurological physical examination, Word List Memory Task examination twice as well as measurement of total testosterone in the blood. The subjects were grouped into total blood testosterone levels of less than 298 ng/dl and more than equal to 298 ng/dl.

Results: Fifty-four subjects studied obtained that total blood testosterone levels <298 ng/dl in the Word List Memory Task (WLMT) group <21 (62.5%) were higher than the WLMT group ≥21 (37.5%). Furthermore, Total Testosterone in the blood more ≥298 ng/dl in the WLMT group <21 (15.2%) was less than in the WLMT group ≥21 (84.8%).

Conclusion: There was a correlation between total testosterone levels in the blood and memory consolidation in elderly men at the Veterans' Institute of Republic Indonesia in Surabaya.

Keywords: Elderly men, Total Testosterone in the Blood, Consolidation of Memory, Neurology

Introduction

It is estimated that the world population is 7 billion, up from 6.5 billion in 2006. The increase in number is followed by an increase in people aged 60 years and over¹ Between 1970 and 2025, the number of elderly people is expected to increase by 223% or about 694 million. In the year 2025, there will be about 1.2 billion people in the world aged 60 years and over then soon will be 2 billion in 2050². Increases occur in many developing

countries, including Indonesia. The increasing number of elderly people in the world brings several problems in the health field³ Health problems of decline in cognitive function will affect the pattern of interaction with the elderly living environment, with family members and social activities. This will add to the burden of families, the environment, and society⁴

In the aging process, there will be a circadian rhythm disorder that is a biological process that shows endogenous oscillations and recurs every 24 hours, including sleep-wake cycle, heart rate, blood pressure, hormone secretion, sensory ability, and mood are all governed by the hypothalamus.⁵

Disorders of hormone secretion possibility cause a decrease in total testosterone levels in men resulting in some symptoms and complaints such as cognitive and mood disorders as well as disorders of virility.

Corresponding Author:

Muhammad Hamdan,

Department of Neurology, Faculty of Medicine, Dr. Soetomo Teaching Hospital, Universitas Airlangga, Jl. Mayjen Prof. Dr. Moestopo No. 47, Surabaya, East Java, Indonesia 60285,

Email: muhammadhamdan.md@gmail.com

Cognitive impairment is much complained by 39% of the population aged 50-59 years and increased to more than 85% at the age of over 80 years. Men (6,7) will experience a decrease in total blood testosterone levels of about 0.8-1.6% every year starting when entering the age of about 40 years.⁶ The decrease in total testosterone levels will disrupt the consolidation of memory so that there possibility complaints of forgetfulness. In this phase, one could still function normally even though it is difficult to recall the information that has been learned. However until now, the correlation between total testosterone levels and memory consolidation remains unclear.

Research on total testosterone levels with memory consolidation disorder in elderly men will be conducted at the Community of Veterans of Republic Indonesia⁸. This community consists of the struggle retired veteran (before independence), retired armed forces of Republic Indonesia (after Indonesian independence) and retired police⁹. The selection of Veterans Institution of the Republic of Indonesia in its population has a high well being educated, has the spirit to move and socialize and still pay attention to the importance of health problems¹⁰. So hopefully this community could help the smoothness of this research.

Examination of total blood testosterone levels needs to be performed, as the total blood testosterone levels could affect the formation of consolidated memory and the learning process, leaving the elderly easily to forget their memories.¹¹ Until now in Indonesia there is no research on this topic, therefore the authors are interested to determine the correlation between total blood testosterone levels and memory consolidation in the elderly male.

Methods

Fifty-four elderly men in Veterans of Republic Indonesia in Surabaya were enrolled from November 2014 to October 2015, attention function (Digit Span) >5, concentration function (Vigilance) >10, Mini-Mental State Examination (MMSE) >24, minimum level of senior secondary education or equivalent, willing to participated the research (informed consent). The method was performed according to consecutive cases (sampling from consecutive admission) until the sample number has been reached to set. Then, it was conducted an interview, performed memory check word list memory task twice and laboratory on participants

who meet the criteria for inclusion.

This was an observational analytic with the cross-sectional approach and has obtained the approval of ethical clearance from the ethics committee of Dr. Soetomo General Hospital, Surabaya Indonesia. The dependent and independent variable data will be analyzed analytically by using chi-square. Data analysis results will be displayed in graphical form. The entire process of data analysis will be processed using the SPSS 21 computer program. (SPSS, Inc., Chicago, IL)

Results

Basic Characteristics of Research Subject

A total of 54 study subjects consisting of 8 subjects with total testosterone less than 298 ng/dl and 46 subjects with testosterone more than or equal to 298 ng/dl. Characteristics age of the subjects obtained; 60-65 years was 25 people (46.3%) and age 66-70 years was 29 people (53.7%). Educational Characteristics was high school graduate level by 52 (96.3%) and university graduate by two (3.7%).

The subjects with hypertension were 17 (31.5%) people, and those who not suffer were 37 (68.5%) people. Subjects with diabetes mellitus were 19 (35.2%) people and those without was 11 (35.8%) people. Subjects with dyslipidemia were 11 (20.4%) people, and those who did not suffer were 43 (79.6%) people. Active subjects smoked was 22 (40.7%) people, and who did not smoke was 32 (59.3%) people. Subjects with memory consolidation disorder were 12 (22.2%) people, and those with no memory consolidation problems were 42 (77.8%) people. Subjects with total testosterone levels less than 298 ng/dl were 8 people (14.8%), and subjects with total testosterone levels more than or equal to 298 ng/dl were 46 people (85.2%).

The correlation between Hypertension and Memory Consolidation

In subjects with uninterrupted consolidation who experienced hypertension was fewer by 2 people (11.8%) than non-hypertensive by 10 people (27.0%). This difference was not statistically significant or clinical, with $p = 0.300$ and odds ratio (RO) of 0.360 (CI 95% 0.070-1.864)

Correlation between Diabetes Mellitus and Memory Consolidation

In the subjects with consolidated disruption who had diabetes was 6 (31.6%) people more than those who did not have diabetes by 6 (17.1%) people. This difference was not statistically significant or clinical, with $p = 0.307$ and odds ratio (RO) of 2.231 (CI 95% 0.604-8.224)

The correlation between Dyslipidemia and Consolidation of Memory

In subjects with uninterrupted consolidation who experienced dyslipidemia was 2 (18.2%) people fewer than non-dyslipidemia by 10 (23.3%) people. This difference was not statistically significant or clinical, with $p = 1,000$ and odds ratio (RO) of 0.733 (CI 95% 0.136-3.965)

Correlation between Smoking and Memory Consolidation

In subjects with uninterrupted consolidation who smoked was 5 (22.7%) people more than non-smokers by 7 (21.9%) people. This difference was not statistically significant or clinical, with $p = 1,000$ and odds ratio (RO) of 1.050 (CI 95% 0.286-3.864)

Correlation between Education and Memory Consolidation

In the subjects experiencing the consolidation that interrupted with senior high school education was 11 (21.2%) people less than college education by 1 (50.0%) people. This difference was not statistically significant or clinical, with $p = 0.398$ and odds ratio (RO) of 0.268 (CI 95% 0.016-4.641)

Correlation between Total Testosterone Levels and Memory Consolidation

In subjects with impaired consolidation having total testosterone levels less than 298 ng/dl for 5 (62.5%) people, it more than those with testosterone levels greater than or equal to 298 ng/dl by 7 (15.2%) people. This difference was statistically and clinically significant with $p = 0.01$ and odds ratio (RO) of 9.286 (CI 95% 1.798-47.964). This means that subjects with a total testosterone level less than 298 ng/dl have a risk for memory consolidation disorder 9,286 times greater than subjects with testosterone levels greater than or equal to 298 ng/dl .

Discussion

In this study, there was a difference in the proportion of memory consolidation disorders in subjects with total testosterone levels less than 298 ng/dl and greater than or equal to 298 ng/dl. It was tested by chi-square test with $p = 0.01$ and odds ratio (RO) of 9.286 (CI 95% 1.798-47.964) . Based on these data, it could be stated that there was a significant correlation between total testosterone levels and memory consolidation, where subjects with total testosterone levels less than 298 ng/dl have a risk for memory consolidation disorder 9.286 times greater than subjects with testosterone levels more or equal to 298 ng/dl.

Based on data, there was no statistically significant difference with $p = 0.307$ and the odds ratio (RO) 2.231 (CI 95% 0.604-8.243). Therefore, the status of diabetes mellitus was not a meaningful confounding factor for the occurrence of memory consolidation disorder¹². This possibly due to the good control of blood glucose in subjects suffering from Diabetes Mellitus. All subjects who suffer from Diabetes have received adequate therapy so that blood glucose levels during examination have been controlled. This was in accordance with the assertion that the correlation of intensive decreased blood glucose levels in diabetics to memory function impairment. The study concluded that intensive blood glucose control could be slowing the decline in cognitive function (CI 95% 1.02 to 1.19; $p < 0.0156$). While the condition of chronic hyperglycemia accelerates the decline in cognitive function¹³ .

Hypertension was one of the confounding factors in this study. Some literature says that there is a correlation between hypertension and memory impairment. Hypertension often did not cause actual clinical symptoms so many hypertensive people did not realize it, If not treated, hypertension could cause coronary heart disease, heart failure, stroke, kidney failure and other problems such as memory function impairment. Hypertension causes narrowing of the blood vessels. Decreased blood flow to the brain due to the narrowing could cause the brain to become inefficient¹⁴ .

Measures of cognitive function in 288 hypertensive patients were produced high blood pressure (mean systolic 154.7 ± 21.3 and diastolic mean 88.6 ± 92) that had the significant role to cognitive function, including memory function with $p < 0.001$.¹⁵

In data there was no significant difference between a statistic and clinical with $p = 0.300$ and the odds ratio (RO) 0.360 (CI 95% 0.070-1.864). So it could be stated that the status of hypertension was not a meaningful confounding factor for the occurrence of memory consolidation disorder. The study of 50 elderly patients with hypertension who performed cognitive examination using MMSE obtained the result of no difference in the cognitive disturbance between elderly and hypertension ($p = 0.331$). In contrast, other studies provide different results due to differences in subject research factors included in the inclusion criteria. Giordano included inclusion criteria ranging in age from 53 years to 94 years and male or female sex. While in this study the subject of research was aged 60 years to 70 years and all are male sex.

In Data there was no statistically significant difference in the value of $p = 1.000$ and the odds ratio (RO) of 0.733 (CI 95% 0.136-3.965). So it could be stated that in this study, dyslipidemia was not a significant confounding factor for memory consolidation disorder. This was in contrast to prospective longitudinal community studies of LDL cholesterol with the risk of dementia in elderly people. The result of increased LDL cholesterol correlates with the risk of dementia with an odds ratio of 3.1 (CI 95% 1.5 - 6.1). In other studies provide a controversial result that there was a weak correlation between levels of High-Density Lipoprotein Cholesterol (HDL-C) and Low-Density Lipoprotein Cholesterol (LDL-C) with dementia disorders. This result was similar to Table 2. In Table 2, there was no statistically significant difference in the value of $p = 1.000$ and the odds ratio (RO) of 1.050 (CI 95% 0.286-3.864).

There have been several studies on the correlation of nicotine to cognitive function especially attention, learning, and memory. The effects of nicotine on neuroplasticity are controversial. Even some research on the effects of nicotine on attention, learning, and memory provide heterogeneous results.¹⁵ Subject who smoked had improved performance in motor responses, good attention, and memory recognition, but had a disruption to learning and memory recall. There have been several studies on the correlation of nicotine to cognitive function especially attention, learning, and memory¹⁶.

In Data, there was no statistically significant difference with $p = 0.398$ and odd ratio (RO) 0.268

(CI 95% 0.016-4.641). So it could be stated that in this study, the level of education was not a confounding factor that meaningful for the occurrence of memory consolidation disorder. These results not in accordance with some studies on the correlation between education level and cognitive impairment to the risk of dementia. Previous studies mentioned that the level of education was a predisposing factor of cognitive impairment and dementia. While the research using MMSE (Mini-Mental State Examination) and CDT (Clock Drawing Test) on elderly cognitive function profile over 60 years showed significant result, that subjects who received more than nine years of education (senior high school, diploma or bachelor), has a cognitive function that classified as normal while the elderly who only educated 9 years more experienced a decrease in cognitive function¹⁸.

Based on the activity theory proposed Stanley to achieve successful aging, the elderly must remain active in both mental and physical activity. One of the mental activities is by undergoing formal education up to the highest level¹⁹.

Results from previous studies were different from current research. In the previous study, there was no significant correlation between MMSE score and testosterone levels. Most patients have had low MMSE results although testosterone levels are within the normal limits. While in this study the factors (attention, concentration, MMSE and sleep disorders also depressive disorders) will be inserted into the subject of research when getting a bad result. Therefore, the memory consolidation disorder could be concluded as a result of low levels of testosterone alone.

Conclusion

There was a correlation between total testosterone levels and memory consolidation in elderly men at the Veterans' Institute of Republic Indonesia in Surabaya.

Conflict of Interest: There is no conflict of interest.

Source of Funding: This study is self-funded.

Ethical Clearance: This study was approved by Ethical Commission of Health Research Faculty of Medicine University of Airlangga.

References

1. Organization WH. Active ageing: A policy framework. Geneva: World Health Organization; 2002.

2. Addina S, Keman S. Hubungan kebisingan lalu lintas dengan peningkatan Tekanan Darah Pada Tukang Becak Di Sekitar Terminal purabaya surabaya. *J Kesehat Lingkung*. 2015;8:69–80.
3. Sosiawan A, Yudianto A, Furqoni AH, Nzilibili SMM, Nuraini I. Full-sibling allelic frequency and sharing among Madurese: STR technique by 12 locus and the sex-typing amelogenin gene. *Egypt J Forensic Sci* [Internet]. 2019;9(1). Available from: <https://www.scopus.com/inward/record.uri?eid=2-s2.0-85068968235&doi=10.1186%2Fs41935-019-0143-5&partnerID=40&md5=ff46010be9c6e0d3e36972e1ec9ee833>
4. en F, Demircuguc-Kunt A, Klapper L, Peria MSM. The foundations of financial inclusion: Understanding ownership and use of formal accounts. The World Bank; 2012.
5. Wreksoatmodjo BR. Pengaruh Social Engagement terhadap Fungsi Kognitif Lanjut Usia di Jakarta. *Has Penelit*. 2014;
6. Anita N, Moeloek N. Aspek hormon testosteron pada pria usia lanjut (andropause). *Maj Andrologi Indones*. 2002;3:81–7.
7. Kusumoputro S, Sidiarto L. Otak menua dan Alzhemier Stad ringan Neurona. 2001;18(3):4–8.
8. Melastuti E, Sukartini T. Motivational interviewing as a problem solving intervention to improve adherence: Review of the related literature. *Indian J Public Heal Res Dev* [Internet]. 2019;10(8):2580–4. Available from: <https://www.scopus.com/inward/record.uri?eid=2-s2.0-85073518050&doi=10.5958%2F0976-5506.2019.02256.3&partnerID=40&md5=9d2fcacc459c4a8671cfb0c28df53b08>
9. Muhammad Z, Sumarmi S. The influence of knowledge and attitude of female adolescents on fe tablet consumption at public senior high school 1 of Gorontalo city, Indonesia. *J Public Health Africa* [Internet]. 2019;10(S1):113–6. Available from: <https://www.scopus.com/inward/record.uri?eid=2-s2.0-85074387234&doi=10.4081%2Fjphia.2019.1201&partnerID=40&md5=67b7d0257ba27c29a88281eea98bc88c>
10. Husen SA, Ansori ANM, Hayaza S, Susilo RJK, Zuraidah AA, Winarni D, et al. Therapeutic effect of okra (*Abelmoschus esculentus moench*) pods extract on streptozotocin-induced type-2 diabetic mice. *Res J Pharm Technol* [Internet]. 2019;12(8):3703–8. Available from: <https://www.scopus.com/inward/record.uri?eid=2-s2.0-85071634008&doi=10.5958%2F0974-360X.2019.00633.4&partnerID=40&md5=87922aa5af59245b7a282f3096a75209>
11. Lu PH, Masterman DA, Mulnard R, Cotman C, Miller B, Yaffe K, et al. Effects of testosterone on cognition and mood in male patients with mild Alzheimer disease and healthy elderly men. *Arch Neurol*. 2006;63(2):177–85.
12. Gupta S, Pathak Y, Gupta MK, Vyas SP. Nanoscale drug delivery strategies for therapy of ovarian cancer: conventional vs targeted. *Artif Cells, Nanomedicine Biotechnol* [Internet]. 2019;47(1):4066–88. Available from: <https://www.scopus.com/inward/record.uri?eid=2-s2.0-85073631789&doi=10.1080%2F21691401.2019.1677680&partnerID=40&md5=83c0e4a4f5a944740c003253ece6e98c>
13. Launer LJ, Miller ME, Williamson JD, Lazar RM, Gerstein HC, Murray AM, et al. Effects of intensive glucose lowering on brain structure and function in people with type 2 diabetes (ACCORD MIND): a randomised open-label substudy. *Lancet Neurol*. 2011;10(11):969–77.
14. Mercado JM, Hilsabeck R. Untreated hypertension can lead to memory loss by cutting down on blood flow to the brain. *Neurology*. 2005;64(8):E28–9.
15. Priftis K, Schiff S, Tikhonoff V, Giordano N, Amodio P, Umiltà C, et al. Hypnosis meets neuropsychology: simulating visuospatial neglect in healthy participants. *Neuropsychologia*. 2011;49(12):3346–50.
16. Foulds J, Stapleton J, Swettenham J, Bell N, McSorley K, Russell MAH. Cognitive performance effects of subcutaneous nicotine in smokers and never-smokers. *Psychopharmacology (Berl)*. 1996;127(1–2):31–8.
17. Larasati TL. Prevalensi demensia di rsud raden mattaher jambi. *JAMBI Med J*. 2013;1(1).
18. Mongisidi R, Tumewah R, Kembuan MAHN. Profil penurunan fungsi kognitif pada lansia di yayasan-yayasan manula di Kecamatan Kawangkoan. *e-CliniC*. 2013;1(1).
19. Wilkinson JM, Stanley D. Posterior surgical approaches to the elbow: a comparative anatomic study. *J shoulder Elb Surg*. 2001;10(4):380–2.