GLOBAL JOURNAL OF MEDICAL RESEARCH: K
INTERDISCIPLINARY
Dr. Charles A. Rarick
Ph.D.
Professor of International Business
College of Business
Purdue University Northwest
Hammond, Indiana USA

Dr. Osman Balcı, Professor
Department of Computer Science
Virginia Tech, Virginia University
Ph.D. and M.S. Syracuse University, Syracuse, New York
M.S. and B.S. Bogazici University, Istanbul, Turkey
Web: manta.cs.vt.edu/balci

Dr. A. Heidari
Ph.D, D.Sc, Faculty of Chemistry
California South University (CSU),
United States

Dr. Miklas Scholz
B.Eng. (equiv), PgC, MSc, Ph.D, CWEM, C.Env., C.Sci,
C.Eng.
Nigeria Health, Wellness and Fitness
University of Lund

Dr. Maria Gullo
Ph.D, Food Science and Technology
University of Catania
Department of Agricultural and Food Sciences
University of Modena and Reggio Emilia, Italy

Dr. Qiang Wu
Ph.D University of Technology, Sydney
Department of Mathematics,
Physics and Electrical Engineering
Northumbria University

Dr. Bingyun Li
Ph.D Fellow, IAES
Guest Researcher, NIOSH, CDC, Morgantown, WV
Institute of Nano and Biotechnologies
West Virginia University, US

Dr. Audeh Ahmad Ahmad
Amman Arab University For Higher Education
Ph.D, Accounting-Ais
Faculty of Business Administration
Alalbyt University, Jordan, Amman

Dr. Maria Gullo
Ph.D, Food Science and Technology
University of Catania
Department of Agricultural and Food Sciences
University of Modena and Reggio Emilia, Italy

Dr. Lucian Baia
Ph.D Julius-Maximilians University Würzburg, Germany
Associate professor
Department of Condensed Matter Physics and
Advanced Technologies, Babes-Bolyai University, Romania

Dr. Sahraoui Chaieb
PhD Physics and Chemical Physics
M.S. Theoretical Physics
B.S. Physics, École Normale Supérieure, Paris
Associate Professor, Bioscience
King Abdullah University of Science and Technology

Dr. Houfa Shen
Ph.D Manufacturing Engineering,
Mechanical Engineering, Structural Engineering
Department of Mechanical Engineering
Tsinghua University, China

Dr. Arshak Poghossian
Ph.D Solid-State Physics
Leningrad Electrotechnic Institute, Russia
Institute of Nano and Biotechnologies
Aachen University of Applied Sciences, Germany
<table>
<thead>
<tr>
<th>Name</th>
<th>Affiliation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dr. A. Stegou-Sagia</td>
<td>Ph.D Mechanical Engineering, Environmental Engineering School of Mechanical Engineering, National Technical University of Athens</td>
</tr>
<tr>
<td>Giuseppe A Provenzano</td>
<td>Irrigation and Water Management, Soil Science, Water Science Hydraulic Engineering, Dept. of Agricultural and Forest Sciences, Universita di Palermo, Italy</td>
</tr>
<tr>
<td>Dr. Ciprian Lăpușan</td>
<td>Ph. D in Mechanical Engineering, Technical University of Cluj-Napoca, Cluj-Napoca (Romania)</td>
</tr>
<tr>
<td>Dr. Haijian Shi</td>
<td>Ph.D Civil Engineering Structural Engineering, Oakland, CA, United States</td>
</tr>
<tr>
<td>Dr. Yogita Bajpai</td>
<td>Ph.D Senior Aerospace/Mechanical/Aeronautical Engineering professional, M.Sc. Mechanical Engineering, M.Sc. Aeronautical Engineering, B.Sc. Vehicle Engineering, Orange County, California, USA</td>
</tr>
<tr>
<td>Dr. Abdurrahman Arslanyilmaz</td>
<td>Computer Science &amp; Information Systems Department, Youngstown State University, Ph.D., Texas A&amp;M University, University of Missouri, Columbia, Gazi University, Turkey, <a href="http://cisc.ysu.edu/~aarslanyilmaz/professional_web">http://cisc.ysu.edu/~aarslanyilmaz/professional_web</a></td>
</tr>
<tr>
<td>Dr. Chao Wang</td>
<td>Ph.D in Computational Mechanics, Rosharon, TX, USA</td>
</tr>
<tr>
<td>Dr. Adel Al Jumaily</td>
<td>Ph.D Electrical Engineering (AI), Faculty of Engineering and IT, University of Technology, Sydney</td>
</tr>
<tr>
<td>Kitipong Jaojaruek</td>
<td>B. Eng, M. Eng, D. Eng (Energy Technology, Asian Institute of Technology), Kasetsart University Kamphaeng Saen (KPS) Campus, Energy Research Laboratory of Mechanical Engineering</td>
</tr>
<tr>
<td>Dr. Mauro Lenzi</td>
<td>Ph.D, Biological Science, Pisa University, Italy, Lagoon Ecology and Aquaculture Laboratory, Orbetello Pesca Lagunare Company</td>
</tr>
<tr>
<td>Dr. Omid Gohardani</td>
<td>M.Sc. (Computer Science), FICCT, U.S.A., Email: <a href="mailto:yogita@computerresearch.org">yogita@computerresearch.org</a></td>
</tr>
<tr>
<td>Dr. Yap Yee Jiun</td>
<td>B.Sc.(Manchester), Ph.D.(Brunel), M.Inst.P.(UK), Institute of Mathematical Sciences, University of Malaya, Kuala Lumpur, Malaysia</td>
</tr>
<tr>
<td>Dr. Thomas Wischgoll</td>
<td>Computer Science and Engineering, Wright State University, Dayton, Ohio, B.S., M.S., Ph.D. (University of Kaiserslautern), Web: avida.cs.wright.edu/personal/wischgol/index_eng.html</td>
</tr>
<tr>
<td>Dr. Baziotos Ioannis</td>
<td>Ph.D. in Petrology-Geochemistry-Mineralogy, Lipson, Athens, Greece</td>
</tr>
<tr>
<td><strong>Dr. Xiaohong He</strong></td>
<td><strong>Dr. T. David A. Forbes</strong></td>
</tr>
<tr>
<td>---------------------</td>
<td>-----------------------------</td>
</tr>
<tr>
<td>Professor of International Business</td>
<td>Associate Professor and Range Nutritionist</td>
</tr>
<tr>
<td>University of Quinnipiac</td>
<td>Ph.D Edinburgh University - Animal Nutrition</td>
</tr>
<tr>
<td>BS, Jilin Institute of Technology; MA, MS, Ph.D, (University of Texas-Dallas)</td>
<td>M.S. Aberdeen University - Animal Nutrition</td>
</tr>
<tr>
<td>Web: quinnipiac.edu/x1606.xml</td>
<td>B.A. University of Dublin - Zoology.</td>
</tr>
<tr>
<td></td>
<td>Web: essm.tamu.edu/people-info/faculty/forbes-david</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Dr. Burcin Becerik-Gerber</strong></th>
<th><strong>Dr. Bassey Benjamin Esu</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>University of Southern Californi</td>
<td>B.Sc. Marketing; MBA Marketing; Ph.D Marketing</td>
</tr>
<tr>
<td>Ph.D in Civil Engineering</td>
<td>Lecturer, Department of Marketing, University of Calabar</td>
</tr>
<tr>
<td>DDes from Harvard University</td>
<td>Tourism Consultant, Cross River State Tourism Development Department</td>
</tr>
<tr>
<td>M.S. from University of California, Berkeley</td>
<td>Co-ordinator, Sustainable Tourism Initiative, Calabar, Nigeria</td>
</tr>
<tr>
<td>M.S. from Istanbul Technical University</td>
<td></td>
</tr>
<tr>
<td>Web: i-lab.usc.edu</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Dr. Söhnke M. Bartram</strong></th>
<th><strong>Dr. Maciej Gucma</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Department of Accounting and Finance</td>
<td>Asistant Professor,</td>
</tr>
<tr>
<td>Lancaster University Management School</td>
<td>Maritime University of Szczecin Szczecin, Poland</td>
</tr>
<tr>
<td>Ph.D. (WHU Koblenz)</td>
<td>Ph.D. Eng. Master Mariner</td>
</tr>
<tr>
<td>MBA/BBA (University of Saarbrücken)</td>
<td>Web: <a href="http://www.mendeley.com/profiles/maciej-gucma/">www.mendeley.com/profiles/maciej-gucma/</a></td>
</tr>
<tr>
<td>Web: lancs.ac.uk/staff/bartras1/</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Dr. Shun-Chung Lee</strong></th>
<th><strong>Dr. Fotini Labropulu</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Department of Resources Engineering, National Cheng Kung University, Taiwan</td>
<td>Mathematics - Luther College, University of Regina</td>
</tr>
<tr>
<td></td>
<td>Ph.D, M.Sc. in Mathematics</td>
</tr>
<tr>
<td></td>
<td>B.A. (Honours) in Mathematics, University of Windsor</td>
</tr>
<tr>
<td></td>
<td>Web: luthercollege.edu/Default.aspx</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Dr. Balasubramani R</strong></th>
<th><strong>Dr. Vesna Stanković Pejnović</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Department of Accounting and Finance</td>
<td>Ph. D. Philospohy , Zagreb, Croatia</td>
</tr>
<tr>
<td>Lancaster University Management School</td>
<td>Rusveltova, Skopje, Macedonia</td>
</tr>
<tr>
<td>Ph.D. (WHU Koblenz)</td>
<td></td>
</tr>
<tr>
<td>MBA/BBA (University of Saarbrücken)</td>
<td></td>
</tr>
<tr>
<td>Web: lancs.ac.uk/staff/bartras1/</td>
<td>Web:</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>M. Meguellati</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Department of Electronics, University of Batna, Batna 05000, Algeria</td>
<td></td>
</tr>
<tr>
<td><strong>Dr. Miguel Angel Ariño</strong></td>
<td><strong>Dr. Carlos García Pont</strong></td>
</tr>
<tr>
<td>--------------------------</td>
<td>---------------------------</td>
</tr>
<tr>
<td>Professor of Decision Sciences</td>
<td>Associate Professor of Marketing</td>
</tr>
<tr>
<td>IIESE Business School</td>
<td>IIESE Business School, University of Navarra</td>
</tr>
<tr>
<td>Barcelona, Spain (Universidad de Navarra)</td>
<td>Doctor of Philosophy (Management), Massachusetts Institute of Technology (MIT)</td>
</tr>
<tr>
<td>CEIBS (China Europe International Business School).</td>
<td>Master in Business Administration, IIESE, University of Navarra</td>
</tr>
<tr>
<td>Beijing, Shanghai and Shenzhen</td>
<td>Degree in Industrial Engineering, Universitat Politècnica de Catalunya</td>
</tr>
<tr>
<td>Ph.D. in Mathematics, University of Barcelona</td>
<td>Degree in Industrial Engineering, Universitat Politècnica de Catalunya</td>
</tr>
<tr>
<td>BA in Mathematics (Licenciatura)</td>
<td>Degree in Industrial Engineering, Universitat Politècnica de Catalunya</td>
</tr>
<tr>
<td>University of Barcelona</td>
<td>Degree in Industrial Engineering, Universitat Politècnica de Catalunya</td>
</tr>
<tr>
<td>Web:web.iese.edu/MAArino/overview.axd</td>
<td>Web: iese.edu/aplicaciones/faculty/facultyDetail.asp</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Dr. Philip G. Moscoso</strong></th>
<th><strong>Dr. Sanjay Dixit, M.D.</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Technology and Operations Management</td>
<td>Director, EP Laboratories, Philadelphia VA Medical Center</td>
</tr>
<tr>
<td>IIESE Business School, University of Navarra</td>
<td>Cardiovascular Medicine - Cardiac Arrhythmia</td>
</tr>
<tr>
<td>Ph.D in Industrial Engineering and Management, ETH Zurich , M.Sc. in Chemical Engineering, ETH Zurich</td>
<td>University of Penn School of Medicine</td>
</tr>
<tr>
<td>Link: Philip G. Moscoso personal webpage</td>
<td>Web: pennmedicine.org/wagform/MainPage.aspx?</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Dr. Mihaly Mezei</strong></th>
<th><strong>Dr. Pina C. Sanelli</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Associate Professor</td>
<td>Associate Professor of Radiology</td>
</tr>
<tr>
<td>Department of Structural and Chemical Biology</td>
<td>Associate Professor of Public Health</td>
</tr>
<tr>
<td>Mount Sinai School of Medical Center</td>
<td>Weill Cornell Medical College</td>
</tr>
<tr>
<td>Ph.D., Etvls Lornd University, Postdoctoral Training, New York University, MSSM home: <a href="https://www.mountsinai.org/Find%20A%20Faculty/profile.do?id=0000072500001497192632">https://www.mountsinai.org/Find%20A%20Faculty/profile.do?id=0000072500001497192632</a></td>
<td>Associate Attending Radiologist</td>
</tr>
<tr>
<td>Lab home - software, publications: <a href="https://inka.mssm.edu/~mezei">https://inka.mssm.edu/~mezei</a></td>
<td>NewYork-Presbyterian Hospital</td>
</tr>
<tr>
<td>Department: <a href="https://atlas.physbio.mssm.edu">https://atlas.physbio.mssm.edu</a></td>
<td>MRI, MRA, CT, and CTA</td>
</tr>
<tr>
<td></td>
<td>Neuroradiology and Diagnostic Radiology</td>
</tr>
<tr>
<td></td>
<td>M.D., State University of New York at Buffalo, School of Medicine and Biomedical Sciences</td>
</tr>
<tr>
<td></td>
<td>Web: weillcornell.org/pinasanelli/</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Dr. Vivek Dubey (HON.)</strong></th>
<th><strong>Er. Suyog Dixit</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>MS (Industrial Engineering), MS (Mechanical Engineering)</td>
<td>(M.Tech), BE (HONS. in CSE), FICCT</td>
</tr>
<tr>
<td>University of Wisconsin</td>
<td>SAP Certified Consultant</td>
</tr>
<tr>
<td>FICCT</td>
<td>CEO at IOSRD, GAOR OSS</td>
</tr>
<tr>
<td>Editor-in-Chief, USA</td>
<td>Technical Dean, Global Journals Inc.(US)</td>
</tr>
<tr>
<td></td>
<td>Website: <a href="http://www.suyogdixit.com">www.suyogdixit.com</a></td>
</tr>
<tr>
<td></td>
<td>Email: <a href="mailto:suyog@suyogdixit.com">suyog@suyogdixit.com</a></td>
</tr>
<tr>
<td>Name</td>
<td>Title and Details</td>
</tr>
<tr>
<td>-------------------------------------</td>
<td>-----------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Er. Pritesh Rajvaidya</td>
<td>Computer Science Department, California State University, BE (Computer Science), FICCT, Technical Dean, USA, Email: <a href="mailto:pritesh@computerresearch.org">pritesh@computerresearch.org</a>, <a href="mailto:deanusa@globaljournals.org">deanusa@globaljournals.org</a></td>
</tr>
<tr>
<td>Jixin Zhong</td>
<td>Department of Medicine, Affiliated Hospital of Guangdong Medical College, Zhanjiang, China, Davis Heart and Lung Research Institute, The Ohio State University, Columbus, OH 43210, USA</td>
</tr>
<tr>
<td>Dr. Apostolos Ch. Zarros</td>
<td>DM, Degree (Pychio) holder in Medicine, National and Kapodistrian University of Athens, MRes, Master of Research in Molecular Functions in Disease, University of Glasgow, FRNS, Fellow, Royal Numismatic Society, Member, European Society for Neurochemistry, Member, Royal Institute of Philosophy, Scotland, United Kingdom</td>
</tr>
<tr>
<td>Dr. Wen-Yih Sun</td>
<td>Professor of Earth and Atmospheric Sciences, Purdue University, Director, National Center for Typhoon and Flooding Research, Taiwan, University Chair Professor, Department of Atmospheric Sciences, National Central University, Chung-Li, Taiwan, University Chair Professor, Institute of Environmental Engineering, National Chiao Tung University, Hsin-chu, Taiwan, Ph.D., MS The University of Chicago, Geophysical Sciences, BS National Taiwan University, Atmospheric Sciences, Web: event.nchc.org.tw/2009</td>
</tr>
<tr>
<td>Dr. Han-Xiang Deng</td>
<td>MD., Ph.D, Associate Professor and Research Department, Division of Neuromuscular Medicine, Davee Department of Neurology and Clinical Neurosciences, Northwestern University Feinberg School of Medicine, Web: neurology.northwestern.edu/faculty/deng.html</td>
</tr>
<tr>
<td>Dr. Michael R. Rudnick</td>
<td>M.D., FACP, Associate Professor of Medicine, Chief, Renal Electrolyte and Hypertension Division (PMC), Penn Medicine, University of Pennsylvania, Presbyterian Medical Center, Philadelphia, Nephrology and Internal Medicine, Certified by the American Board of Internal Medicine, Web: uphs.upenn.edu/</td>
</tr>
<tr>
<td>Dr. Roberto Sanchez</td>
<td>Associate Professor, Department of Structural and Chemical Biology, Mount Sinai School of Medicine, Ph.D., The Rockefeller University, Web: mountsinai.org/</td>
</tr>
<tr>
<td>Dr. Aziz M. Barbar, Ph.D.</td>
<td>IEEE Senior Member, Chairperson, Department of Computer Science, AUST - American University of Science &amp; Technology, Alfred Naccash Avenue - Ashrafieh</td>
</tr>
<tr>
<td>Name</td>
<td>Department/University/College</td>
</tr>
<tr>
<td>---------------------------</td>
<td>------------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>Dr. Minghua He</strong></td>
<td>Department of Civil Engineering</td>
</tr>
<tr>
<td></td>
<td>Tsinghua University</td>
</tr>
<tr>
<td></td>
<td>Beijing, 100084, China</td>
</tr>
<tr>
<td><strong>Anis Bey</strong></td>
<td>Dept. of Comput. Sci.,</td>
</tr>
<tr>
<td></td>
<td>Badji Mokhtar-Annaba Univ.,</td>
</tr>
<tr>
<td></td>
<td>Annaba, Algeria</td>
</tr>
<tr>
<td><strong>Chutisant Kerdvibulvech</strong></td>
<td>Dept. of Inf.&amp; Commun. Technol.,</td>
</tr>
<tr>
<td></td>
<td>Rangsit University, Pathum Thani, Thailand</td>
</tr>
<tr>
<td></td>
<td>Chulalongkorn University, Thailand</td>
</tr>
<tr>
<td></td>
<td>Keio University, Tokyo, Japan</td>
</tr>
<tr>
<td><strong>Dr. Wael Abdullah</strong></td>
<td>Elhelece Lecturer of Chemistry,</td>
</tr>
<tr>
<td></td>
<td>Faculty of science, Gazan Univeristy,</td>
</tr>
<tr>
<td></td>
<td>KSA. Ph. D. in Inorganic Chemistry,</td>
</tr>
<tr>
<td></td>
<td>Faculty of Science, Tanta University, Egypt</td>
</tr>
<tr>
<td><strong>Yaping Ren</strong></td>
<td>School of Statistics and Mathematics</td>
</tr>
<tr>
<td></td>
<td>Yunnan University of Finance and Economics</td>
</tr>
<tr>
<td></td>
<td>Kunming 650221, China</td>
</tr>
<tr>
<td><strong>Ye Tian</strong></td>
<td>The Pennsylvania State University</td>
</tr>
<tr>
<td></td>
<td>121 Electrical Engineering East</td>
</tr>
<tr>
<td></td>
<td>University Park, PA 16802, USA</td>
</tr>
<tr>
<td><strong>Dr. Diego González-Aguilera</strong></td>
<td>Ph.D. Dep. Cartographic and Land Engineering,</td>
</tr>
<tr>
<td></td>
<td>University of Salamanca, Ávila, Spain</td>
</tr>
<tr>
<td><strong>Dr. Hai-Linh Tran</strong></td>
<td>PhD in Biological Engineering</td>
</tr>
<tr>
<td></td>
<td>Department of Biological Engineering</td>
</tr>
<tr>
<td></td>
<td>College of Engineering Inha University, Incheon, Korea</td>
</tr>
<tr>
<td><strong>Dr. Tao Yang</strong></td>
<td>Ph.D, Ohio State University</td>
</tr>
<tr>
<td></td>
<td>M.S. Kansas State University</td>
</tr>
<tr>
<td></td>
<td>B.E. Zhejiang University</td>
</tr>
<tr>
<td><strong>Dr. Feng Feng</strong></td>
<td>Boston University</td>
</tr>
<tr>
<td></td>
<td>Microbiology, 72 East Concord Street R702</td>
</tr>
<tr>
<td></td>
<td>Duke University</td>
</tr>
<tr>
<td></td>
<td>United States of America</td>
</tr>
<tr>
<td><strong>Shengbing Deng</strong></td>
<td>Departamento de Ingeniería Matemática,</td>
</tr>
<tr>
<td></td>
<td>Universidad de Chile</td>
</tr>
<tr>
<td></td>
<td>Facultad de Ciencias Físicas y Matemáticas.</td>
</tr>
<tr>
<td></td>
<td>Blanco Encalada 2120, piso 4.</td>
</tr>
<tr>
<td></td>
<td>Casilla 170-3. Correo 3. - Santiago, Chile</td>
</tr>
<tr>
<td><strong>Claudio Cuevas</strong></td>
<td>Department of Mathematics</td>
</tr>
<tr>
<td></td>
<td>Universidade Federal de Pernambuco</td>
</tr>
<tr>
<td></td>
<td>Recife PE Brazil</td>
</tr>
<tr>
<td><strong>Dr. Alis Puteh</strong></td>
<td>Ph.D. (Edu.Policy) UUM</td>
</tr>
<tr>
<td></td>
<td>Sintok, Kedah, Malaysia</td>
</tr>
<tr>
<td></td>
<td>M.Ed (Curr. &amp; Inst.), University of Houston, USA</td>
</tr>
<tr>
<td><strong>Dr. R.K. Dixit(HON.)</strong></td>
<td>M.Sc., Ph.D., FICCT Chief Author, India</td>
</tr>
<tr>
<td></td>
<td>Email: <a href="mailto:authorind@globaljournals.org">authorind@globaljournals.org</a></td>
</tr>
<tr>
<td><strong>Dr. Dodi Irawanto</strong></td>
<td><strong>Dr. Alex W. Dawotola</strong></td>
</tr>
<tr>
<td>-----------------------</td>
<td>-------------------------</td>
</tr>
<tr>
<td>PhD, M.Com, B.Econ Hons.</td>
<td>Hydraulic Engineering Section,</td>
</tr>
<tr>
<td>Department of Management</td>
<td>Delft University of Technology,</td>
</tr>
<tr>
<td>Faculty of Economics and Business, Brawijaya University</td>
<td>Stevinweg, Delft, Netherlands</td>
</tr>
<tr>
<td>Malang, Indonesia</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Ivona Vrdoljak Raguz</strong></th>
<th><strong>Dr. Luisa dall’Acqua</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>University of Dubrovnik, Head,</td>
<td>PhD in Sociology (Decisional Risk sector),</td>
</tr>
<tr>
<td>Department of Economics and Business Economics,</td>
<td>Master MU2, College Teacher in Philosophy (Italy),</td>
</tr>
<tr>
<td>Croatia</td>
<td>Edu-Research Group, Zürich/Lugano</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Dr. Prof Adrian Armstrong</strong></th>
<th><strong>Xianghong Qi</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>BSc Geography, LSE, 1970</td>
<td>University of Tennessee</td>
</tr>
<tr>
<td>PhD Geography (Geomorphology)</td>
<td>Oak Ridge National Laboratory</td>
</tr>
<tr>
<td>Kings College London 1980</td>
<td>Center for Molecular Biophysics</td>
</tr>
<tr>
<td>Ordained Priest, Church of England 1988</td>
<td>Oak Ridge National Laboratory</td>
</tr>
<tr>
<td>Taunton, Somerset, United Kingdom</td>
<td>Knoxville, TN 37922, United States</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Thierry FEUILLET</strong></th>
<th><strong>Gerard G. Dumancas</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Géolittomer – LETG UMR 6554 CNRS (Université de Nantes)</td>
<td>Postdoctoral Research Fellow,</td>
</tr>
<tr>
<td>Institut de Géographie et d’Aménagement</td>
<td>Arthritis and Clinical Immunology Research Program,</td>
</tr>
<tr>
<td>Régional de l’Université de Nantes.</td>
<td>Oklahoma Medical Research Foundation</td>
</tr>
<tr>
<td>Chemin de la Censive du Tertre – BP, Rodez</td>
<td>Oklahoma City, OK</td>
</tr>
<tr>
<td></td>
<td>United States</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Dr. Yongbing Jiao</strong></th>
<th><strong>Vladimir Burtman</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Ph.D. of Marketing</td>
<td>Research Scientist</td>
</tr>
<tr>
<td>School of Economics &amp; Management</td>
<td>The University of Utah, Geophysics</td>
</tr>
<tr>
<td>Ningbo University of Technology</td>
<td>Frederick Albert Sutton Building, 115 S 1460 E Room 383</td>
</tr>
<tr>
<td>Zhejiang Province, P. R. China</td>
<td>Salt Lake City, UT 84112, USA</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Cosimo Magazzino</strong></th>
<th><strong>Jalal Kafashan</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Roma Tre University</td>
<td>Mechanical Engineering, Division of Mechatronics</td>
</tr>
<tr>
<td>Rome, 00145, Italy</td>
<td>KU Leuven, BELGIUM</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Dr. Shaoping Xiao</strong></th>
<th><strong>Zhibin Lin</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>BS, MS, Ph.D Mechanical Engineering, Northwestern University</td>
<td>Center for Infrastructure Engineering Studies</td>
</tr>
<tr>
<td>The University of Iowa</td>
<td>Missouri University of Science and Technology</td>
</tr>
<tr>
<td>Department of Mechanical and Industrial Engineering</td>
<td>ERL, 500 W. 16th St. Rolla,</td>
</tr>
<tr>
<td>Center for Computer-Aided Design</td>
<td>Missouri 65409, USA</td>
</tr>
<tr>
<td>Name</td>
<td>Details</td>
</tr>
<tr>
<td>-----------------------------</td>
<td>--------------------------------------------------------------------------</td>
</tr>
</tbody>
</table>
| **Dr. Lzzet Yavuz**         | MSc, PhD, D Ped Dent.  
Associate Professor,  
Pediatric Dentistry Faculty of Dentistry,  
University of Dicle, Diyarbakir, Turkey |
| **Prof. Dr. Eman M. Gouda** | Biochemistry Department,  
Faculty of Veterinary Medicine, Cairo University,  
Giza, Egypt |
| **Della Ata**               | BS in Biological Sciences  
MA in Regional Economics  
Hospital Pharmacy  
Pharmacy Technician Educator |
| **Dr. Muhammad Hassan Raza, PhD** | Engineering Mathematics  
Internetworking Engineering, Dalhousie University,  
Canada |
| **Dr. Asunción López-Varela** | BA, MA (Hons), Ph.D (Hons)  
Facultad de Filología.  
Universidad Complutense Madrid  
29040 Madrid, Spain |
| **Dr. Bondage Devanand Dhondiram** | Ph.D  
No. 8, Alley 2, Lane 9, Hongdao station,  
Xizhi district, New Taipei city 221, Taiwan (ROC) |
| **Dr. Latifa Oubedda**      | National School of Applied Sciences,  
University Ibn Zohr, Agadir, Morocco  
Lotissement Elkhier N°66  
Bettana Salé Maroc |
| **Dr. Belen Riverio, PhD**  | School of Industrial Engineering  
University of Vigo  
Spain |
CONTENTS OF THE ISSUE

1. Knowledge, Attitude and Practices Amongst Subjects with Diabetes on Insulin Therapy: A Need to Bridge the Gap. 1-7
2. Assessment of Nurses’ Knowledge and Attitude towards Nursing Profession at Public Hospitals in Mekelle Town, Tigray, Ethiopia. 9-14
3. An Analytical Study of Chest Girth, Vital Capacity and Respiratory Rate of Inter Collegiate Players of Selected Ball Games. 15-18
4. Equine Erythrocyte Lysed Exposed to T-Butyl Hydroperoxide as a Model to Study the Oxidative Stress Caused by Exercise Using a Chemiluminescence Assay. 19-24
5. Towards Automated Epileptic Seizure Detection for Lightweight Devices through EEG Signal Processing. 25-31

v. Fellows
vi. Auxiliary Memberships
vii. Process of Submission of Research Paper
viii. Preferred Author Guidelines
ix. Index
Knowledge, Attitude and Practices Amongst Subjects with Diabetes on Insulin Therapy: A Need to Bridge the Gap

By Surekha Bhujanga Shetty, Lalitha Ramachandrappa & Anil Kumar Rudramunisetty

Karnataka Institute of Endocrinology and Research

Abstract- Objectives: To assess the knowledge, attitude and practices of subjects with diabetes on insulin therapy. Materials and Methods: A questionnaire based cross-sectional study was done at Karnataka Institute of Endocrinology and Research, Bangalore in 448 subjects with diabetes on insulin therapy. Results: 61.38% subjects were men and 44.9% subjects were in the age group of > 60 years. Premixed insulin was the most commonly used insulin regimen (81.47%). Most of the subjects were on conventional insulin (86.8%). Insulin syringe was the most commonly used delivery device (64.7%). 13.1% of subjects were using non corresponding syringes with insulin vials. 94.9% subjects were regular with insulin therapy. 70.5% subjects were self-injecting insulin and 85.4% subjects were rotating the injection sites. Only 20.1% self adjusted the insulin dose. Only 50.7% subjects used the pinch up technique.

Keywords: diabetes mellitus; insulin injection technique; knowledge; attitude; practices.

GJMR-K Classification: NLMC Code: WK 820
Knowledge, Attitude and Practices Amongst Subjects with Diabetes on Insulin Therapy: A Need to Bridge the Gap

Surekha Bhujanga Shetty *, Lalitha Ramachandrappa o & Anil Kumar Rudramunisetty o

Abstract- Objectives: To assess the knowledge, attitude and practices of subjects with diabetes on insulin therapy. Materials and Methods: A questionnaire based cross-sectional study was done at Karnataka Institute of Endocrinology and Research, Bangalore in 448 subjects with diabetes on insulin therapy. Results: 61.38% subjects were men and 44.9% subjects were in the age group of > 60 years. Premixed insulin was the most commonly used insulin regimen (81.47%). Most of the subjects were on conventional insulin (86.8%). Insulin syringe was the most commonly used delivery device (64.7%). 13.1% of subjects were using non corresponding syringes with insulin vials. 94.9% subjects were regular with insulin therapy. 70.5% subjects were self-injecting insulin and 85.4% subjects were rotating the injection sites. Only 20.1% self adjusted the insulin dose. Only 50.7% subjects used the pinch up technique. 45.91% subjects used 90-degree angulation for insulin injection. 49.4% subjects found insulin therapy to be painful. Local site reactions were noted in 32.1% subjects. 45.91% subjects used 90-degree angulation for insulin injection. 49.4% subjects found insulin therapy to be painful. Local site reactions were noted in 32.1% subjects. Conclusions: Our study has found several errors in insulin injection technique that needs to be circumvented by pre-injection counselling and periodic reassessment by the clinicians.

Keywords: diabetes mellitus; insulin injection technique; knowledge; attitude; practices.

I. INTRODUCTION

Type 2 diabetes mellitus is a multi-systemic disease with multi-factorial etiology and needs multidisciplinary approach. Due to the slowly progressive beta-cell failure, up to 50% of the beta cells are not functioning adequately at diagnosis itself (1). The beta-cell failure continues further, at a rate of about 4% each year (2). Therefore, most patients with type 2 diabetes will require stepwise intensification of anti-diabetic therapy to achieve good glycemic control. According to the UKPDS data, each therapeutic agent increases the proportion of patients attaining HbA1c below 7%, (53 mmol/ mol) by 2 to 3 fold. But, only 50% of patients can maintain this goal after 3 years, and by 9 years only 25% can maintain glycemic control with the same drugs. Hence, it has been suggested that over a period of time, majority of patients will need addition of insulin therapy to attain an HbA1c level below 7% (53 mmol/ mol) (3).

Insulin is the oldest of the anti-diabetic medications available and hence has the most clinical experience. It is also the most effective agent in lowering hyperglycemia, since it can decrease any level of elevated HbA1c to the therapeutic goal, when used in appropriate doses. There is no maximum dose of insulin beyond which therapeutic effect will not occur (4). Despite of these advantages, there is significant delay in transitioning from oral agents to insulin therapy in most subjects with type 2 diabetes and insulin remains an underutilized tool for achieving glycemic control (5).

Amongst patients on insulin therapy, many patients continue to have elevated HbA1c levels and experience years of uncontrolled hyperglycemia. This is attributable to several obstacles in designing and implementing suitable insulin therapy. These obstacles could be physician related, patient related or even health care system related (6). Many studies have revealed poor knowledge, attitude and practices among subjects with type 2 diabetes on insulin therapy. It appears that there is a lot of scope for improvement in subjects with diabetes’ approach towards insulin therapy. Insulin injection technique is one of the most common areas with likelihood of errors and it is imperative to look at these factors for formulating a strategy of optimising insulin therapy.

a) Objectives

1. To assess the knowledge, attitude and practice (KAP) of subjects with diabetes who were self-administering insulin.
2. To assess the impact of KAP factors on their glycemic control.

II. MATERIALS AND METHODS

A cross-sectional study was conducted in the outpatient department of Karnataka Institute of Endocrinology and Research, Bangalore from 1st January
to 31st August 2015, through questionnaire based interview of 448 subjects with diabetes who were self administering insulin as a part of their diabetic therapy. The study was approved by the ethical committee of the hospital. The patients consent to participate in the study was taken, after the nature of the study was explained to them.

Subjects with diabetes, of any age and duration of diabetes, on insulin therapy and willing to participate in the study were included in the study. Patients who were not physically or mentally able to respond to the interview were excluded. The interviews with the patients were conducted by the diabetic educators cum nutritionists in our hospital. The questionnaire contained 33 questions, focussing on the type of insulin regimen, drug compliance, insulin storage, timing of insulin injection in relation to meal, insulin injection site rotation, etc. In addition to KAP data, we collected demographic data including gender, age, occupation, educational status, duration of diabetes, duration of insulin use, and level of glycemic control.

### III. Statistical Analysis

Data was entered into microsoft excel data sheet and was analyzed using SPSS 22 version software. Categorical data was represented in the form of frequencies and proportions. Chi-square was used as the test of significance. Independent t test was used as the test of significance for quantitative data. Continuous data was represented as mean and standard deviation. P value <0.05 was considered as statistically significant.

### IV. Results

In the study, 95.5% of subjects had type 2 diabetes and 4.5% had type 1 diabetes. Mean age of the subjects in the study was 55 ± 10.78 years. Mean age of type 1 DM subjects was 15.95 ± 10.78 years and Type 2 DM subjects was 56.82 ± 11.66 years. Significant number of subjects (44.9%) were in the age group of above 60 years. 61.38% of the subjects were male and 38.62% of the subjects were females. 36.4% of the subjects had duration of diabetes between 10 to 20 years; followed by duration between 5 to 10 years. 34.8% of the subjects were using insulin for < 1 year, while 33.9% between 1 to 5 years and 31.3% for > 5 years. Regarding the type of insulin used, 8.04% of the subjects were using basal insulin, 8.48% were using bolus insulin, 81.47% were using premixed insulin and 6.03% were using basal-bolus insulin. 82.6% of the subjects were using conventional insulin, 13.2% were using analogue insulin and 4.2% were using combination of conventional and analogue insulin. With respect to the insulin device used, 64.7% of the subjects were using insulin syringe, 33.5% were using insulin pen and 1.8% were using both. Mean HbA1c of subjects in the study was 9.91 ± 1.97. Among type 1 diabetics, mean HbA1c was 10.85 ± 2.76% and among type 2 diabetic mean HbA1c was 9.86 ± 1.91%. This difference in mean HbA1c between Type 1 and Type 2 DM subjects was statistically significant. 81.4% of the subjects had HbA1c >8% (64 mmol/mol). Only 5.7% of the subjects had HbA1c <7% (53 mmol/mol). Regarding education status of the patients, 14.1% had education up to primary school, 27.5% had education up to high school, and 12.7% had studied up to PUC / diploma. 23.7% were graduates and 22.1% were illiterate. 99.8% of subjects in the study were right handed and 17.9% of subjects had abnormal vision (Table 1).

In the study, 86.4% of subjects had obtained knowledge about insulin injection technique from trained professionals. Positive attitude regarding insulin therapy was seen in variable number of patients for different practices associated with insulin use. 91.2% subjects' verified the expiry date of insulin before use. 92.9% of subjects checked the name and type of insulin before use. 78.5% of subjects stopped using the insulin vial/cartridge after one month of initiation and 21.5% of subjects continued to use the same insulin even after one month of initiation. Of the 297 subjects using syringes for insulin injection, 86.9% were using corresponding syringe with insulin, while 13.1% were using wrong syringes. 96.6% of the subjects were injecting insulin directly on the skin while rest were injecting often through clothing. 40.2% of the subjects reported that they were avoiding insulin injections at social gatherings and outings. Almost 49.4% of subjects felt that insulin injections are painful. Local reactions like lumps/discoloration/abscess at the injection site were noted by 32.1% of subjects (Figure 1).

With respect to the practices, 94.9% of the subjects were taking insulin regularly. 70.5% of the subjects were self injecting insulin and 85.4% were rotating the sites of injections regularly. 50.7% of the subjects used the pinch up technique and folded the skin between thumb and index finger while taking insulin injection. Only 32.2% of subjects waited 10 sec before inserting the insulin needle, while 67.8% did not wait before insulin injection. Only 32.1% of subjects adjusted the insulin dose by self. Surprisingly, 1.5% of the subjects shared their insulin vials and pens (Figure 2).

71.4% and 54.8% of the subjects stored insulin in refrigerator when not in use and when in use respectively. 73.4% of the subjects preferred storing insulin in handbag while travelling. 58.9% of the subjects used insulin immediately after taking it out of the refrigerator. Most common sites used for insulin injection were thigh (53.1%), then upper arm (43.3%) and anterior abdomen (40.8%). Atleast 15.4% of the subjects used non-recommended sites for injection including inner thigh, around the umbilicus, hip, groin, calf muscle area, close to the knee, inner arm, forearm and hand. 57.2% of the subjects used clean site for insulin injection while 31.12% used spirit swab to clean the injection site. Only 45.91% of the subjects used 90 degree angulation for insulin injection, while 31.56% used 45 degree angulation.
and 17.05% used 30 degree angulation. Among 412 subjects who used conventional insulin, 42.72% of them maintained a injection- meal gap of 11 to 20 minutes and only 8.33% maintained a gap of 20-30 minutes between injection and meals. Out of 36 subjects who used analogue insulin, 27.78% injected within 10 minutes and 27.78% took injection immediately after meal. 98.2% of the subjects discarded insulin syringes in general waste (Table 2).

V. Discussion

Right injection technique is instrumental in making insulin therapy comfortable and acceptable to subjects with diabetes and also in achieving good glycemic control. Hence, it is essential to guide the patients on using insulin therapy with minimal discomfort and maximum benefits. The forum for injection technique, India has developed evidence based recommendations for the right insulin injection technique, to assist healthcare providers in guiding their patients. Apart from compliance with therapy and regular insulin dose titration, the forum has identified injection site selection, depth of injection, angulation of injection, time lapse before withdrawing the needle and time gap between injection and meals as some of the modifiable factors influencing the success of insulin injection therapy (7).

Studies from different countries have demonstrated that diabetes knowledge, attitude and practices (KAP) are poor among subjects with diabetes, especially regarding insulin therapy. Different studies have looked at different aspects of KAP and used different scales of measurement of KAP. In a cross-sectional study (n -150) in North Western Ethiopia, 30.7% of the patients reported that they had missed their insulin due to different reasons at different times (8). Another study of 575 subjects with diabetes in UAE showed that 57% had HbA1c levels reflecting poor glycemic control, while 10% admitted non-compliance with insulin therapy (9). A multinational survey of 1530 insulin-treated patients showed that 33.2% of patients reported insulin omission at least 1 day in a month, with an average of 3.3 days. The most common reasons for insulin omission included being busy, travelling, skipping meals, stress and public embarrassment (10). However, not many studies have been conducted to evaluate the errors in insulin injection technique.

Our findings show that there is gap in knowledge, attitude and practices amongst subjects with diabetes on insulin therapy. In our study, subjects with duration of diabetes more than atleast 5 years, were on insulin therapy. The study population consisted of subjects on insulin therapy for short and long duration equally. Despite of insulin therapy, the glycemic control was poor in most patients and only 5.7% of the subjects had HbA1c <7%. This can be explained by the fact that most of the respondents were patients visiting our institute for the first time and the reason for their visit was poor glycemic control.

In our study population, premixed insulin was the most commonly used insulin regimen, conventional insulin was the commonest insulin used and insulin syringe was the commonest device used. It appears that exploring the use of multi dose insulin regimen, insulin analogues, and pen devices more frequently may contribute to better glycemic control.

Despite of injection technique training by professionals, subjects were found to be committing many errors in insulin injection technique. Usage of non corresponding syringes (100 IU syringe with 40 IU insulin and vice versa) was seen in significant number of subjects. This is due to the fact that patients don’t have any knowledge of different types of syringes and their appropriate usage. Also, pharmacies dispense syringes without verifying the type of insulin being used by the patient. There have been instances when patients have drawn insulin from insulin penfills using 40 IU syringes. This obviously leads to erroneous dose delivery. Hence, clinicians should spend some time in educating their patients on the usage of corresponding syringes and vials and also verify at regular intervals if patients are following it. Delaying/ skipping insulin in social gatherings and outings, missing insulin often, taking insulin after meals, was noted in significant number of subjects. This can be minimised by counselling about the importance of each dose of insulin and how it can affect their overall glycemic control. Maintenance of time gap between the injection and meal was also not strictly followed both for conventional and analogue insulin. This shows that the knowledge about time for onset of action of each insulin should be provided to the subjects, so that they maintain the time gap everytime they take insulin injection. Rotating the site of insulin injection, use of pinch up technique, waiting for 10 seconds before withdrawing the needle, were not being followed in small number of subjects. Patient training in this aspect can reduce the pain associated with insulin injection and also maximise the insulin absorption. Shockingly, a small percentage of subjects’ shared the pen device with spouse, changing only the needle. This emphasises the importance of highlighting about not sharing delivery device/ insulin between individuals on insulin therapy. Last but not least, most of the subjects disposed insulin waste in general waste. This is happening because many people in India do not have access to medical waste disposal system. Our subjects were educated to store the disposables in a container and deliver it to nearest hospital for disposal. Yet, there is urgent need for establishing better medical waste disposal method by the public waste disposal system.

Nearly half of the subjects found insulin to be painful and also reported local site reactions like lumps, discoloration, and abscesses. This provides evidence that measures to reduce the pain associated with insulin
therapy and avoid local injection site reaction must be provided by the health care providers. Self titration of insulin dose was infrequently done in this study population. This highlights the need for patients on insulin therapy to be educated about self titration of insulin dose, so as to achieve rapid glycemic control. Therefore, it appears that initiating insulin therapy is just the beginning of a long journey of continuous monitoring and modification. Paying attention to the above modifiable factors in insulin injection technique will go a long way in achieving maximum benefit from insulin therapy.

VI. Conclusions

Our study has found several errors in insulin injection technique that makes the insulin injection painful, reduces patient compliance, prevents optimal utilisation of insulin therapy and also adversely effects glycemic control. The study confirms the need for pre-injection counselling, frequent reassessment of injection technique, and correction of errors in the insulin injection technique. Every clinician caring for diabetic patients must acknowledge, address, and alleviate these factors for achieving optimal success with insulin therapy.

VII. Acknowledgements

I would like to thank the diabetic educators cum nutritionists at Karnataka Institute of Endocrinology and Research, Bangalore including Mrs. Vasavi Shabrish, Mrs. Poornima H, Mrs. Deepthi Srinivas, Ms. Sharryana Shetty, Ms. Shruthi Ramesh and Ms. Shilpa Parmar for assisting me in data collection. I would also like to thank Dr. Mahesh Venki for assistance in statistical analysis.

References Réferences Referencias

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Type of DM</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type 1 Diabetes</td>
<td>20</td>
<td>4.5</td>
</tr>
<tr>
<td>Type 2 Diabetes</td>
<td>428</td>
<td>95.5</td>
</tr>
<tr>
<td><strong>Age</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; 39 years</td>
<td>61</td>
<td>13.6</td>
</tr>
<tr>
<td>40 to 49 years</td>
<td>48</td>
<td>10.7</td>
</tr>
<tr>
<td>50 to 59 years</td>
<td>138</td>
<td>30.8</td>
</tr>
<tr>
<td>&gt; 60 years</td>
<td>201</td>
<td>44.9</td>
</tr>
<tr>
<td><strong>Mean Age (Mean ± SD)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean Age Type 1 Diabetes (n =20)</td>
<td>15.95 ± 10.78 years</td>
<td></td>
</tr>
<tr>
<td>Mean Age Type 2 Diabetes (n =428)</td>
<td>56.82 ± 11.66 years</td>
<td></td>
</tr>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>275</td>
<td>61.38</td>
</tr>
<tr>
<td>Female</td>
<td>173</td>
<td>38.62</td>
</tr>
<tr>
<td><strong>Duration of Diabetes</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; 1 year</td>
<td>47</td>
<td>10.5</td>
</tr>
<tr>
<td>1 to 5 year</td>
<td>68</td>
<td>15.2</td>
</tr>
<tr>
<td>5 to 10 year</td>
<td>115</td>
<td>25.7</td>
</tr>
<tr>
<td>10 to 20 years</td>
<td>163</td>
<td>36.4</td>
</tr>
<tr>
<td>&gt; 20 years</td>
<td>55</td>
<td>12.3</td>
</tr>
<tr>
<td><strong>Education</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Illiterate</td>
<td>99</td>
<td>22.1</td>
</tr>
<tr>
<td>Primary School</td>
<td>63</td>
<td>14.1</td>
</tr>
<tr>
<td>High School</td>
<td>123</td>
<td>27.5</td>
</tr>
<tr>
<td>PUC and Diploma</td>
<td>57</td>
<td>12.7</td>
</tr>
<tr>
<td>Graduate and Above</td>
<td>106</td>
<td>23.7</td>
</tr>
<tr>
<td><strong>Duration of insulin use</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; 1 year</td>
<td>156</td>
<td>34.8</td>
</tr>
<tr>
<td>1 to 5 years</td>
<td>152</td>
<td>33.9</td>
</tr>
<tr>
<td>&gt; 5 years</td>
<td>140</td>
<td>31.3</td>
</tr>
<tr>
<td><strong>Insulin regime used</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Basal only</td>
<td>36</td>
<td>8.04</td>
</tr>
<tr>
<td>Bolus only</td>
<td>38</td>
<td>8.48</td>
</tr>
<tr>
<td>Pre mixed</td>
<td>365</td>
<td>81.47</td>
</tr>
<tr>
<td>Basal -Bolus</td>
<td>27</td>
<td>6.03</td>
</tr>
<tr>
<td><strong>Type of insulin used</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Conventional</td>
<td>370</td>
<td>82.6</td>
</tr>
<tr>
<td>Analogue</td>
<td>59</td>
<td>13.2</td>
</tr>
<tr>
<td>Conventional + Analogue</td>
<td>19</td>
<td>4.2</td>
</tr>
<tr>
<td><strong>Insulin device used</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Insulin Syringe</td>
<td>298</td>
<td>64.7</td>
</tr>
<tr>
<td>40 IU</td>
<td>290</td>
<td>97.3</td>
</tr>
<tr>
<td>100IU</td>
<td>8</td>
<td>2.7</td>
</tr>
<tr>
<td>Insulin pen</td>
<td>150</td>
<td>33.5</td>
</tr>
<tr>
<td>Refillable</td>
<td>99</td>
<td>62.6</td>
</tr>
<tr>
<td>Disposable</td>
<td>59</td>
<td>37.4</td>
</tr>
<tr>
<td><strong>HbA1c (n= 366)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; 7</td>
<td>21</td>
<td>5.7</td>
</tr>
<tr>
<td>7 to 8</td>
<td>47</td>
<td>12.8</td>
</tr>
<tr>
<td>&gt; 8</td>
<td>298</td>
<td>81.4</td>
</tr>
<tr>
<td><strong>Handedness</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Left</td>
<td>1</td>
<td>0.2</td>
</tr>
<tr>
<td>Right</td>
<td>447</td>
<td>99.8</td>
</tr>
<tr>
<td><strong>Vision</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Abnormal</td>
<td>80</td>
<td>17.9</td>
</tr>
<tr>
<td>Normal</td>
<td>368</td>
<td>82.1</td>
</tr>
</tbody>
</table>
Figure 1: Bar diagram showing attitude of diabetic subjects towards insulin injection technique.

- Insulin injections are painful: 49.4%
- Avoids taking insulin before meal at social gatherings: 40.2%
- Injects Insulin through Clothing: 3.4%
- Uses Corresponding Syringe with Insulin: 86.9%
- Checks the Name and Type of Insulin: 92.9%
- Use Insulin even after 1 month of Initiation: 21.5%
- Verifies Expiry Date of Insulin: 91.2%

Figure 2: Bar diagram showing practices among diabetic subjects with respect to insulin injection technique.

- Shares insulin vials or pen with anyone: 1.5%
- Adjusts the dose of insulin by self: 20.1%
- Takes insulin injection on the day of blood test: 73.9%
- Takes insulin injection after meal: 25.2%
- Waits before withdrawing the needle: 32.2%
- Uses pinch up technique for injection: 50.7%
- Rubs the site after injecting: 22.6%
- Rotates injection sites regularly: 85.4%
- Takes insulin injections Self: 70.5%
- Takes insulin injections regularly: 94.9%
**Table 2:** Insulin storage, injection procedure and other aspects of injection technique

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Method</th>
<th>Number (Percentage)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Storage of insulin pens and insulin vials when not in use</td>
<td>Refrigeration</td>
<td>320 (71.4)</td>
</tr>
<tr>
<td></td>
<td>Water Filled Earthen Pitcher</td>
<td>43 (9.6)</td>
</tr>
<tr>
<td></td>
<td>Room Temperature</td>
<td>43 (9.6)</td>
</tr>
<tr>
<td></td>
<td>Freezer</td>
<td>6 (1.3)</td>
</tr>
<tr>
<td></td>
<td>Others</td>
<td>4 (0.9)</td>
</tr>
<tr>
<td></td>
<td>NA</td>
<td>32 (7.1)</td>
</tr>
<tr>
<td>Storage of insulin pen in use</td>
<td>Refrigerator</td>
<td>102 (54.8)</td>
</tr>
<tr>
<td></td>
<td>Room Temperature</td>
<td>84 (45.2)</td>
</tr>
<tr>
<td>Storage of insulin device while travelling</td>
<td>Hand bag at room Temperature</td>
<td>332 (73.4)</td>
</tr>
<tr>
<td></td>
<td>Inside Water Bottle</td>
<td>33 (7.4)</td>
</tr>
<tr>
<td></td>
<td>Icepack</td>
<td>25 (5.6)</td>
</tr>
<tr>
<td></td>
<td>Others</td>
<td>52 (11.6)</td>
</tr>
<tr>
<td>Time for which refrigerated insulin vials are kept at room temperature before injecting, (n= 292)</td>
<td>Use Immediately</td>
<td>172 (58.9)</td>
</tr>
<tr>
<td></td>
<td>&lt; 5 min</td>
<td>40 (13.7)</td>
</tr>
<tr>
<td></td>
<td>10 to 20 min</td>
<td>61 (20.8)</td>
</tr>
<tr>
<td></td>
<td>&gt; 30 min</td>
<td>19 (6.5)</td>
</tr>
<tr>
<td>While mixing NPH/regular insulin, which insulin is drawn in to the syringe first?</td>
<td>NPH</td>
<td>1 (11.2)</td>
</tr>
<tr>
<td></td>
<td>Regular</td>
<td>8 (88.8)</td>
</tr>
<tr>
<td>Site of injection</td>
<td>Anterior Abdomen</td>
<td>183 (40.8)</td>
</tr>
<tr>
<td></td>
<td>Upper Arm</td>
<td>194 (43.3)</td>
</tr>
<tr>
<td></td>
<td>Thigh</td>
<td>238 (53.1)</td>
</tr>
<tr>
<td></td>
<td>Others</td>
<td>69 (15.4)</td>
</tr>
<tr>
<td>How injection site is cleaned</td>
<td>Don’t bother much</td>
<td>28 (6.41)</td>
</tr>
<tr>
<td></td>
<td>Use Spirit Swab</td>
<td>136 (31.12)</td>
</tr>
<tr>
<td></td>
<td>Uses Clean Site</td>
<td>250 (57.21)</td>
</tr>
<tr>
<td></td>
<td>Wash With Water</td>
<td>23 (5.26)</td>
</tr>
<tr>
<td>Angulation used while injection</td>
<td>90</td>
<td>202 (45.91)</td>
</tr>
<tr>
<td></td>
<td>45</td>
<td>138 (31.36)</td>
</tr>
<tr>
<td></td>
<td>30</td>
<td>75 (17.05)</td>
</tr>
<tr>
<td></td>
<td>Others</td>
<td>25 (5.68)</td>
</tr>
<tr>
<td>Injection and meal time gap (Conventional, n = 412)</td>
<td>≤10 min</td>
<td>42 (10.19)</td>
</tr>
<tr>
<td></td>
<td>11 to 20 min</td>
<td>176 (42.72)</td>
</tr>
<tr>
<td></td>
<td>21 min to 30</td>
<td>104 (25.24)</td>
</tr>
<tr>
<td></td>
<td>&gt; 30 min</td>
<td>15 (3.64)</td>
</tr>
<tr>
<td></td>
<td>Immediately after meal</td>
<td>69 (16.75)</td>
</tr>
<tr>
<td></td>
<td>Not known</td>
<td>6 (1.46)</td>
</tr>
<tr>
<td>Injection and meal time gap (Analogues, n = 36)</td>
<td>≤10 min</td>
<td>10 (27.78)</td>
</tr>
<tr>
<td></td>
<td>11 to 20 min</td>
<td>2 (5.56)</td>
</tr>
<tr>
<td></td>
<td>21 min to 30</td>
<td>3 (8.33)</td>
</tr>
<tr>
<td></td>
<td>&gt; 30 min</td>
<td>0 (0.00)</td>
</tr>
<tr>
<td></td>
<td>Immediately after meal</td>
<td>10 (27.78)</td>
</tr>
<tr>
<td></td>
<td>Not known</td>
<td>11 (30.56)</td>
</tr>
<tr>
<td>Disposal of used insulin syringes, needles or pens</td>
<td>General Garbage</td>
<td>440 (98.2)</td>
</tr>
<tr>
<td></td>
<td>Medical Waste</td>
<td>8 (1.2)</td>
</tr>
</tbody>
</table>
This page is intentionally left blank
Assessment of Nurses’ Knowledge and Attitude Towards Nursing Profession at Public Hospitals in Mekelle Town, Tigray, Ethiopia

By Zaid Tadesse Gebrezgabher & Gerezgiher Buruh Abera

Mekelle University

Abstract - Background: In health related areas it is clear that there are different perceptions of nursing. Perception by itself is merely defined as an idea, belief, or an image you have as a result of how you see or understand something. The Perception of nursing may vary depending on age, educational level, social and professional experience.

Objective: To assess Nurses’ knowledge and Attitude towards Nurses Profession in public hospitals in Mekelle Town, Tigray, Ethiopia.

Methods: Institution based cross sectional study design was conducted used to assess knowledge and attitude of nurses towards the nursing profession. Sample size was calculated using a formula for estimating a single population proportion. Accordingly, sample size was 135. The dependent variable was attitude of nurses. Simple random sampling techniques were used to select the desired institutions and population proportion to size allocation was done to select the intended study subjects. Data was collected by 10 professional nurses for 1 week using structured self administer questionnaire. Data was entered and analyzed using SPSS version 16.

Keywords: nurse, public hospitals, nursing profession.

GJMR-K Classification: NLMC Code: WY 16

Strictly as per the compliance and regulations of:
Assessment of Nurses' Knowledge and Attitude Towards Nursing Profession at Public Hospitals in Mekelle Town, Tigray, Ethiopia

Zaid Tadesse Gebrezgabher & Gerezghiher Buruh Aberapa

Abstract- Background: In health related areas it is clear that there are different perceptions of nursing. Perception by itself is merely defined as an idea, belief, or an image you have as a result of how you see or understand something. The Perception of nursing may vary depending on age, educational level, social and professional experience.

Objective: To assess Nurses’ knowledge and Attitude towards Nurses Profession in public hospitals in Mekelle Town, Tigray, Ethiopia.

Methods: Institution based cross sectional study design was conducted used to assess knowledge and attitude of nurses towards the nursing profession. Sample size was calculated using a formula for estimating a single population proportion. Accordingly, sample size was 135. The dependent variable was attitude of nurses. Simple random sampling techniques were used to select the desired institutions and population proportion to size allocation was done to select the intended study subjects. Data was collected by 10 professional nurses for 1 week using structured self administer questionnaire. Data was entered and analyzed using SPSS version 16.

Result: According to the findings 135 nurses were participated with a response rate of 92%. Accordingly, socio-demographic characteristics, more than half, 75(55.5%) of the respondents were females. About 48(35.6%) of the respondents age lies 36-40. Nearly half, 112(81.7%) of the respondents were married and the majority of the respondents, 117(86.6%) were orthodox followers. About 67%(%) of the respondents were diploma graduates in Nursing. Fifty six of them get monthly salary of 774-1644 ETB. The majority, 117 (86.6%) of the respondents primary work place were government hospitals and 86 of them had more than ten years of work experience. Out of 135 nurses, 124 (91.8%) of them had a favorable attitude for nursing profession. Majority of them, 99 (73.3%) have good knowledge towards nursing profession.

Conclusion and recommendation: Majority of the respondents like and had a favorable attitude towards nursing profession. Majority of them also have good knowledge towards nursing profession. Regional health beuro need to provide training for nurses to increase knowledge and change attitude of nurses.

Keywords: nurse, public hospitals, nursing profession.

I. CHAPTER ONE- INTRODUCTION

a) Background

The definition of Nursing defers from theory to other theory so is not an easy activity to define, but effort has been made by many scholars and health organizations to define it. Among those definitions Virginia Handerson’s definition of nursing is more elaborated definition. Virginia Handerson defined Nursing practice as the unique function of the nurse is to assist the individual, sick or well, in the performance of those activities contributing to health or its recovery (or to a peaceful death) that he would perform unaided if he had the necessary strength, will, or knowledge, and to do this in such a way as to help him to gain independence as rapidly as possible (1). The other known definition of nursing is by American Nurses Association (ANA), Nursing is the protection, promotion, and optimization of health and abilities; prevention of illness and injury; alleviation of suffering through the diagnosis and treatment of human responses; and advocacy in health care for individuals, families, communities, and populations (2).

Whatever notion or idea best describes nursing and whatever set of activities it is defined, it is clear that there are different perceptions of nursing. Perception by itself is merely defined as an idea, belief, or an image you have as a result of how you see or understand something (3). More importantly, Perception of nursing may vary depending on age, educational level, social and professional experience and occupational and social factors. My personal and professional experiences have revealed that there are different angles in which people perceive nursing. Some assume nursing as if “it is a vocation and doesn’t have its code of ethics” others consider it as “it is only for females” and most assume nursing as “it is only concerned with bed making”. The question is how people really perceive nursing particularly the actual perception among professional nurses. The study conducted in UK and Spain by involving nurses, nursing students, patients and non nursing students have revealed that the perception of nursing across all participating groups is largely the same and some changes in the perception of nursing takes place in nursing students. This means, the important
aspects of nursing are perceived more coherently by all the participant groups in the present study as evidenced by the derivation of an internally consistent factor (Factor 1: Important aspects of nursing) from all participant groups.

The second factor (Factor 2: Unimportant aspects of nursing) was not as clearly perceived and was only internally consistent for the diabetic outpatients. This suggests that there may be some difference in the perception of nursing by the diabetic outpatients from the other participant groups. They used the 35-item Nursing Dimensions Inventory (NDI-35) stem questions to gather perception of UK nursing students throughout their education program, qualified UK nurses and Diabetic outpatients (4). Generally Nurses are well thought of by the public, and their image is very positive. In a Harris poll taken in July 1999, more than 1,000 people were surveyed about their attitudes toward nursing. The poll showed that 92% of those polled trusted information about health care that provided by RNs and 85% would be pleased if their son or daughter became a RN. If we seriously entertain the views of people outside the field of nursing, we can decide collectively on an agenda that will put the best possible public face on nursing. It is important that we do this because nurses are the health care providers involved with the patient throughout the care continuum they manage the journey of patients under their care on a daily basis (5).

By other study it has also been demonstrated that unless public misconceptions of the nursing profession are not corrected nursing schools continue attract some students who do not have the academic and technical aptitudes to meet the nursing education requirement and unless staff nurses and other stakeholders work together to address the critical issue the goal of reducing the nursing shortage through recruitment and retention will remain a distant one (6).

Authors from various fields since Abraham Flexner (1910) have provided different perspectives on what professionalism means, including knowledge based on scientific principles, accountability, autonomy, inquiry, collegiality, collaboration, innovation, ethics and values (7).

Since Florence Nightingale published her 19th-century book “Notes on Nursing,” the nursing profession has developed from a low-paying, undesirable career into a highly acclaimed and respected profession. According to the American Nurses Association (ANA), professional nursing excellence centers on prevention of illness, alleviation of suffering, diagnosis, treatment and advocacy in the care of persons, families and communities.

Professional Development

Nursing is a challenging profession that tends to attract self-motivated, lifelong learners. A nurse’s education never ends, because of the need to stay in progress on health care issues and changes in medical theory and practice (8).

b) Statement of the Problem

Since the development of Florence Nightingale, each generation of nurses, in its own way, has fostered the movement to professionalize the image of nurses and nursing. The struggle to change the status of nurses from that of female domestic servants to one of high-level health care providers has been a primary goal of nursing’s leaders for many years (9).

Researchers have revealed a number of negative societal perceptions of nursing related to gender stereotyping, subordination to doctors, low academic standards, limited career opportunities and poor pay and conditions, and importantly how these perceptions may affect levels of recruitment into nursing. Focusing specifically on nurses, research has also considered the extent to which these societal perceptions are realities in their workplaces, and the direct experiences that contribute to attrition from both nursing courses and jobs. However, to date, little research has actually bridged the above approaches and considered the perceptions that nurses (6).

In addressing the negative images of nursing directors of nursing must develop strategies to at a local level before launching any national campaign to improve nurses’ image. But the pilots have indicated the need to improve nurses’ sense of their own work first (10).

How individuals perceive themselves and how they are perceived by others are an important part of the relationships between maternal health educators, nurses, other health-care providers, and the families they serve (11). A study conducted on the professional self-image, nurses employed in 22 Belgian general hospitals with the goal of identifying problems affecting recruitment and retention. Nurses reported having a positive self-image. Most were proud to be a nurse and considered themselves as competent health professionals and having great responsibility (12).

This area of study, Perception of nursing, has not been researched in developing countries. Thus, it is high time to carry out scientific inquiry to have new insight in Sub Saharan Countries such as Ethiopia where perception is remarkably affected by many social, economical, cultural and spiritual factors. Hopefully the finding of this research will fill the existing knowledge gap and contribute to educators and policy makers for creation of better awareness among the wider community. Though the perception of nursing could have impact on the coordinated work of the health care providers this study will focus only on the knowledge and attitude of nursing nurses towards nursing profession. Assessing knowledge and attitude of nurses to their profession may indirectly assess their motivation and deviation to give a service for the entire beneficiary.
This study have an expected input for any health professionals especially for nurses. Besides in the age of technological advances and economical complexes to health profession it is necessary to assess the perception of nurses to their protection. More over this study has importance for patients, and the community at large in which they all are service takers in which it may be influenced by nursing professionals. It may also have significant input for policy makers and researchers in which may be used as base line data.

II. Chapter two - Methods and Materials

An institution based cross-sectional study was conducted from May to December 2016. There are four governmental hospitals in Mekelle. Two of them are under RHB (Quiha and Mekelle hospital), one under the ministry of defense (North command referral hospital), one referral hospital (Ayder referral hospital). There are also four other private hospitals in the town. In addition there are eight health centers and 38 private clinics in Mekelle (35).

The source of population was all nurses who are working under Public hospitals in Mekelle town and a sampled eligible nurse with six months and above work experience in their respective public hospitals. The sample size has determined using a formula of single population proportion. Prevalence was taken as 56 %

\[ n = \frac{(Z_{\alpha/2})^2 p (1-p)}{d^2} \]

Since the study population was less than 10,000 finite population correction formulas was applied:

\[ nf = \frac{n}{1 + (n/N)} \]

\[ nf = \frac{378}{1 + (378/220)} \]

\[ nf = 140 \]

Adding 5% non response rate, the total sample size required for this study appears to be 147 nurses.

Data collection techniques, Instrument

This study was conducted using a structured, quantitative self administered questioner among public hospital in Mekelle town. A structured questionnaire has designed by reviewing previous similar studies in such a way that consists all the variables that can meet the objectives of the study. It includes all questions related to knowledge and attitude. The questionnaire was translated into Amharic language. The data was collected by 10 professional nurses with good data collection experience; two supervisors were selected from the group members. The data collectors were not staff members of the participants to ensure confidentiality. The supervisors was strictly followed the overall activities on daily base to ensure the completeness of the questionnaire, to give further clarification and support for data collectors. Training was given to data collectors for three days. In the training session, the data collectors were oriented on the objectives of the study, how to collect data and confidentiality of information was obtained. All the collected data were checked for completeness, accuracy and consistency by the principal investigators and supervisors. Five percent of the questionnaires were pre-tested at Wukro hospital for individual nurses with the same criteria and necessary corrections was done accordingly.

Study variables

Dependent variables: Attitude of nurses

Independent variables

✓ Socio demographic factor: Sex, Age, Marital status, Religion, Profession
✓ Individual Factor : Knowledge , previous experience, training, work experience

Data processing and analysis

The data was checked in the field to ensure that all the information if properly collected and recorded. Before and during data processing the information was checked for its completeness. Data was analyzed using scientific calculator. All data was coded in terms of numbers. The collected data was summarized and presented using measure tables and charts, all of which are instruments for interpretation of the collected data.

To assess attitude of nurses towards nursing profession was developed by presenting respondents with a series of negative and positive statements that reflect different aspects of the underlying attitude in a variety of ways. Attitude statements have five possible responses. The responses was labeled as “favorable” or “unfavorable” as follows; “favorable” responses were responses including strongly agreeing and agree for positive statements and strongly disagree, disagree for negative statements. “Unfavorable” responses’ are responses including “strongly agree”, “Agree” and uncertain for negative statements, and disagree, strongly disagree and uncertain for positive statements. Marking the total attitude score out of hundred, those
with scores of greater than 50% was rated to have favorable attitude and those with a score below 50% as unfavorable attitude.

Knowledge of the respondents towards safe abortion was measured by marking the correct answers of subjects out of a hundred. Knowledge scores 50% or less was labeled as “poor knowledge”, knowledge scores between 50% and 70% was labeled as moderate knowledge” and knowledge score above 70% was labeled as “good knowledge” (37).

Ethical Considerations

The study proposal was approved by the ethical clearance committee of Sheba University College. Written permission of these hospitals was secured for their employees to participate in the study and; each nurse within these hospitals was given a written consent to participate in the study after a thorough explanation of the objectives and the procedures of the study. Specifically, respondents was informed about the objectives of the study and that their participation be purely voluntary and they can be free to decline or withdraw at any time during the course of the study. So only those willing to participate were included in the study. Confidentiality was insured by making the questionnaires anonymous. Personal identification of the respondents was not asked. They were also assured that the information provided in writing would be used only for research purpose and would therefore be strictly anonymous.

III. Chapter Three: Result

a) Socio-Demographic Characteristics

About 147 self administered questionnaire were prepared to be distributed into respondents of all public hospitals in Mekelle town. About 135 of nurses were participated with a total response of 92%.

According to the findings of socio-demographic characteristics, more than half, 75(55.5%) of the respondents were females. About 48(35.6%) of the respondents age lies 36-40. Nearly half, 112(81.7%) of the respondents were married and the majority of the respondents, 117(86.6%) were orthodox followers. About 67(%) of the respondents were diploma graduates in Nursing. Fifty six of them they get monthly salary about 774-1644 ETB. The majority, 117 (%) of the respondents primary work place were government hospitals and 86 (%) of the respondents had more than ten years of work experience (Table 1).

Table-1: Socio-demographic characteristics of nurses on knowledge and attitude of nursing profession at public hospitals in Mekelle town from May to July 2016 (n=135)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex of the respondent</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>75</td>
<td>55.5</td>
</tr>
<tr>
<td>Male</td>
<td>60</td>
<td>44.5</td>
</tr>
<tr>
<td>Age category</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20-25</td>
<td>6</td>
<td>4.4</td>
</tr>
<tr>
<td>26-30</td>
<td>10</td>
<td>7.4</td>
</tr>
<tr>
<td>31-35</td>
<td>15</td>
<td>11.1</td>
</tr>
<tr>
<td>36-40</td>
<td>48</td>
<td>35.6</td>
</tr>
<tr>
<td>41-45</td>
<td>37</td>
<td>27.5</td>
</tr>
<tr>
<td>46-50</td>
<td>15</td>
<td>11.1</td>
</tr>
<tr>
<td>&gt;50</td>
<td>4</td>
<td>2.9</td>
</tr>
<tr>
<td>Marital status of the respondent</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Married</td>
<td>112</td>
<td>81.7</td>
</tr>
<tr>
<td>Divorced</td>
<td>4</td>
<td>2.9</td>
</tr>
<tr>
<td>Cohabiting</td>
<td>1</td>
<td>0.7</td>
</tr>
<tr>
<td>Widowed</td>
<td>4</td>
<td>2.9</td>
</tr>
<tr>
<td>Single</td>
<td>16</td>
<td>11.8</td>
</tr>
<tr>
<td>Religion of the respondent</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Orthodox</td>
<td>117</td>
<td>86.6</td>
</tr>
<tr>
<td>Muslim</td>
<td>15</td>
<td>11.1</td>
</tr>
<tr>
<td>Protestant</td>
<td>3</td>
<td>2.2</td>
</tr>
<tr>
<td>Work experience of the respondent (in years)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 month -1year</td>
<td>7</td>
<td>5.18</td>
</tr>
<tr>
<td>1-3</td>
<td>18</td>
<td>13.3</td>
</tr>
<tr>
<td>3-5</td>
<td>11</td>
<td>8.1</td>
</tr>
<tr>
<td>5-10</td>
<td>11</td>
<td>8.1</td>
</tr>
<tr>
<td>&gt;10</td>
<td>86</td>
<td>65</td>
</tr>
</tbody>
</table>
b) Nurses attitude towards nursing profession

As shown below, out of the 135 nurses, 124 (91.8%) of them had a favorable attitude for nursing profession [Fig. 3].

c) Knowledge and feeling for nursing profession

 Majority of the respondents, 99 (73.3%) have good knowledge towards nursing profession. Majority of the respondents, 95 (70.3%) like nursing profession. About 40 (29.6%) of the respondents didn’t like their profession due to low payment compare to their efforts, bad administrative system in the environment they work with, due to it has not grantee and work over load 19(14%), 5(3.7%), 3(2.2%), 2(1.5%) respectively (table 3).

Table-3: Knowledge and feeling to like nursing profession of nurses on nursing profession at public hospitals in Mekelle town from May to July 2016 (n=135)

<table>
<thead>
<tr>
<th>Do you like your nursing profession</th>
<th>frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>106</td>
<td>78.5</td>
</tr>
<tr>
<td>No due to low payment</td>
<td>19</td>
<td>14.1</td>
</tr>
<tr>
<td>No due to work overload</td>
<td>2</td>
<td>1.5</td>
</tr>
<tr>
<td>No due to bad administrative system</td>
<td>5</td>
<td>3.7</td>
</tr>
<tr>
<td>No due to it has not guarantee</td>
<td>3</td>
<td>2.2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>135</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Knowledge</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Poor knowledge</td>
<td>13</td>
<td>9.7</td>
</tr>
<tr>
<td>Moderate knowledge</td>
<td>23</td>
<td>17</td>
</tr>
<tr>
<td>Good knowledge</td>
<td>99</td>
<td>73.3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>135</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

IV. Chapter Four: Discussion

In this study about 135 of nurses were participated with main purpose assessing nurse’s attitude towards nursing profession at public hospitals, in Mekelle town.

According to the results that were trying to assess the attitude of nurses towards nursing profession, majority of the respondents 91.8% had a favorable attitude. This result is high when we compare to a study done at Addis ababa in which about 56% of the respondents have positive perception for nursing profession. This gap may be due to although respondents on both studies have same salary but there is a big gap on their daily personal expenses that is high expense for living in Addis compare to Mekelle. So it is difficult to live with this professions salary in which this respond may indirectly affect their attitude towards their profession.

Majority of the respondents 106 (78.5%) like nursing profession. About 40 (29.6%) of the respondents didn’t like their profession due to low payment compare to their efforts, bad administrative system in the environment they work with, due to it has not grantee and work over load 19(14.1%), 5(3.7%), 3(2.2%), 2(1.5%) respectively. Majority of the respondents, 99 (73.3%) have good knowledge towards nursing profession.

V. Chapter Five Conclusion and Recommendation

- Majority of the respondents had a favorable attitude towards nursing profession
Majority of the respondents like nursing profession
Majority of the respondents have good knowledge towards nursing profession
Of those didn’t like their profession due to low payment compare to their efforts and bad administrative system in the environment they work with, due to it has not grantee and work over load were the main reasons they hate their work.

Recommendation
According to the conclusions the following recommendations are drown Regional government need to provide training for nurses to have consistent good knowledge for their profession.

ABBRIVATION AND ACRONYMS

ANA American nursing association
CI confidence interval
P Prevalence
PI Principal investigator
UK United kingdom
WHO World health organization

REFERENCES Références Referencias
An Analytical Study of Chest Girth, Vital Capacity and Respiratory Rate of Inter Collegiate Players of Selected Ball Games

By Miss. Shivani & Dr. Arvind Kumar Tripathi
R. C. College of Physical Education

Introduction- The lungs, heart and blood vessels perform a vital function as the body’s supply system. They supply the muscles with the necessary fuels and oxygen, and carry away waste products such as carbon-dioxide (CO2) and lactic acid. Consequently, the cardio-respiratory system in the athlete needs to be developed to match the muscles which it supplies and cleanses. It is believed that bigger the lungs and heart size greater will be the cardio-respiratory efficiency. Hence the Research Scholar undertook the present study to determine the relationship among the selected variables as well to find out the difference among the Football, Volleyball and Handball.

Keywords: chest girth, vital capacity, respiratory rate, physical education.

GJMR-K Classification: NLMC Code: WF 102

Strictly as per the compliance and regulations of:

© 2017. Miss. Shivani & Dr. Arvind Kumar Tripathi. This is a research/review paper, distributed under the terms of the Creative Commons Attribution-Noncommercial 3.0 Unported License http://creativecommons.org/licenses/by-nc/3.0/), permitting all non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.
An Analytical Study of Chest Girth, Vital Capacity and Respiratory Rate of Inter Collegiate Players of Selected Ball Games

Miss. Shivani & Dr. Arvind Kumar Tripathi

Keywords: chest girth, vital capacity, respiratory rate, physical education

I. INTRODUCTION

The lungs, heart and blood vessels perform a vital function as the body’s supply system. They supply the muscles with the necessary fuels and oxygen, and carry away waste products such as carbon-dioxide (CO2) and lactic acid. Consequently, the cardiorespiratory system in the athlete needs to be developed to match the muscles which it supplies and cleanses. It is believed that bigger the lungs and heart size greater will be the cardio-respiratory efficiency.

The Research Scholar undertook the present study to determine the relationship among the selected variables as well to find out the difference among the Football, Volleyball and Handball.

a) Statement of the problem

The research scholar was interested to undertake the study stated as “An Analytical Study of Chest Girth, Vital Capacity and Respiratory Rate of Intercollegiate Players of Selected Ball Games”.

b) Purpose of the study

1. The main purpose of the study was to find out the relationship among selected variables i.e. the Chest girth, Vital capacity and Respiratory rate of intercollegiate players of selected ball games.
2. The other purpose of the study was to determine the difference in Chest girth, Vital capacity and Respiratory rate among the players of three selected ball games.

c) Significance of the study

1. The findings of the study would be helpful to the physical education teachers, coaches and players to know the relationship among the chest girth, vital capacity and respiratory rate.
2. The result of the study would help for diagnostic purpose.

3. The findings might help to know which sportsmen possess greater vital capacity and strong respiratory rate hence suitable training programme may be advised accordingly.

d) Hypothesis

1. On the basis of literature, discussion with the experts and scholar’s own understanding it was hypothesized that there will be positive co-relation among the selected variables.
2. It was further hypothesized that there will be significance differences in chest girth, vital capacity and respiratory rate among the intercollegiate players of selected ballot games.

e) Delimitations

The present study was restricted to the following aspects:-

1. 30 male inter collegiate players were selected from Pt. R.S. University, Raipur.
2. The age of the subjects was ranging from 18 to 28 years.
3. The study was further delimited to the following selected variables: Chest girth, vital Capacity and respiratory rate.
4. The study also delimited to Football, Handball and Volleyball players only.

f) Limitations

1. Coaching and physical education background of the subjects were unknown to the research scholar.
2. The social and economical statuses of the subjects were not known.
3. Diet of the subjects was unknown.
4. Daily routine activities of the subjects were also unknown to the scholar.

II. OPERATIONAL DEFINITION OF THE TERMINOLOGIES

a) Chest girth

Chest girth is the circumference of chest at the level of the nipples in front sub scapular region at the back and is measured at the end of a normal expiration.
b) **Vital capacity**
   It can be defined as the total volume of air that can be forcibly expire after a complete inspiration.

c) **Respiratory rate**
   Number of breaths taken in a minute or number of inspiration/expiration in a minute.

### III. Design of the Study

In this chapter selection of subjects, sources of data, selection of tests and criterion measures, administration of test and collection of data are described.

a) **Sources of Data**
   For the present study intercollegiate male players of Physical Education were the sources of data.

b) **Selection of Subjects**
   30 male intercollegiate players of Pt. R.S. University, Raipur, 10 from each selected sports were selected as subjects for the purpose of the study. The age of the subjects was ranging from 18 to 28 years.

c) **Sampling Procedure**
   Simple random sampling method was adopted for the present study.

d) **Criterion Measures**
   The criterion measures chosen for the present study were as under -
   1. Chest girth was measured by using non stretchable steel tape, and the score was recorded in cm.
   2. Vital capacity was measured by using wet spirometer, and the score was recorded in litre.
   3. The respiratory rate was counted by using stop watch, and the score was recorded in numbers of exhalation or inhalation in one minute.

e) **Collection of Data**
   The data pertaining to the study were collected by applying the selected above mentioned tests following the under described procedures.

f) **Administration of Tests**
   i. **Chest girth**
      *Purpose:* to measure the chest circumference of the subjects.
      *Equipment:* non stretchable steel tape.
      *Scoring:* the tester observed the indicator closely to note when it had reached the highest point. The score was recorded in cm.
   ii. **Vital capacity**
      *Purpose:* - to measure the volume of air in the lungs at the end of maximal inspiration.
      *Equipment:* Wet spirometer
      *Scoring:* the tester observed the indicator closely to note when it had reached the highest point. The score was recorded in litres.
   iii. **Respiratory rate**
      *Purpose:* To measure the inhalation and exhalation of the subjects.
      *Equipment:* stop watch and mat.
      *Scoring:* The total number of exhalation or inhalation per minute was recorded for each subject.

### IV. Analysis and Interpretation

a) **Finding**
   The data collected on chest girth, vital capacity and respiratory rate of football, volleyball and handball players were computed by using Pearson’s Product Moment co-efficient correlation and one way analysis of variance (F- ratio) statistical techniques. The result pertaining to these have been presented in the following tables.

<table>
<thead>
<tr>
<th>GAME</th>
<th>VARIABLES CORRELATED</th>
<th>CO – EFFICIENT OF CORRELATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Football</td>
<td>Chest Girth and Vital capacity</td>
<td>0.655*</td>
</tr>
<tr>
<td></td>
<td>Chest Girth and Respiratory rate</td>
<td>- 0.772*</td>
</tr>
<tr>
<td></td>
<td>Vital capacity and Respiratory rate</td>
<td>- 0.419</td>
</tr>
<tr>
<td>Volleyball</td>
<td>Chest Girth and Vital capacity</td>
<td>0.86*</td>
</tr>
<tr>
<td></td>
<td>Chest Girth and Respiratory rate</td>
<td>- 0.88*</td>
</tr>
<tr>
<td></td>
<td>Vital capacity and Respiratory rate</td>
<td>- 0.08</td>
</tr>
<tr>
<td>Handball</td>
<td>Chest Girth and Vital capacity</td>
<td>0.86*</td>
</tr>
<tr>
<td></td>
<td>Chest Girth and Respiratory rate</td>
<td>- 0.71*</td>
</tr>
<tr>
<td></td>
<td>Vital capacity and Respiratory rate</td>
<td>- 0.73*</td>
</tr>
</tbody>
</table>

An analysis of data of football players in Table- 1 reveals that there is significant positive correlation in between chest girth and vital capacity as the calculated r – value of 0.655 is higher than the tabulated r –value of
0.632 at 0.05 level for 8 degrees of freedom, there is also significant negative correlation in between chest girth and respiratory rate as the calculated r-value of 0.772 is higher than the tabulated r-value of 0.632 but there is no significant correlation between vital capacity and respiratory rate as the calculated r-value of 0.419 is lesser than the tabulated r-value of 0.632 at 0.05 level for 8 degrees of freedom.

For analysis of data of volleyball players, there is significant positive correlation in between chest girth and vital capacity as the calculated r-value of 0.86 is higher than the tabulated r-value 0.632, there is also significant negative correlation in between chest girth and respiratory rate as the calculated r-value of 0.88 is higher than the tabulated r-value of 0.632, but there is no significant correlation between vital capacity and respiratory rate as r-value of 0.08 is lesser than the tabulated r-value of 0.632 at 0.05 level for 8 degrees of freedom.

For analysis of data of handball players, there is significant positive correlation in between chest girth and vital capacity as the calculated r-value of 0.86 is higher than the tabulated r-value of 0.632, there is also significant negative correlation in between chest girth and respiratory rate as the calculated r-value of 0.71 is higher than tabulated r-value of 0.632, and also significant negative correlation in between vital capacity and respiratory rate as the calculated r-value of 0.73 is higher than the tabulate r-value of 0.632 at 0.05 level for 8 degrees of freedom.

Table 2: Comparison of chest girth, vital capacity and respiratory rate among the Intercollegiate male players of Football, Volleyball and Handball

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>SOURCE OF VARIATION</th>
<th>DEGREE OF FREEDOM</th>
<th>SUM OF SQUARE</th>
<th>MEAN SUM OF SQUARE</th>
<th>F-- RATIO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chest girth</td>
<td>Between the groups</td>
<td>k-1 = 3-1 =2</td>
<td>34.4</td>
<td>34.4/2 =17.2</td>
<td>17.2/38.8 = 0.44</td>
</tr>
<tr>
<td></td>
<td>Within the groups</td>
<td>N-K= 30-3 =27</td>
<td>1047.6</td>
<td>1047.6/27 =38.8</td>
<td>3.42*</td>
</tr>
<tr>
<td>Vital capacity</td>
<td>Between the groups</td>
<td>k-1 = 3-1 =2</td>
<td>2.74</td>
<td>2.74/2=1.37</td>
<td>3.04/3.92 =0.78</td>
</tr>
<tr>
<td></td>
<td>Within the groups</td>
<td>N-K = 30-3 =27</td>
<td>10.83</td>
<td>10.83/27 =0.40</td>
<td></td>
</tr>
<tr>
<td>Respiratory rate</td>
<td>Between the groups</td>
<td>k-1 = 3-1 =2</td>
<td>6.07</td>
<td>6.07/2=3.04</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Within the groups</td>
<td>N-K = 30-3 =27</td>
<td>105.8</td>
<td>105.8/27 =3.92</td>
<td></td>
</tr>
</tbody>
</table>

Table-2 reveals that there are significant difference of vital capacity among the intercollegiate players of selected three ball games as the calculated ‘F’ values, respectively 0.44 and 0.78 are lesser than the tabulated ‘F’ value of 3.35 at 0.05 level for (2,27) degree of freedom. But there are no significant difference of chest girth and respiratory rate among the intercollegiate players of selected three ball games as the calculated ‘F’ values, respectively 0.44 and 0.78 are lesser than the tabulated ‘F’ value of 3.35 at 0.05 level for (2,27) degree of freedom.

Since the obtained F- ratio was found to be significant, the Least Significant Difference Post Hoc Test was applied to determine the paired mean difference among the selected groups has been shown in Table-3.

Table 3: Paired mean difference of vital capacity among football, volleyball and handball players

<table>
<thead>
<tr>
<th>MEAN OF</th>
<th>MEAN DIFFERENCE</th>
<th>CRITICAL DIFFERENCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>FOOTBALL</td>
<td>VOLLEYBALL</td>
<td>HANDBALL</td>
</tr>
<tr>
<td>4.07</td>
<td>3.49</td>
<td>0.58*</td>
</tr>
<tr>
<td>4.07</td>
<td>4.18</td>
<td>0.11</td>
</tr>
<tr>
<td>3.49</td>
<td>4.18</td>
<td>0.69*</td>
</tr>
</tbody>
</table>

The findings of table-3 reveals that there is significant difference of vital capacity in between the football and volleyball players and also volleyball and handball players as the mean difference of 0.58 and 0.69 respectively are higher than the critical difference of 0.57 at 0.05 level. But there is no significant difference of vital capacity in between the football and handball games players at 0.05 level as means difference of 0.11 is lesser than the critical value of 0.57.
Discussion on Findings

It is learnt from the findings of Table -1 that there are significant positive correlation in between chest girth and vital capacity \( (r=0.655, 0.86 \text{ and } 0.86) \) of Football, Volleyball and Handball players respectively. The significant positive correlation might have occurred may be attributed to the fact that greater vital capacity depends upon the size of lungs and efficiency of the intercostals muscles which are attached to the ribs of the chest cavity, hence such results occurred in this study.

The findings of Table-1 reveals that there are negatively significant correlation in between chest girth and respiratory rate \( (r= -0.772, -0.88 \text{ and } -0.71) \) of Football, Volleyball and Handball players it may be because less respiratory rate is the product of bigger chest cavity and efficient lungs function, hence this results occur.

Significant relationship also shown in between respiratory rate and vital capacity \( (r= -0.73) \) of Handball players it may probably be due to optimal improvement of lungs efficiency.

Findings of Table-3 showed that there are significant mean difference in vital capacity between the Football and Volleyball players \( (MD= 0.69) \), the significant mean difference occur may be one of the fastest game in the world and completely combination of Aerobic and Anaerobic nature of activity hence they need to improve the vital capacity, according larger vital capacity was shown by the handball players in comparison to volleyball and football players.

V. Conclusion

Under the limitation of the study and on the basis of statistical findings it concluded that there are significant positive correlations in between chest girth and vital capacity and negatively significant correlations in between suggested that to improve vital capacity and develop respiratory rate need to pay due attention for improvement of the chest girth. It is also concluded that handball players showed higher vital capacity than the football and volleyball players, hence due importance to be given while construct a training schedule for the handball players.

Bibliography

6. Gajendra Prakash, “Comparison of selected Physiological and Phsical Fitness Factors of soccer and cricket players”, (Unpublished Master’s Thesis Jiwaji University,1984.)
Equine erythrocyte lysed exposed to t-butyl hydroperoxide as a model to study the oxidative stress caused by exercise using a chemiluminescence assay

By Savignone C & Palacios A

Abstract- The present investigation was carried out to determine the presence of oxidative alterations in the horses erythrocyte membrane during a high intensity exercise test. The degree of peroxidation was estimated by chemiluminescence using a suspension of lysed erythrocytes incubated with t-butyl hydroperoxide (t-BHP). Differences were observed in the total values of chemiluminescence throughout the exercise routine, with higher values of light emission obtained with the animal at rest in relation to those observed during and after exercise. The conclusions of this study are the existence of changes in the erythrocyte membranes of the horses exposed to physical exertion, probably associated with the release of ROS caused by the exercise and that the determination of chemiluminescence in suspension of lysates erythrocyte is a sensitive assay applied to detect the existence of oxidative stress associated to physical exercise.

Keywords: oxidative stress; exercise; chemiluminescence; erythrocyte; tert-butyl hydroperoxide.

GJMR-K Classification: NLMC Code: WH 150
Equine Erythrocyte Lysed Exposed to T-Butyl Hydroperoxide as a Model to Study the Oxidative Stress Caused by Exercise Using a Chemiluminescence Assay

Savignone C * & Palacios A *

Abstract- The present investigation was carried out to determine the presence of oxidative alterations in the horses erythrocyte membrane during a high intensity exercise test. The degree of peroxidation was estimated by chemiluminescence using a suspension of lysed erythrocytes incubated with t-butyl hydroperoxide (t-BHP). Differences were observed in the total values of chemiluminescence throughout the exercise routine, with higher values of light emission obtained with the animal at rest in relation to those observed during and after exercise. The conclusions of this study are the existence of changes in the erythrocyte membranes of the horses exposed to physical exertion, probably associated with the release of ROS caused by the exercise and that the determination of chemiluminescence in suspension of lysates erythrocyte is a sensitive assay applied to detect the existence of oxidative stress associated to physical exercise.

Keywords: oxidative stress; exercise; chemiluminescence; erythrocyte; tert-butyl hydroperoxide.

I. INTRODUCTION

During the exercise, there are several potential sources to produce reactive oxygen species, which can produce oxidative stress. Exercise generates different types of physiological responses in an individual that depend on the type and duration of the same, since it supposes a stress for the organism that tests its capacity of adaptation (Art and Lekeux 2005; Vollaard et al. 2005; Posada Arias et al. 2013). During exercise, oxygen consumption (VO₂) is increased, which is used to produce energy in the mitochondria of muscle fibers, generating intermediate species called reactive oxygen species (ROS) (Inayama et al. 2000; Fernandez et al. 2009). In blood, the oxidation of oxyhemoglobin to methaemoglobin generates a large amount of ROS, the value of which is directly related to the type of exercise performed and the need for oxygen in the tissues (Clemens and Waller 1987; Svistunenko 2005). The ROS production during exercise depends on the intensity, frequency, duration and type of exercise (Williams et al. 2005; Kirschvink et al. 2008). Therefore, the exercise is considered as a condition of excessive generation of ROS, which also results in compensatory compensations by the antioxidant systems (Vollaard et al. 2005), however, ROS generation can become overwhelming for the antioxidant defense system and pose potential problems, inducing the loss of membrane integrity and cellular dysfunctions, affecting cellular lipids, proteins and DNA (Clarkson and Thompson 2000). In relation to blood cells, circulating erythrocytes are regularly exposed to stress conditions and are especially vulnerable as they have no membrane repair mechanism or regenerative capacity. Due to the high tension of O₂ in arterial blood and the content of Fe, within erythrocyte continuously occur ROS such as O₂ (-), H₂O₂ and HO (Bakker et al. 2000; Cimen 2008; Herlax et al. 2011). It is known that ROS readily attack polyunsaturated fatty acids (PUFAs), present in cell membranes, such as the erythrocyte, a process known as lipid peroxidation (oxidative destruction of PUFAs) (Dillard et al. 1978). Oxidative lipid damage can lead to disorganization, dysfunction and destruction of membranes (Halliwell and Gutteridge 1990). This may be due to a decrease in their fluidity, inactivation of receptors and enzymes, increased ion permeability and eventually membrane rupture (Gutteridge and Halliwell 1990; Gutteridge 1995). The presence of oxidative stress does not automatically imply oxidative damage. Oxidative stress has been defined as the exposure of cells to various sources that produce a break in the balance between the pro-oxidant factors and the antioxidant mechanisms responsible for eliminating these chemical species, either by a deficit of these defenses or by an exaggerated increase of the production of ROS. All this results in alterations of the structure-function relationship in any specialized organ, system or cell group (Venero Gutierrez 2002). Oxidative damage can only be verified by direct measurement of different markers of this process. Peroxidation is the biomarker of oxidative damage most extensively studied after exercise (Deaton and Marlin 2003). Various studies in human and veterinary medicine have been developed for the analysis of peroxidation in red blood cells, with the exposure to a large number of prooxidants agents such as: cumenehydroperoxide (Akoev et al. 1998; Tesoriere et al. 2001), t-butyl hydroperoxide (t-BHP) (Mawatari et al. 2001), t-butyl hydroperoxide (t-BHP) (Mawatari et al. 2001).
Murakami 2001; Zou et al. 2001; Iglesias and Catalá 2005) and hydroperoxides of fatty acids (Mawatari and Murakami 1998; Udi1o1 et al. 2003). They have been made from suspensions of erythrocyte ghosts (Mawatari and Murakami 1998, 2001; Tesoriere et al. 2001, Zou et al. 2001, Udi1o1 et al. 2003, Iglesias and Catalá 2005 and Muriel 2016), or from lysed cells (Van der Zee 1996; Domanski et al. 2004; Svi1tenenko 2005; Sajewicz 2010; Sajewicz et al. 2015; Savignone et al. 2016). The aim of the present study was to determine the presence of oxidative alterations in the erythrocyte membrane in horses submitted to a high intensity exercise test by estimating the degree of peroxidation by chemiluminescence.

II. MATERIALS AND METHODS

a) Materials

The tert-BHP was obtained from Sigma Chemical Co. (St. Louis, MO, USA). All other reagents and chemicals were of analytical grade.

b) Animals

Eight adult horses, weighing between 450 and 470 kg and belonging to University farm, were used in the assay. Horses were maintained on alfalfa bale and tap water ad libitum.

The horses were accustomed to continuous training on a treadmill (Kagra, Mustang 2200) which is in the Laboratory of Physiology and Pathophysiology of Equine Sport, Faculty of Veterinary Sciences, National University of La Plata. The animals were given the following standardized exercise protocol: preheating 1 min at 1.5 m/s and 4 min at 4 m/s; then, with a 3% slope, 1 minute steps were performed with increasing intensities (5; 6; 7; 8; 9; 10; 11; 12; 13 m/sec, etc.) until reaching the fatigue point. Finally, the recovery phase was performed without slope at 4 and 1.5 m/s for 4 and 1 min respectively (Muriel 2016). Peripheral blood samples were obtained from the right jugular vein (previous channeling) in heparinized tubes. Samples were taken with the animal at rest prior to exercise (T0 or rest), at the fatigue point (T1 or exercise) and at the end of recovery (T2 or recovery) (Muriel 2016). All applicable international, national, and/or institutional guidelines for the care and use of animals were followed.

c) Preparation of erythrocytes

Samples were quantified based on hemoglobin concentration, determined by photometry on a Sysmex KX21-N hematology analyzer (Sysmex corporation, Kobe, Japan). The erythrocytes were isolated from whole blood by centrifugation (1000g for 10 min at 4°C). The buffy coat and plasma were discarded and erythrocytes were washed three times in isotonic phosphate buffer (PBS 5 mM pH 7.4, 150 mM NaCl). The erythrocytes pellet was suspended in isotonic phosphate buffer. Preparation of suspension of lysates erythrocyte was carried out according to the method of Dodge et al. (1963). Briefly, packed, washed erythrocytes were lysed by adding 10 vol of 5 mM phosphate buffer pH 7.4 (at 4°C) while mixing and after leaving on ice for 30 min. Finally, homogenizing the suspension.

d) Peroxidation of erythrocyte analyzed by chemiluminescence

Suspensions of lysates erythrocyte were incubated at a final concentration of 0.25 mg/ml total hemoglobin with 2 mM t-BHP for 40 min at 37°C. Identical aliquots of the preparation were incubated for 40 min at 37°C without addition of t-BHP as the control experiment for endogenous peroxidation products in the erythrocyte lysates preparation.

Peroxidation was initiated by adding a small amount of stock solution of t-BHP (80 mM) to each vial that was maintained at 37°C and was measured by monitoring light emission (Wright et al. 1979) with a liquid scintillation analyzer Packard 1900 TR. Chemiluminescence was determined over a 40 min period and recorded as count per minute (cpm) every 10 min.

e) Statistical analysis

Analysis of variance and student’s t-test was performed to test the significance of difference (P<0.05) between the mean values among groups.

f) Results

The addition of t-BHP to equine suspension of lysates erythrocyte resulted in the peroxidation as evidenced by the emission of light. All results are shown in Table 1.
Table 1: Total light emission (cpm x 1000) of lysates erythrocyte

<table>
<thead>
<tr>
<th>Blood sample time</th>
<th>Equine 1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>mean ± SE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>with t-BHP</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>T0</td>
<td>260,1</td>
<td>370,8</td>
<td>271,2</td>
<td>401,1</td>
<td>246,1</td>
<td>400,5</td>
<td>425,0</td>
<td>277,9</td>
<td>331.62±26a</td>
</tr>
<tr>
<td></td>
<td>without t-BHP</td>
<td>90,4</td>
<td>139,2</td>
<td>174,9</td>
<td>149,3</td>
<td>89,5</td>
<td>115,1</td>
<td>187,2</td>
<td>91,9</td>
</tr>
<tr>
<td>T1</td>
<td>250,4</td>
<td>262,9</td>
<td>184,2</td>
<td>256,1</td>
<td>174,8</td>
<td>250,7</td>
<td>315,5</td>
<td>251,4</td>
<td>243.29±16c</td>
</tr>
<tr>
<td></td>
<td>with t-BHP</td>
<td>98,1</td>
<td>99,4</td>
<td>122,9</td>
<td>150,1</td>
<td>93,9</td>
<td>78,1</td>
<td>145,1</td>
<td>190,7</td>
</tr>
<tr>
<td></td>
<td>without t-BHP</td>
<td>107,9</td>
<td>185,9</td>
<td>114,8</td>
<td>156,3</td>
<td>103,3</td>
<td>93,9</td>
<td>234,6</td>
<td>200,9</td>
</tr>
</tbody>
</table>

abc: means with different superscripts differ significantly at p < 0.05

Differences were observed in the total values of chemiluminescence throughout the exercise routine, with observed values of 331.620 cpm (± 26.324), 243.290 cpm (± 15.875) and 242.630 cpm (± 8.351) for T0, T1 and T2 respectively. The values obtained were different between T0 and T1 and between T0 and T2 (p = 0.0413 and 0.0131 respectively). There were no differences between T1 and T2.

Figure 1 shows the total chemiluminescence during incubation of equine suspension of lysates erythrocyte with or without the addition of t-BHP.

The higher value of chemiluminescence reached with addition of t-BHP was 425.002 cpm (equine 7, TO) while the minimum value was 174.860 cpm (equine 5, T1). The data are given in Fig. 2.

![Fig. 1: Total chemiluminescence during incubation with or without t-BHP](image)
III. DISCUSSION

It is known that horses are exposed to exercise-induced changes in oxidative/antioxidant balance, depending on the type of exercise, intensity and duration, training level, environmental conditions, and the presence of diseases (Williams et al. 2005, 2012). In this specie, the occurrence of oxidative stress induced by exercise has been well demonstrated (Hargreaves et al. 2002; Kirschvink et al. 2002). Both training and exercise induce the production of ROS which cause cell and tissue damage (Clarkson and Thompson 2000). The mechanics of ROS generation are not completely clear, although its sources include the oxidation of hemoglobin in the same blood and the processes of ischemia-reperfusion in various tissues (Van der Zee 1996; Domanski et al. 2004; Svištunenko 2005; Muriel 2016). These mechanisms may act synergistically and their magnitude is related to the type of exercise performed and its intensity (Finaud et al. 2006). Respect to the ischemia-reperfusion mechanism, during exercise the flow of blood is restricted in some areas (kidneys and splanchnic region) to be diverted to the active muscles. This produces a hypoxia state in restricted areas, directly related to the magnitude of the exercise (Adams and Best 2002). Also, muscles undergo relative hypoxia during exercise performed at intensities above maximal oxygen consumption, since the supply cannot meet the energy needs (Powers and Jackson 2008). Finally, reoxygenation of these tissues, known as payment of oxygen debt, occurs after cessation of exercise, which leads to an increase in ROS generation (Ji 1999).

In the present study, suspension of lysates erythrocyte from equine submitted to a high intensity exercise, were exposed to a prooxidant (t-BHP). Erythrocytes have many scavenger systems, and can be used to examine the balance between pro-oxidants and antioxidants since they are representative cells where superoxide radicals are being continuously generated by auto oxidation of hemoglobin. We used lysed red cells because we believe it is a relatively simple model, since in these cells the presence of redox-active hemoglobin residues, with peroxidative activity, potentially catalyzes the oxidation of membrane components including polyunsaturated lipids (Everse et al. 1994; Alayash et al. 2001; Silaghi Dumitrescu et al. 2007; Lu et al. 2014; Ansari et al. 2015).

Lipid peroxidation is by far the most extensively studied marker of oxidative damage following exercise (Deaton and Marlin 2003). Although it is possible to have chemiluminescence without lipid peroxidation in cell-free systems, it is established that an increase in lipid peroxidation rate in organs and isolated cells produces a parallel increase in photoemission.

We observed the existence of changes in the erythrocyte membranes of the horses subjected to physical exertion, these findings clearly suggest the pro-oxidant environment prevailing in the blood during high-intensity exercise, probably associated with the release of ROS caused by the exercise.

IV. ACKNOWLEDGEMENTS

This work was supported by Secretaría de Ciencia y Técnica, Universidad Nacional de La Plata, V227 grant to Dr. A. Palacios.

BIBLIOGRAFÍA

30. Muriel MG. (2016) Determinación de la cinética del daño en el ADN de leucocitos de sangre periférica en equinos sometidos a esfuerzo físico de alta intensidad. DMV Thesis. Faculty of Veterinary Sciences, National University of La Plata.


Towards Automated Epileptic Seizure Detection for Lightweight Devices through EEG Signal Processing

By Noor Mohammad, Shamim Ara, Mst Rafiatul Jannat & Ding Shifang

Shandong University

Abstract- Epileptic seizure is considered as one of the severe disorder of the nervous system. The quality of life hampered those have this disorder. An appropriate system which can detect the epilepsy will leverage the quality of life for the affected person. This paper mainly focuses on the development of a novel method to detect real-time epileptic seizure based on lightweight device such as ‘Emotiv Epoc’. Weighted Permutation Entropy (WPE) value was computed to segment and extract the features. A threshold based algorithm which optimizes the battery consumption of the epoc device has also been proposed.

Keywords: epileptic seizure, k-means clustering, discrete wavelet transform, power optimization.

GJMR-K Classification: NLMC Code: WL 140
Towards Automated Epileptic Seizure Detection for Lightweight Devices through EEG Signal Processing

Noor Mohammad *, Shamim Ara *, Mst Rafiatul Jannat * & Ding Shifang *

Abstract: Epileptic seizure is considered as one of the severe disorder of the nervous system. The quality of life hampered those have this disorder. An appropriate system which can detect the epilepsy will leverage the quality of life for the affected person. This paper mainly focuses on the development of a novel method to detect real-time epileptic seizure based on lightweight device such as ‘Emotiv Epoc’. Weighted Permutation Entropy (WPE) value was computed to segment and extract the features. A threshold based algorithm which optimizes the battery consumption of the epoc device has also been proposed.

Keywords: epileptic seizure, k-means clustering, discrete wavelet transform, power optimization.

I. INTRODUCTION

Epilepsy is one of the most common disorders of the nervous system and affects people of all ages, races and ethnic backgrounds. Epileptic seizures are characterized by an unpredictable occurrence pattern and transient dysfunctions of the central nervous system, due to excessive and synchronous abnormal neuronal activity in the cortex [1]. This activity could include several neurons of different locations and sizes. The clinical symptoms of epileptic seizures might affect the motor, sensory, and automatic functions of the body along with the consciousness, cognition, and memory of the patient [2]. To diagnosis of epilepsy, EEG signal interpretation is considered as the most prominent testing tools due to painless, at a reasonable cost, and efficient temporal resolution of long-term monitoring [3]. However for long EEG recording the visual interpretation becomes an expensive, intensive and tedious error-prone exercise and also result can be vary from different neurophysiologists in same recording [4].

In a conventional system, EEG recording used to be conducted in well equipped hospitals which required equipments are at least bulky, expensive, and require professional setup and configuration. The development of several sophisticated, lightweight and accurate EEG recording devices with wireless transmission like ‘Emotiv Epoc’ [15] becomes more practical for epileptic patients, offer movement freedom and lowering the infection risks due to percutaneous plugs. The availability of such kind of devices open the door for smartphone based epilepsy care. Today the smartphone has the strong processing capability with high speed wireless connectivity and being extensively used even in low and middle income countries and possible to capture the seizure event and it may serve like a physician having witnessed the event. Now there arises some question such as whether it will satisfy the physician expectation or not, how faster it will give the result against the physician.

In this paper we mainly focus on real-time EEG signal processing for epilepsy monitoring. Here we have designed and developed a novel method for preprocessing and classification step which is suitable for real-time epilepsy detection. Our classification algorithm is based on unsupervised learning and it needs to calibrate the system before running the detection. We also propose a method to optimize the power consumption of the portable device using motion detection algorithm.

The rest of this paper is organized as follows. Section 2 discusses the review of prior work related to the use of smartphone. Section 3 details the EEG processing pipeline for our approach and its components. Section 4 presents the experimental discussion and the power optimization algorithm, followed by the conclusion in Section 5.

II. RELATED WORK

Many researches were done by using offline data form laboratory to improve the feature extraction and classification module. However, a very few real-time work was done with the live EEG data using lightweight devices. In [4], they have evaluated the presently available applications of mobile phones in the day to day care of epileptic patients as a diagnostic,
Towards Automated Epileptic Seizure Detection for Lightweight Devices through EEG Signal Processing

César et al. [5] showed the multi-centre prospective assessment and evaluation of seizure prediction performance on a long-term EEG recording of 278 patients suffering from pharmaco-resistant partial epilepsy, also known as refractory epilepsy. They explained that computational intelligence techniques showed a high potential for seizure prediction.

Sang-Hong Lee et al. [6] proposed new combined methods to classify normal and epileptic seizure EEG signals using wavelet transform (WT), phase-space reconstruction (PSR), and Euclidean distance (ED) based on a neural network with weighted fuzzy membership functions (NEWFM). From 24 initial extracted features, 4 minimum features with the highest accuracy were selected using a non-overlap area distribution measurement method supported by the NEWFM and this resulted in performance sensitivity, specificity, and accuracy of 96.33%, 100%, and 98.17%, respectively.

An efficient feature extraction method was proposed by computing the spectral power of Hjorth’s mobility components, which were effectively estimated by differentiating EEG signals in real-time [7]. They used five epileptic patients EEG data and resulted in a detection rate of 99.46% between interictal and epileptic EEG signals and 99.78% between normal and epileptic EEG signals. Their results suggest that the spectral features of Hjorth’s mobility components in EEG signals can represent seizure activity and may pave the way for developing a fast and reliable epileptic seizure detection method.

Noha S. Tawfik et al. [8] introduced a new automated seizure detection model that integrates Weighted Permutation Entropy (WPE) and a Support Vector Machine (SVM) classifier model to enhance the sensitivity and precision of the detection process. The WPE algorithm relies on the ordinal pattern of the time series along with the amplitudes of its sample points. They implemented and tested on hundreds real EEG signals and the performance is compared based on sensitivity, specificity and accuracy. They did various experiments in different scenarios including healthy with eyes open, healthy with eyes closed, epileptic patients during no-seizure state from two different location of the brain. Their results claimed outstanding performance and revealed promising results in terms of discrimination of seizure and seizure free segments with manifests high robustness against noise sources.

In [9], the authors proposed the new features based on the phase space representation (PSR) for classification of epileptic seizure and seizure-free EEG signals. First of all EEG signals were decomposed using empirical mode decomposition (EMD) and then phase space reconstructed for obtained intrinsic mode functions (IMFs). They proposed new features based on the 2D and 3D PSRs of IMFs for classification of epileptic seizure and seizure-free EEG signals. Least squares support vector machine (LS-SVM) employed for classification of epileptic seizure and seizure-free EEG signals, and evaluated its classification performance using different kernels namely, radial basis function (RBF), Mexican hat wavelet and Morlet wavelet kernels.

In this work we designed and developed a real-time EEG signal processing using Weighted Permutation Entropy based segmentation and select optimum features from time domain and frequency domain and applied the unsupervised machine learning technique to detect the epileptic seizure. We also proposed a threshold based algorithm to optimize the power consumption of the light weight weight device as Emotiv epoc.

III. Materials and Methods

In our study we used CHB-MIT scalp EEG dataset which is publicly available in online [14]. This database was collected at the Children’s Hospital Boston, consists of EEG recordings from pediatric subjects with intractable seizures. Subjects were monitored for up to several days following withdrawal of anti-seizure medication in order to characterize their seizures and assess their candidacy for surgical intervention. The EEG data were recorded with respect to the international standard 10–20 system. Such recordings were collected from 24 patient subjects where 5 males-aged 3 to 22, 17 females-aged 1.5 to 19 and 1 unknown. All EEG recordings were sampled at 256 Hz with 16-bit resolution. Most files contain 23 EEG signals (24 or 26 in a few cases). In general, the dataset consisted of 916 h of continuously recorded EEG and 198 seizures. All recordings of every patient were divided into 1 h length. According to the annotation files accompanying the dataset, the duration of a seizure was at least 9 s in every EEG recording while the longest seizure was about 190 s long. In this study, we took total 8 minutes where 240 s before the seizure onset for the pre-ictal state and 240 s after the seizure onset for the ictal and post-ictal states from every EEG recording including 23 channels (figure 2(a)). The whole procedure is shown in figure 1.
a) Preprocessing

To reduce the computational cost and optimize the memory, firstly we resample the EEG raw data from higher frequency to a smaller frequency 128Hz. Band pass filter and notch filter has been applied to remove the artifacts. First of all we applied low pass filter with 0.1Hz and then followed by high pass filter with 60Hz frequency. The power line interference has been eliminated by using 50Hz notch filter. This filter has been designed according to [10], the quality factor $Q$ is calculated by

$$Q = \frac{f_0}{(f_2-f_1)}$$

(1)

Here frequency $f_0$ at 50 Hz while the cutoff frequencies $f_1$ and $f_2$ at 49 Hz and 51 Hz, respectively. As the filtered signal still nonstationary so we segment the signal using Weighted Permutation Entropy (WPE) value which has been calculated according to [8, 11]. The probability distribution of each pattern with weight $\omega$ can be represented as:

$$P(\omega\pi i) = \frac{\Sigma j < N \text{1: type}(u) = \pi i(X_j) \omega j}{\Sigma j < N \text{1: type}(u) = \pi (X_j) \omega j}$$

(2)

Figure 1: Flow diagram of this work.
b) Feature Extraction

The approach to epileptic feature extraction was based on mobility, Fourier transform and wavelet transform. Twenty-five time-domain features were computed for all the selected electrodes, using consecutive 5 s windows without overlap.

For generating time-varying spectral features of the differentiated EEG signals, we applied Short-time Fourier transform (STFT). In the STFT analysis, the parameters of the sliding window were optimized, including the window size and the step size. Then we extracted the averaged powers ranging from 2 to 55 Hz with 2-Hz frequency resolution. For each frequency-bin, we calculated the ratio of the averaged power of differentiated signals to that of the original signals. Those calculated ratios of all frequency-bins were constructed as a feature vector into classifiers.
A discrete wavelet transform (DWT) was utilized to facilitate efficient time-frequency analysis. The segmented signal is decomposed into a set of coefficients describing the frequency content at given times. According to [12], the DWT can be defined as:

\[ S_{2^i}x(n) = h_k S_{2^{i-1}}x(n - 2^{i-1}k) \]  

(6)

\[ W_{2^i}x(n) = \sum_{k \in Z} g_k S_{2^{i-1}}x(n - 2^{i-1}k) \]  

(7)

where \( S_{2^i} \) is a smoothing operator, \( W_{2^i} \) is the digital signal \( x(n) \), \( k \in Z \) is the integral set, and \( h_k \) and \( g_k \) are coefficients for the corresponding low-pass and high-pass filters. As the filtered signal at level \( i \) is downsampled, so we reduce the length of the signal at level \( i - 1 \) by a factor of two and generating the detail (\( d_i \)) and approximation coefficients (\( a_i \)) at level \( i \). In our work, using Daubechies 4 (DB4) we produced wavelet coefficients, including detail and approximation coefficients at levels 1–4.

c) Classification

For real time scenario, there is no way to first label or train the data while analyzing live EEG. So we adopted unsupervised classification techniques. That is, these techniques only depend on the information contained in the EEG data. Considering the flexibility of the computation we used K-means clustering technique which partitions the objects into \( K \) mutually exclusive clusters, such that objects within each cluster are as close to each other as possible, and as far from objects in other clusters as possible [10,16]. Grouping similar components of a signal enables physicians to localize seizure states quickly. The K-means algorithm minimizes the within-cluster sum of squares by Lloyd iteration to make the data to the same cluster more compact and dependent.

The Euclidean distance between the \( i \)th data point and the \( j \)th centroid is defined as follows:

\[ d(x_i, c_j) = \sqrt{\sum_{j=1}^{k} (x_i - c_j)^2} \]  

(9)

The central point of a cluster is recomputed as:

\[ c_j = \frac{1}{k \cdot \sum_{x \in c_j} x} \]  

(10)

The overall k-means algorithm summarized as:

1. Initialization
   a. Define the number of clusters (\( k \))
   b. Designate a cluster center for each cluster, typically chosen from the available data points
2. Assign each remaining data point to the closest cluster centre. That data point is now a member of that cluster.
3. Calculate the new cluster centre from equation (10).
4. Calculate the sum of within-cluster sum of squares from equation (8). If this value has not significantly changed over a certain number of iterations, stop the iterations. Otherwise, go back to step 2.

IV. Experimental Results

We have divided the data as healthy (N), interictal (I) and epileptic (E). According to section 3 we have preprocessed and extracted features. These extracted features then fed to the k-means clustering algorithm and we analyzed the results. Our results showed 97.6 % accuracy. Figure 4 showed the different error rate after applying k-means clustering technique. The statistical measurement showed in Table 1.

**Table 1**: Performance measurement of our proposed method using K-means clustering

<table>
<thead>
<tr>
<th>Precision</th>
<th>Recall</th>
<th>F-Measure</th>
<th>ROC Area</th>
<th>Class</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.98</td>
<td>0.985</td>
<td>0.983</td>
<td>0.999</td>
<td>N</td>
</tr>
<tr>
<td>0.97</td>
<td>0.97</td>
<td>0.97</td>
<td>0.997</td>
<td>I</td>
</tr>
<tr>
<td>0.98</td>
<td>0.97</td>
<td>0.975</td>
<td>0.999</td>
<td>E</td>
</tr>
</tbody>
</table>
a) **Power optimization**

Emotiv Epoc device has limited battery life. We have developed a threshold based algorithm which will optimize the battery life (Figure: 3). In this case, user first needs to place his/her smartphone in arm using an arm hand. Then we will use the inbuilt motion sensor to check the frequency of the body movement. If the frequency movement fall under 2-5 Hz then we consider it as an ongoing seizure and we turn on the epoc device for 10 minutes. After 10 minutes the device will turn to sleep mode and send an acknowledgement to smartphone. So the smartphone is again becoming sensing mode and checking the body movement as described above.

**Figure 3:** Flow diagram of power optimization

**Figure 4:** Different error rate for K-means clustering
V. Conclusion

Monitoring of epilepsy is considered a very challenging activity which requires a set of technical and essential processes including continuous acquisition of EEG signals, pre-processing, feature extraction and selection, seizures detection and classification and continuous visualization of the obtained results. The main contribution of this article lies in developing and implementing an automatic, efficient and scalable approach to monitor the unpredictable occurrence of epileptic seizures in a reasonable time. Our experimental results showed the feasibility to apply our technique in lightweight device such as Emotiv epoc.

References Références Referencias


6. Sang-Hong Lee, Joon S. Lim, Jae-Kwon Kim, Junggi Yang, Youngho Lee, Classification of normal and epileptic seizure EEG signals using wavelet transform, phase-space reconstruction, and Euclidean distance, Computer Methods and Programs in Biomedicine, Volume 116, Issue 1, August 2014, Pages 10-25, ISSN 0169-2607.


FELLLOW OF ASSOCIATION OF RESEARCH SOCIETY IN MEDICAL (FARSM)

Global Journals Incorporate (USA) is accredited by Open Association of Research Society (OARS), U.S.A and in turn, awards “FARSM” title to individuals. The ‘FARSM’ title is accorded to a selected professional after the approval of the Editor-in-Chief/Editorial Board Members/Dean.

The “FARSM” is a dignified title which is accorded to a person’s name viz. Dr. John E. Hall Ph.D., FARSS or William Walldroff, M.S., FARSM.

FARSM accrediting is an honor. It authenticates your research activities. After recognition as FARSM, you can add 'FARSM' title with your name as you use this recognition as additional suffix to your status. This will definitely enhance and add more value and repute to your name. You may use it on your professional Counseling Materials such as CV, Resume, and Visiting Card etc.

*The following benefits can be availed by you only for next three years from the date of certification:*

FARSM designated members are entitled to avail a 40% discount while publishing their research papers (of a single author) with Global Journals Incorporation (USA), if the same is accepted by Editorial Board/Peer Reviewers. If you are a main author or co-author in case of multiple authors, you will be entitled to avail discount of 10%.

Once FARSM title is accorded, the Fellow is authorized to organize a symposium/seminar/conference on behalf of Global Journal Incorporation (USA). The Fellow can also participate in conference/seminar/symposium organized by another institution as representative of Global Journal. In both the cases, it is mandatory for him to discuss with us and obtain our consent.

You may join as member of the Editorial Board of Global Journals Incorporation (USA) after successful completion of three years as Fellow and as Peer Reviewer. In addition, it is also desirable that you should organize seminar/symposium/conference at least once.

We shall provide you intimation regarding launching of e-version of journal of your stream time to time. This may be utilized in your library for the enrichment of knowledge of your students as well as it can also be helpful for the concerned faculty members.
The FARSM can go through standards of OARS. You can also play vital role if you have any suggestions so that proper amendment can take place to improve the same for the benefit of entire research community.

As FARSM, you will be given a renowned, secure and free professional email address with 100 GB of space e.g. johnhall@globaljournals.org. This will include Webmail, Spam Assassin, Email Forwarders, Auto-Responders, Email Delivery Route tracing, etc.

The FARSM will be eligible for a free application of standardization of their researches. Standardization of research will be subject to acceptability within stipulated norms as the next step after publishing in a journal. We shall depute a team of specialized research professionals who will render their services for elevating your researches to next higher level, which is worldwide open standardization.

The FARSM member can apply for grading and certification of standards of their educational and Institutional Degrees to Open Association of Research, Society U.S.A. Once you are designated as FARSM, you may send us a scanned copy of all of you credentials. OARS will verify, grade and certify them. This will be based on your academic records, quality of research papers published by you, and some more criteria. After certification of all your credentials by OARS, they will be published on your Fellow Profile link on website https://associationofresearch.org which will be helpful to upgrade the dignity.

The FARSM members can avail the benefits of free research podcasting in Global Research Radio with their research documents. After publishing the work, (including published elsewhere worldwide with proper authorization) you can upload your research paper with your recorded voice or you can utilize chargeable services of our professional RJs to record your paper in their voice on request.

The FARSM member also entitled to get the benefits of free research podcasting of their research documents through video clips. We can also streamline your conference videos and display your slides/ online slides and online research video clips at reasonable charges, on request.
The FARSM is eligible to earn from sales proceeds of his/her researches/reference/review Books or literature, while publishing with Global Journals. The FARSS can decide whether he/she would like to publish his/her research in a closed manner. In this case, whenever readers purchase that individual research paper for reading, maximum 60% of its profit earned as royalty by Global Journals, will be credited to his/her bank account. The entire entitled amount will be credited to his/her bank account exceeding limit of minimum fixed balance. There is no minimum time limit for collection. The FARSM member can decide its price and we can help in making the right decision.

The FARSM member is eligible to join as a paid peer reviewer at Global Journals Incorporation (USA) and can get remuneration of 15% of author fees, taken from the author of a respective paper. After reviewing 5 or more papers you can request to transfer the amount to your bank account.

**MEMBER OF ASSOCIATION OF RESEARCH SOCIETY IN MEDICAL (MARM)**

The ' MARM ' title is accorded to a selected professional after the approval of the Editor-in-Chief / Editorial Board Members/Dean.

The “MARM” is a dignified ornament which is accorded to a person’s name viz. Dr. John E. Hall, Ph.D., MARM or William Walldroff, M.S., MARM.

MARM accrediting is an honor. It authenticates your research activities. After becoming MARM, you can add ‘MARM’ title with your name as you use this recognition as additional suffix to your status. This will definitely enhance and add more value and repute to your name. You may use it on your professional Counseling Materials such as CV, Resume, Visiting Card and Name Plate etc.

*The following benefits can be availed by you only for next three years from the date of certification.*

MARM designated members are entitled to avail a 25% discount while publishing their research papers (of a single author) in Global Journals Inc., if the same is accepted by our Editorial Board and Peer Reviewers. If you are a main author or co-author of a group of authors, you will get discount of 10%.

As MARM, you will be given a renowned, secure and free professional email address with 30 GB of space e.g. johnhall@globaljournals.org. This will include Webmail, Spam Assassin, Email Forwarders, Auto-Responders, Email Delivery Route tracing, etc.
We shall provide you intimation regarding launching of e-version of journal of your stream time to time. This may be utilized in your library for the enrichment of knowledge of your students as well as it can also be helpful for the concerned faculty members.

The MARSM member can apply for approval, grading and certification of standards of their educational and Institutional Degrees to Open Association of Research, Society U.S.A.

Once you are designated as MARSM, you may send us a scanned copy of all of your credentials. OARS will verify, grade and certify them. This will be based on your academic records, quality of research papers published by you, and some more criteria.

It is mandatory to read all terms and conditions carefully.
Institutional Fellow of Open Association of Research Society (USA) - OARS (USA)

Global Journals Incorporation (USA) is accredited by Open Association of Research Society, U.S.A (OARS) and in turn, affiliates research institutions as “Institutional Fellow of Open Association of Research Society” (IFOARS).

The “FARSC” is a dignified title which is accorded to a person’s name viz. Dr. John E. Hall, Ph.D., FARSC or William Walldroff, M.S., FARSC.

The IFOARS institution is entitled to form a Board comprised of one Chairperson and three to five board members preferably from different streams. The Board will be recognized as “Institutional Board of Open Association of Research Society”-(IBOARS).

The Institute will be entitled to following benefits:

The IBOARS can initially review research papers of their institute and recommend them to publish with respective journal of Global Journals. It can also review the papers of other institutions after obtaining our consent. The second review will be done by peer reviewer of Global Journals Incorporation (USA).

The Board is at liberty to appoint a peer reviewer with the approval of chairperson after consulting us.

The author fees of such paper may be waived off up to 40%.

The Global Journals Incorporation (USA) at its discretion can also refer double blind peer reviewed paper at their end to the board for the verification and to get recommendation for final stage of acceptance of publication.

The IBOARS can organize symposium/seminar/conference in their country on behalf of Global Journals Incorporation (USA)-OARS (USA). The terms and conditions can be discussed separately.

The Board can also play vital role by exploring and giving valuable suggestions regarding the Standards of “Open Association of Research Society, U.S.A (OARS)” so that proper amendment can take place for the benefit of entire research community.

We shall provide details of particular standard only on receipt of request from the Board.

The board members can also join us as Individual Fellow with 40% discount on total fees applicable to Individual Fellow. They will be entitled to avail all the benefits as declared. Please visit Individual Fellow-sub menu of GlobalJournals.org to have more relevant details.
We shall provide you intimation regarding launching of e-version of journal of your stream time to time. This may be utilized in your library for the enrichment of knowledge of your students as well as it can also be helpful for the concerned faculty members.

After nomination of your institution as “Institutional Fellow” and constantly functioning successfully for one year, we can consider giving recognition to your institute to function as Regional/Zonal office on our behalf. The board can also take up the additional allied activities for betterment after our consultation.

The following entitlements are applicable to individual Fellows:

Open Association of Research Society, U.S.A (OARS) By-laws states that an individual Fellow may use the designations as applicable, or the corresponding initials. The Credentials of individual Fellow and Associate designations signify that the individual has gained knowledge of the fundamental concepts. One is magnanimous and proficient in an expertise course covering the professional code of conduct, and follows recognized standards of practice.

Open Association of Research Society (US)/ Global Journals Incorporation (USA), as described in Corporate Statements, are educational, research publishing and professional membership organizations. Achieving our individual Fellow or Associate status is based mainly on meeting stated educational research requirements.

Disbursement of 40% Royalty earned through Global Journals: Researcher = 50%, Peer Reviewer = 37.50%, Institution = 12.50% E.g. Out of 40%, the 20% benefit should be passed on to researcher, 15 % benefit towards remuneration should be given to a reviewer and remaining 5% is to be retained by the institution.

We shall provide print version of 12 issues of any three journals [as per your requirement] out of our 38 journals worth $ 2376 USD.

Other:

The individual Fellow and Associate designations accredited by Open Association of Research Society (US) credentials signify guarantees following achievements:

- The professional accredited with Fellow honor, is entitled to various benefits viz. name, fame, honor, regular flow of income, secured bright future, social status etc.
In addition to above, if one is single author, then entitled to 40% discount on publishing research paper and can get 10% discount if one is co-author or main author among group of authors.

- The Fellow can organize symposium/seminar/conference on behalf of Global Journals Incorporation (USA) and he/she can also attend the same organized by other institutes on behalf of Global Journals.

- The Fellow can become member of Editorial Board Member after completing 3yrs.

- The Fellow can earn 60% of sales proceeds from the sale of reference/review books/literature/publishing of research paper.

- Fellow can also join as paid peer reviewer and earn 15% remuneration of author charges and can also get an opportunity to join as member of the Editorial Board of Global Journals Incorporation (USA)

- This individual has learned the basic methods of applying those concepts and techniques to common challenging situations. This individual has further demonstrated an in-depth understanding of the application of suitable techniques to a particular area of research practice.

Note:

In future, if the board feels the necessity to change any board member, the same can be done with the consent of the chairperson along with anyone board member without our approval.

In case, the chairperson needs to be replaced then consent of 2/3rd board members are required and they are also required to jointly pass the resolution copy of which should be sent to us. In such case, it will be compulsory to obtain our approval before replacement.

In case of “Difference of Opinion [if any]” among the Board members, our decision will be final and binding to everyone.
Process of submission of Research Paper

The Area or field of specialization may or may not be of any category as mentioned in ‘Scope of Journal’ menu of the GlobalJournals.org website. There are 37 Research Journal categorized with Six parental Journals GJCST, GJMR, GJRE, GJMBR, GJSFR, GJHSS. For Authors should prefer the mentioned categories. There are three widely used systems UDC, DDC and LCC. The details are available as ‘Knowledge Abstract’ at Home page. The major advantage of this coding is that, the research work will be exposed to and shared with all over the world as we are being abstracted and indexed worldwide.

The paper should be in proper format. The format can be downloaded from first page of ‘Author Guideline’ Menu. The Author is expected to follow the general rules as mentioned in this menu. The paper should be written in MS-Word Format (*.DOC,*.DOCX).

The Author can submit the paper either online or offline. The authors should prefer online submission.

Online Submission: There are three ways to submit your paper:

(A) (I) First, register yourself using top right corner of Home page then Login. If you are already registered, then login using your username and password.

(II) Choose corresponding Journal.

(III) Click ‘Submit Manuscript’. Fill required information and Upload the paper.

(B) If you are using Internet Explorer, then Direct Submission through Homepage is also available.

(C) If these two are not convenient, and then email the paper directly to dean@globaljournals.org.

Offline Submission: Author can send the typed form of paper by Post. However, online submission should be preferred.
PREFERRED AUTHOR GUIDELINES

MANUSCRIPT STYLE INSTRUCTION (Must be strictly followed)

Page Size: 8.27” X 11”

- Left Margin: 0.65
- Right Margin: 0.65
- Top Margin: 0.75
- Bottom Margin: 0.75
- Font type of all text should be Swis 721 Lt BT.
- Paper Title should be of Font Size 24 with one Column section.
- Author Name in Font Size of 11 with one column as of Title.
- Abstract Font size of 9 Bold, “Abstract” word in Italic Bold.
- Main Text: Font size 10 with justified two columns section
- Two Column with Equal Column with of 3.38 and Gaping of .2
- First Character must be three lines Drop capped.
- Paragraph before Spacing of 1 pt and After of 0 pt.
- Line Spacing of 1 pt
- Large Images must be in One Column
- Numbering of First Main Headings (Heading 1) must be in Roman Letters, Capital Letter, and Font Size of 10.
- Numbering of Second Main Headings (Heading 2) must be in Alphabets, Italic, and Font Size of 10.

You can use your own standard format also.

Author Guidelines:

1. General,
2. Ethical Guidelines,
3. Submission of Manuscripts,
4. Manuscript’s Category,
5. Structure and Format of Manuscript,
6. After Acceptance.

1. GENERAL

Before submitting your research paper, one is advised to go through the details as mentioned in following heads. It will be beneficial, while peer reviewer justify your paper for publication.

Scope

The Global Journals Inc. (US) welcome the submission of original paper, review paper, survey article relevant to the all the streams of Philosophy and knowledge. The Global Journals Inc. (US) is parental platform for Global Journal of Computer Science and Technology, Researches in Engineering, Medical Research, Science Frontier Research, Human Social Science, Management, and Business organization. The choice of specific field can be done otherwise as following in Abstracting and Indexing Page on this Website. As the all Global
Journals Inc. (US) are being abstracted and indexed (in process) by most of the reputed organizations. Topics of only narrow interest will not be accepted unless they have wider potential or consequences.

2. ETHICAL GUIDELINES

Authors should follow the ethical guidelines as mentioned below for publication of research paper and research activities.

Papers are accepted on strict understanding that the material in whole or in part has not been, nor is being, considered for publication elsewhere. If the paper once accepted by Global Journals Inc. (US) and Editorial Board, will become the copyright of the Global Journals Inc. (US).

**Authorship:** The authors and coauthors should have active contribution to conception design, analysis and interpretation of findings. They should critically review the contents and drafting of the paper. All should approve the final version of the paper before submission.

The Global Journals Inc. (US) follows the definition of authorship set up by the Global Academy of Research and Development. According to the Global Academy of R&D authorship, criteria must be based on:

1) Substantial contributions to conception and acquisition of data, analysis and interpretation of the findings.

2) Drafting the paper and revising it critically regarding important academic content.

3) Final approval of the version of the paper to be published.

All authors should have been credited according to their appropriate contribution in research activity and preparing paper. Contributors who do not match the criteria as authors may be mentioned under Acknowledgement.

Acknowledgements: Contributors to the research other than authors credited should be mentioned under acknowledgment. The specifications of the source of funding for the research if appropriate can be included. Suppliers of resources may be mentioned along with address.

**Appeal of Decision:** The Editorial Board’s decision on publication of the paper is final and cannot be appealed elsewhere.

Permissions: It is the author’s responsibility to have prior permission if all or parts of earlier published illustrations are used in this paper.

Please mention proper reference and appropriate acknowledgements wherever expected.

If all or parts of previously published illustrations are used, permission must be taken from the copyright holder concerned. It is the author's responsibility to take these in writing.

Approval for reproduction/modification of any information (including figures and tables) published elsewhere must be obtained by the authors/copyright holders before submission of the manuscript. Contributors (Authors) are responsible for any copyright fee involved.

3. SUBMISSION OF MANUSCRIPTS

Manuscripts should be uploaded via this online submission page. The online submission is most efficient method for submission of papers, as it enables rapid distribution of manuscripts and consequently speeds up the review procedure. It also enables authors to know the status of their own manuscripts by emailing us. Complete instructions for submitting a paper is available below.

Manuscript submission is a systematic procedure and little preparation is required beyond having all parts of your manuscript in a given format and a computer with an Internet connection and a Web browser. Full help and instructions are provided on-screen. As an author, you will be prompted for login and manuscript details as Field of Paper and then to upload your manuscript file(s) according to the instructions.
To avoid postal delays, all transaction is preferred by e-mail. A finished manuscript submission is confirmed by e-mail immediately and your paper enters the editorial process with no postal delays. When a conclusion is made about the publication of your paper by our Editorial Board, revisions can be submitted online with the same procedure, with an occasion to view and respond to all comments.

Complete support for both authors and co-author is provided.

4. MANUSCRIPT’S CATEGORY

Based on potential and nature, the manuscript can be categorized under the following heads:

Original research paper: Such papers are reports of high-level significant original research work.

Review papers: These are concise, significant but helpful and decisive topics for young researchers.

Research articles: These are handled with small investigation and applications

Research letters: The letters are small and concise comments on previously published matters.

5. STRUCTURE AND FORMAT OF MANUSCRIPT

The recommended size of original research paper is less than seven thousand words, review papers fewer than seven thousands words also. Preparation of research paper or how to write research paper, are major hurdle, while writing manuscript. The research articles and research letters should be fewer than three thousand words, the structure original research paper; sometime review paper should be as follows:

**Papers**:
These are reports of significant research (typically less than 7000 words equivalent, including tables, figures, references), and comprise:

(a) Title should be relevant and commensurate with the theme of the paper.

(b) A brief Summary, “Abstract” (less than 150 words) containing the major results and conclusions.

(c) Up to ten keywords, that precisely identifies the paper’s subject, purpose, and focus.

(d) An Introduction, giving necessary background excluding subheadings; objectives must be clearly declared.

(e) Resources and techniques with sufficient complete experimental details (wherever possible by reference) to permit repetition; sources of information must be given and numerical methods must be specified by reference, unless non-standard.

(f) Results should be presented concisely, by well-designed tables and/or figures; the same data may not be used in both; suitable statistical data should be given. All data must be obtained with attention to numerical detail in the planning stage. As reproduced design has been recognized to be important to experiments for a considerable time, the Editor has decided that any paper that appears not to have adequate numerical treatments of the data will be returned un-refereed;

(g) Discussion should cover the implications and consequences, not just recapitulating the results; conclusions should be summarizing.

(h) Brief Acknowledgements.

(i) References in the proper form.

Authors should very cautiously consider the preparation of papers to ensure that they communicate efficiently. Papers are much more likely to be accepted, if they are cautiously designed and laid out, contain few or no errors, are summarizing, and be conventional to the approach and instructions. They will in addition, be published with much less delays than those that require much technical and editorial correction.
The Editorial Board reserves the right to make literary corrections and to make suggestions to improve briefness.

It is vital, that authors take care in submitting a manuscript that is written in simple language and adheres to published guidelines.

**Format**

*Language: The language of publication is UK English. Authors, for whom English is a second language, must have their manuscript efficiently edited by an English-speaking person before submission to make sure that, the English is of high excellence. It is preferable, that manuscripts should be professionally edited.*

Standard Usage, Abbreviations, and Units: Spelling and hyphenation should be conventional to The Concise Oxford English Dictionary. Statistics and measurements should at all times be given in figures, e.g. 16 min, except for when the number begins a sentence. When the number does not refer to a unit of measurement it should be spelt in full unless, it is 160 or greater.

Abbreviations supposed to be used carefully. The abbreviated name or expression is supposed to be cited in full at first usage, followed by the conventional abbreviation in parentheses.

Metric SI units are supposed to generally be used excluding where they conflict with current practice or are confusing. For illustration, 1.4 l rather than 1.4 × 10⁻³ m³, or 4 mm somewhat than 4 × 10⁻³ m. Chemical formula and solutions must identify the form used, e.g. anhydrous or hydrated, and the concentration must be in clearly defined units. Common species names should be followed by underlines at the first mention. For following use the generic name should be constricted to a single letter, if it is clear.

**Structure**

All manuscripts submitted to Global Journals Inc. (US), ought to include:

**Title:** The title page must carry an instructive title that reflects the content, a running title (less than 45 characters together with spaces), names of the authors and co-authors, and the place(s) wherever the work was carried out. The full postal address in addition with the e-mail address of related author must be given. Up to eleven keywords or very brief phrases have to be given to help data retrieval, mining and indexing.

**Abstract, used in Original Papers and Reviews:**

Optimizing Abstract for Search Engines

Many researchers searching for information online will use search engines such as Google, Yahoo or similar. By optimizing your paper for search engines, you will amplify the chance of someone finding it. This in turn will make it more likely to be viewed and/or cited in a further work. Global Journals Inc. (US) have compiled these guidelines to facilitate you to maximize the web-friendliness of the most public part of your paper.

**Key Words**

A major linchpin in research work for the writing research paper is the keyword search, which one will employ to find both library and Internet resources.

One must be persistent and creative in using keywords. An effective keyword search requires a strategy and planning a list of possible keywords and phrases to try.

Search engines for most searches, use Boolean searching, which is somewhat different from Internet searches. The Boolean search uses "operators," words (and, or, not, and near) that enable you to expand or narrow your affords. Tips for research paper while preparing research paper are very helpful guideline of research paper.

Choice of key words is first tool of tips to write research paper. Research paper writing is an art. A few tips for deciding as strategically as possible about keyword search:
One should start brainstorming lists of possible keywords before even begin searching. Think about the most important concepts related to research work. Ask, "What words would a source have to include to be truly valuable in research paper?" Then consider synonyms for the important words.

It may take the discovery of only one relevant paper to steer in the right keyword direction because in most databases, the keywords under which a research paper is abstracted are listed with the paper.

One should avoid outdated words.

Keywords are the key that opens a door to research work sources. Keyword searching is an art in which researcher's skills are bound to improve with experience and time.

Numerical Methods: Numerical methods used should be clear and, where appropriate, supported by references.

Acknowledgements: Please make these as concise as possible.

References

References follow the Harvard scheme of referencing. References in the text should cite the authors' names followed by the time of their publication, unless there are three or more authors when simply the first author's name is quoted followed by et al. unpublished work has to only be cited where necessary, and only in the text. Copies of references in press in other journals have to be supplied with submitted typescripts. It is necessary that all citations and references be carefully checked before submission, as mistakes or omissions will cause delays.

References to information on the World Wide Web can be given, but only if the information is available without charge to readers on an official site. Wikipedia and Similar websites are not allowed where anyone can change the information. Authors will be asked to make available electronic copies of the cited information for inclusion on the Global Journals Inc. (US) homepage at the judgment of the Editorial Board.

The Editorial Board and Global Journals Inc. (US) recommend that, citation of online-published papers and other material should be done via a DOI (digital object identifier). If an author cites anything, which does not have a DOI, they run the risk of the cited material not being noticeable.

The Editorial Board and Global Journals Inc. (US) recommend the use of a tool such as Reference Manager for reference management and formatting.

Tables, Figures and Figure Legends

Tables: Tables should be few in number, cautiously designed, uncrowned, and include only essential data. Each must have an Arabic number, e.g. Table 4, a self-explanatory caption and be on a separate sheet. Vertical lines should not be used.

Figures: Figures are supposed to be submitted as separate files. Always take in a citation in the text for each figure using Arabic numbers, e.g. Fig. 4. Artwork must be submitted online in electronic form by e-mailing them.

Preparation of Electronic Figures for Publication

Even though low quality images are sufficient for review purposes, print publication requires high quality images to prevent the final product being blurred or fuzzy. Submit (or e-mail) EPS (line art) or TIFF (halftone/photographs) files only. MS PowerPoint and Word Graphics are unsuitable for printed pictures. Do not use pixel-oriented software. Scans (TIFF only) should have a resolution of at least 350 dpi (halftone) or 700 to 1100 dpi (line drawings) in relation to the imitation size. Please give the data for figures in black and white or submit a Color Work Agreement Form. EPS files must be saved with fonts embedded (and with a TIFF preview, if possible).

For scanned images, the scanning resolution (at final image size) ought to be as follows to ensure good reproduction: line art: >650 dpi; halftones (including gel photographs): >350 dpi; figures containing both halftone and line images: >650 dpi.
Color Charges: It is the rule of the Global Journals Inc. (US) for authors to pay the full cost for the reproduction of their color artwork. Hence, please note that, if there is color artwork in your manuscript when it is accepted for publication, we would require you to complete and return a color work agreement form before your paper can be published.

Figure Legends: Self-explanatory legends of all figures should be incorporated separately under the heading 'Legends to Figures'. In the full-text online edition of the journal, figure legends may possibly be truncated in abbreviated links to the full screen version. Therefore, the first 100 characters of any legend should notify the reader, about the key aspects of the figure.

6. AFTER ACCEPTANCE

Upon approval of a paper for publication, the manuscript will be forwarded to the dean, who is responsible for the publication of the Global Journals Inc. (US).

6.1 Proof Corrections

The corresponding author will receive an e-mail alert containing a link to a website or will be attached. A working e-mail address must therefore be provided for the related author.

Acrobat Reader will be required in order to read this file. This software can be downloaded (Free of charge) from the following website:

www.adobe.com/products/acrobat/readstep2.html. This will facilitate the file to be opened, read on screen, and printed out in order for any corrections to be added. Further instructions will be sent with the proof.

Proofs must be returned to the dean at dean@globaljournals.org within three days of receipt.

As changes to proofs are costly, we inquire that you only correct typesetting errors. All illustrations are retained by the publisher. Please note that the authors are responsible for all statements made in their work, including changes made by the copy editor.

6.2 Early View of Global Journals Inc. (US) (Publication Prior to Print)

The Global Journals Inc. (US) are enclosed by our publishing’s Early View service. Early View articles are complete full-text articles sent in advance of their publication. Early View articles are absolute and final. They have been completely reviewed, revised and edited for publication, and the authors’ final corrections have been incorporated. Because they are in final form, no changes can be made after sending them. The nature of Early View articles means that they do not yet have volume, issue or page numbers, so Early View articles cannot be cited in the conventional way.

6.3 Author Services

Online production tracking is available for your article through Author Services. Author Services enables authors to track their article - once it has been accepted - through the production process to publication online and in print. Authors can check the status of their articles online and choose to receive automated e-mails at key stages of production. The authors will receive an e-mail with a unique link that enables them to register and have their article automatically added to the system. Please ensure that a complete e-mail address is provided when submitting the manuscript.

6.4 Author Material Archive Policy

Please note that if not specifically requested, publisher will dispose off hardcopy & electronic information submitted, after the two months of publication. If you require the return of any information submitted, please inform the Editorial Board or dean as soon as possible.

6.5 Offprint and Extra Copies

A PDF offprint of the online-published article will be provided free of charge to the related author, and may be distributed according to the Publisher’s terms and conditions. Additional paper offprint may be ordered by emailing us at: editor@globaljournals.org.
Before start writing a good quality Computer Science Research Paper, let us first understand what is Computer Science Research Paper? So, Computer Science Research Paper is the paper which is written by professionals or scientists who are associated to Computer Science and Information Technology, or doing research study in these areas. If you are novel to this field then you can consult about this field from your supervisor or guide.

TECHNIQUES FOR WRITING A GOOD QUALITY RESEARCH PAPER:

1. **Choosing the topic:** In most cases, the topic is searched by the interest of author but it can be also suggested by the guides. You can have several topics and then you can judge that in which topic or subject you are finding yourself most comfortable. This can be done by asking several questions to yourself, like Will I be able to carry our search in this area? Will I find all necessary recourses to accomplish the search? Will I be able to find all information in this field area? If the answer of these types of questions will be “Yes” then you can choose that topic. In most of the cases, you may have to conduct the surveys and have to visit several places because this field is related to Computer Science and Information Technology. Also, you may have to do a lot of work to find all rise and falls regarding the various data of that subject. Sometimes, detailed information plays a vital role, instead of short information.

2. **Evaluators are human:** First thing to remember that evaluators are also human being. They are not only meant for rejecting a paper. They are here to evaluate your paper. So, present your Best.

3. **Think Like Evaluators:** If you are in a confusion or getting demotivated that your paper will be accepted by evaluators or not, then think and try to evaluate your paper like an Evaluator. Try to understand that what an evaluator wants in your research paper and automatically you will have your answer.

4. **Make blueprints of paper:** The outline is the plan or framework that will help you to arrange your thoughts. It will make your paper logical. But remember that all points of your outline must be related to the topic you have chosen.

5. **Ask your Guides:** If you are having any difficulty in your research, then do not hesitate to share your difficulty to your guide (if you have any). They will surely help you out and resolve your doubts. If you can’t clarify what exactly you require for your work then ask the supervisor to help you with the alternative. He might also provide you the list of essential readings.

6. **Use of computer is recommended:** As you are doing research in the field of Computer Science, then this point is quite obvious.

7. **Use right software:** Always use good quality software packages. If you are not capable to judge good software then you can lose quality of your paper unknowingly. There are various software programs available to help you, which you can get through Internet.

8. **Use the Internet for help:** An excellent start for your paper can be by using the Google. It is an excellent search engine, where you can have your doubts resolved. You may also read some answers for the frequent question how to write my research paper or find model research paper. From the internet library you can download books. If you have all required books make important reading selecting and analyzing the specified information. Then put together research paper sketch out.

9. **Use and get big pictures:** Always use encyclopedias, Wikipedia to get pictures so that you can go into the depth.

10. **Bookmarks are useful:** When you read any book or magazine, you generally use bookmarks, right! It is a good habit, which helps to not to lose your continuity. You should always use bookmarks while searching on Internet also, which will make your search easier.

11. **Revise what you wrote:** When you write anything, always read it, summarize it and then finalize it.
12. **Make all efforts**: Make all efforts to mention what you are going to write in your paper. That means always have a good start. Try to mention everything in introduction, that what is the need of a particular research paper. Polish your work by good skill of writing and always give an evaluator, what he wants.

13. **Have backups**: When you are going to do any important thing like making research paper, you should always have backup copies of it either in your computer or in paper. This will help you to not to lose any of your important.

14. **Produce good diagrams of your own**: Always try to include good charts or diagrams in your paper to improve quality. Using several and unnecessary diagrams will degrade the quality of your paper by creating "hotchpotch." So always, try to make and include those diagrams, which are made by your own to improve readability and understandability of your paper.

15. **Use of direct quotes**: When you do research relevant to literature, history or current affairs then use of quotes become essential but if study is relevant to science then use of quotes is not preferable.

16. **Use proper verb tense**: Use proper verb tenses in your paper. Use past tense, to present those events that happened. Use present tense to indicate events that are going on. Use future tense to indicate future happening events. Use of improper and wrong tenses will confuse the evaluator. Avoid the sentences that are incomplete.

17. **Never use online paper**: If you are getting any paper on Internet, then never use it as your research paper because it might be possible that evaluator has already seen it or maybe it is outdated version.

18. **Pick a good study spot**: To do your research studies always try to pick a spot, which is quiet. Every spot is not for studies. Spot that suits you choose it and proceed further.

19. **Know what you know**: Always try to know, what you know by making objectives. Else, you will be confused and cannot achieve your target.

20. **Use good quality grammar**: Always use a good quality grammar and use words that will throw positive impact on evaluator. Use of good quality grammar does not mean to use tough words, that for each word the evaluator has to go through dictionary. Do not start sentence with a conjunction. Do not fragment sentences. Eliminate one-word sentences. Ignore passive voice. Do not ever use a big word when a diminutive one would suffice. Verbs have to be in agreement with their subjects. Prepositions are not expressions to finish sentences with. It is incorrect to ever divide an infinitive. Avoid clichés like the disease. Also, always shun irritating alliteration. Use language that is simple and straightforward. Put together a neat summary.

21. **Arrangement of information**: Each section of the main body should start with an opening sentence and there should be a changeover at the end of the section. Give only valid and powerful arguments to your topic. You may also maintain your arguments with records.

22. **Never start in last minute**: Always start at right time and give enough time to research work. Leaving everything to the last minute will degrade your paper and spoil your work.

23. **Multitasking in research is not good**: Doing several things at the same time proves bad habit in case of research activity. Research is an area, where everything has a particular time slot. Divide your research work in parts and do particular part in particular time slot.

24. **Never copy others’ work**: Never copy others’ work and give it your name because if evaluator has seen it anywhere you will be in trouble.

25. **Take proper rest and food**: No matter how many hours you spend for your research activity, if you are not taking care of your health then all your efforts will be in vain. For a quality research, study is must, and this can be done by taking proper rest and food.

26. **Go for seminars**: Attend seminars if the topic is relevant to your research area. Utilize all your resources.
27. **Refresh your mind after intervals**: Try to give rest to your mind by listening to soft music or by sleeping in intervals. This will also improve your memory.

28. **Make colleagues**: Always try to make colleagues. No matter how sharper or intelligent you are, if you make colleagues you can have several ideas, which will be helpful for your research.

29. **Think technically**: Always think technically. If anything happens, then search its reasons, its benefits, and demerits.

30. **Think and then print**: When you will go to print your paper, notice that tables are not be split, headings are not detached from their descriptions, and page sequence is maintained.

31. **Adding unnecessary information**: Do not add unnecessary information, like, I have used MS Excel to draw graph. Do not add irrelevant and inappropriate material. These all will create superfluous. Foreign terminology and phrases are not apropos. One should NEVER take a broad view. Analogy in script is like feathers on a snake. Not at all use a large word when a very small one would be sufficient. Use words properly, regardless of how others use them. Remove quotations. Puns are for kids, not grunt readers. Amplification is a billion times of inferior quality than sarcasm.

32. **Never oversimplify everything**: To add material in your research paper, never go for oversimplification. This will definitely irritate the evaluator. Be more or less specific. Also too, by no means, ever use rhythmic redundancies. Contractions aren't essential and shouldn't be there used. Comparisons are as terrible as clichés. Give up ampersands and abbreviations, and so on. Remove commas, that are, not necessary. Parenthetical words however should be together with this in commas. Understatement is all the time the complete best way to put onward earth-shaking thoughts. Give a detailed literary review.

33. **Report concluded results**: Use concluded results. From raw data, filter the results and then conclude your studies based on measurements and observations taken. Significant figures and appropriate number of decimal places should be used. Parenthetical remarks are prohibitive. Proofread carefully at final stage. In the end give outline to your arguments. Spot out perspectives of further study of this subject. Justify your conclusion by at the bottom of them with sufficient justifications and examples.

34. **After conclusion**: Once you have concluded your research, the next most important step is to present your findings. Presentation is extremely important as it is the definite medium though which your research is going to be in print to the rest of the crowd. Care should be taken to categorize your thoughts well and present them in a logical and neat manner. A good quality research paper format is essential because it serves to highlight your research paper and bring to light all necessary aspects in your research.

**Informal Guidelines of Research Paper Writing**

**Key points to remember:**

- Submit all work in its final form.
- Write your paper in the form, which is presented in the guidelines using the template.
- Please note the criterion for grading the final paper by peer-reviewers.

**Final Points:**

A purpose of organizing a research paper is to let people to interpret your effort selectively. The journal requires the following sections, submitted in the order listed, each section to start on a new page.

The introduction will be compiled from reference matter and will reflect the design processes or outline of basis that direct you to make study. As you will carry out the process of study, the method and process section will be constructed as like that. The result segment will show related statistics in nearly sequential order and will direct the reviewers next to the similar intellectual paths throughout the data that you took to carry out your study. The discussion section will provide understanding of the data and projections as to the implication of the results. The use of good quality references all through the paper will give the effort trustworthiness by representing an alertness of prior workings.

© Copyright by Global Journals Inc.(US) | Guidelines Handbook
Writing a research paper is not an easy job no matter how trouble-free the actual research or concept. Practice, excellent preparation, and controlled record keeping are the only means to make straightforward the progression.

**General style:**

Specific editorial column necessities for compliance of a manuscript will always take over from directions in these general guidelines.

To make a paper clear

- Adhere to recommended page limits

Mistakes to evade

- Insertion a title at the foot of a page with the subsequent text on the next page
- Separating a table/chart or figure - impound each figure/table to a single page
- Submitting a manuscript with pages out of sequence

In every sections of your document

- Use standard writing style including articles ("a", "the," etc.)
- Keep on paying attention on the research topic of the paper
- Use paragraphs to split each significant point (excluding for the abstract)
- Align the primary line of each section
- Present your points in sound order
- Use present tense to report well accepted
- Use past tense to describe specific results
- Shun familiar wording, don’t address the reviewer directly, and don’t use slang, slang language, or superlatives
- Shun use of extra pictures - include only those figures essential to presenting results

**Title Page:**

Choose a revealing title. It should be short. It should not have non-standard acronyms or abbreviations. It should not exceed two printed lines. It should include the name(s) and address(es) of all authors.
Abstract:

The summary should be two hundred words or less. It should briefly and clearly explain the key findings reported in the manuscript--must have precise statistics. It should not have abnormal acronyms or abbreviations. It should be logical in itself. Shun citing references at this point.

An abstract is a brief distinct paragraph summary of finished work or work in development. In a minute or less a reviewer can be taught the foundation behind the study, common approach to the problem, relevant results, and significant conclusions or new questions.

Write your summary when your paper is completed because how can you write the summary of anything which is not yet written? Wealth of terminology is very essential in abstract. Yet, use comprehensive sentences and do not let go readability for briefness. You can maintain it succinct by phrasing sentences so that they provide more than lone rationale. The author can at this moment go straight to shortening the outcome. Sum up the study, with the subsequent elements in any summary. Try to maintain the initial two items to no more than one ruling each.

- Reason of the study - theory, overall issue, purpose
- Fundamental goal
- To the point depiction of the research
- Consequences, including definite statistics - if the consequences are quantitative in nature, account quantitative data; results of any numerical analysis should be reported
- Significant conclusions or questions that track from the research(es)

Approach:

- Single section, and succinct
- As a outline of job done, it is always written in past tense
- A conceptual should situate on its own, and not submit to any other part of the paper such as a form or table
- Center on shortening results - bound background information to a verdict or two, if completely necessary
- What you account in an conceptual must be regular with what you reported in the manuscript
- Exact spelling, clearness of sentences and phrases, and appropriate reporting of quantities (proper units, important statistics) are just as significant in an abstract as they are anywhere else

Introduction:

The introduction should "introduce" the manuscript. The reviewer should be presented with sufficient background information to be capable to comprehend and calculate the purpose of your study without having to submit to other works. The basis for the study should be offered. Give most important references but shun difficult to make a comprehensive appraisal of the topic. In the introduction, describe the problem visibly. If the problem is not acknowledged in a logical, reasonable way, the reviewer will have no attention in your result. Speak in common terms about techniques used to explain the problem, if needed, but do not present any particulars about the protocols here. Following approach can create a valuable beginning:

- Explain the value (significance) of the study
- Shield the model - why did you employ this particular system or method? What is its compensation? You strength remark on its appropriateness from a abstract point of vision as well as point out sensible reasons for using it.
- Present a justification. Status your particular theory (es) or aim(s), and describe the logic that led you to choose them.
- Very for a short time explain the tentative propose and how it skilled the declared objectives.

Approach:

- Use past tense except for when referring to recognized facts. After all, the manuscript will be submitted after the entire job is done.
- Sort out your thoughts; manufacture one key point with every section. If you make the four points listed above, you will need a least of four paragraphs.
Present surroundings information only as desirable in order hold up a situation. The reviewer does not desire to read the whole thing you know about a topic.

Shape the theory/purpose specifically - do not take a broad view.

As always, give awareness to spelling, simplicity and correctness of sentences and phrases.

Procedures (Methods and Materials):

This part is supposed to be the easiest to carve if you have good skills. A sound written Procedures segment allows a capable scientist to replacement your results. Present precise information about your supplies. The suppliers and clarity of reagents can be helpful bits of information. Present methods in sequential order but linked methodologies can be grouped as a segment. Be concise when relating the protocols. Attempt for the least amount of information that would permit another capable scientist to spare your outcome but be cautious that vital information is integrated. The use of subheadings is suggested and ought to be synchronized with the results section. When a technique is used that has been well described in another object, mention the specific item describing a way but draw the basic principle while stating the situation. The purpose is to text all particular resources and broad procedures, so that another person may use some or all of the methods in one more study or referee the scientific value of your work. It is not to be a step by step report of the whole thing you did, nor is a methods section a set of orders.

Materials:

- Explain materials individually only if the study is so complex that it saves liberty this way.
- Embrace particular materials, and any tools or provisions that are not frequently found in laboratories.
- Do not take in frequently found.
- If use of a definite type of tools.
- Materials may be reported in a part section or else they may be recognized along with your measures.

Methods:

- Report the method (not particulars of each process that engaged the same methodology)
- Describe the method entirely
- To be succinct, present methods under headings dedicated to specific dealings or groups of measures
- Simplify - details how procedures were completed not how they were exclusively performed on a particular day.
- If well known procedures were used, account the procedure by name, possibly with reference, and that's all.

Approach:

- It is embarrassed or not possible to use vigorous voice when documenting methods with no using first person, which would focus the reviewer's interest on the researcher rather than the job. As a result when script up the methods most authors use third person passive voice.
- Use standard style in this and in every other part of the paper - avoid familiar lists, and use full sentences.

What to keep away from

- Resources and methods are not a set of information.
- Skip all descriptive information and surroundings - save it for the argument.
- Leave out information that is immaterial to a third party.

Results:

The principle of a results segment is to present and demonstrate your conclusion. Create this part a entirely objective details of the outcome, and save all understanding for the discussion.

The page length of this segment is set by the sum and types of data to be reported. Carry on to be to the point, by means of statistics and tables, if suitable, to present consequences most efficiently. You must obviously differentiate material that would usually be incorporated in a study editorial from any unprocessed data or additional appendix matter that would not be available. In fact, such matter should not be submitted at all except requested by the instructor.
Content

- Sum up your conclusion in text and demonstrate them, if suitable, with figures and tables.
- In manuscript, explain each of your consequences, point the reader to remarks that are most appropriate.
- Present a background, such as by describing the question that was addressed by creation an exacting study.
- Explain results of control experiments and comprise remarks that are not accessible in a prescribed figure or table, if appropriate.
- Examine your data, then prepare the analyzed (transformed) data in the form of a figure (graph), table, or in manuscript form.

What to stay away from

- Do not discuss or infer your outcome, report surroundings information, or try to explain anything.
- Not at all, take in raw data or intermediate calculations in a research manuscript.
- Do not present the similar data more than once.
- Manuscript should complement any figures or tables, not duplicate the identical information.
- Never confuse figures with tables - there is a difference.

Approach

- As forever, use past tense when you submit to your results, and put the whole thing in a reasonable order.
- Put figures and tables, appropriately numbered, in order at the end of the report.
- If you desire, you may place your figures and tables properly within the text of your results part.

Figures and tables

- If you put figures and tables at the end of the details, make certain that they are visibly distinguished from any attach appendix materials, such as raw facts.
- Despite of position, each figure must be numbered one after the other and complete with subtitle.
- In spite of position, each table must be titled, numbered one after the other and complete with heading.
- All figure and table must be adequately complete that it could situate on its own, divide from text.

Discussion:

The Discussion is expected the trickiest segment to write and describe. A lot of papers submitted for journal are discarded based on problems with the Discussion. There is no head of state for how long a argument should be. Position your understanding of the outcome visibly to lead the reviewer through your conclusions, and then finish the paper with a summing up of the implication of the study. The purpose here is to offer an understanding of your results and hold up for all of your conclusions, using facts from your research and generally accepted information, if suitable. The implication of result should be visibly described. Infer your data in the conversation in suitable depth. This means that when you clarify an observable fact you must explain mechanisms that may account for the observation. If your results vary from your prospect, make clear why that may have happened. If your results agree, then explain the theory that the proof supported. It is never suitable to just state that the data approved with prospect, and let it drop at that.

- Make a decision if each premise is supported, discarded, or if you cannot make a conclusion with assurance. Do not just dismiss a study or part of a study as "uncertain."
- Research papers are not acknowledged if the work is imperfect. Draw what conclusions you can based upon the results that you have, and take care of the study as a finished work.
- You may propose future guidelines, such as how the experiment might be personalized to accomplish a new idea.
- Give details all of your remarks as much as possible, focus on mechanisms.
- Make a decision if the tentative design sufficiently addressed the theory, and whether or not it was correctly restricted.
- Try to present substitute explanations if sensible alternatives be present.
- One research will not counter an overall question, so maintain the large picture in mind, where do you go next? The best studies unlock new avenues of study. What questions remain?
- Recommendations for detailed papers will offer supplementary suggestions.

Approach:

- When you refer to information, differentiate data generated by your own studies from available information.
- Submit to work done by specific persons (including you) in past tense.
  - Submit to generally acknowledged facts and main beliefs in present tense.
The Administration Rules

Please carefully note down following rules and regulation before submitting your Research Paper to Global Journals Inc. (US):

Segment Draft and Final Research Paper: You have to strictly follow the template of research paper. If it is not done your paper may get rejected.

- **The major constraint** is that you must independently make all content, tables, graphs, and facts that are offered in the paper. You must write each part of the paper wholly on your own. The Peer-reviewers need to identify your own perceptive of the concepts in your own terms. NEVER extract straight from any foundation, and never rephrase someone else’s analysis.

- Do not give permission to anyone else to "PROOFREAD" your manuscript.

- **Methods to avoid Plagiarism** is applied by us on every paper, if found guilty, you will be blacklisted by all of our collaborated research groups, your institution will be informed for this and strict legal actions will be taken immediately.

- To guard yourself and others from possible illegal use please do not permit anyone right to use to your paper and files.
Please note that following table is only a Grading of "Paper Compilation" and not on "Performed/Stated Research" whose grading solely depends on Individual Assigned Peer Reviewer and Editorial Board Member. These can be available only on request and after decision of Paper. This report will be the property of Global Journals Inc. (US).

<table>
<thead>
<tr>
<th>Topics</th>
<th>Grades</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A-B</td>
</tr>
<tr>
<td><strong>Abstract</strong></td>
<td>Clear and concise with appropriate content, Correct format. 200 words or below</td>
</tr>
<tr>
<td></td>
<td>Above 200 words</td>
</tr>
<tr>
<td><strong>Introduction</strong></td>
<td>Containing all background details with clear goal and appropriate details, flow specification, no grammar and spelling mistake, well organized sentence and paragraph, reference cited</td>
</tr>
<tr>
<td><strong>Methods and Procedures</strong></td>
<td>Clear and to the point with well arranged paragraph, precision and accuracy of facts and figures, well organized subheads</td>
</tr>
<tr>
<td><strong>Result</strong></td>
<td>Well organized, Clear and specific, Correct units with precision, correct data, well structuring of paragraph, no grammar and spelling mistake</td>
</tr>
<tr>
<td><strong>Discussion</strong></td>
<td>Well organized, meaningful specification, sound conclusion, logical and concise explanation, highly structured paragraph reference cited</td>
</tr>
<tr>
<td><strong>References</strong></td>
<td>Complete and correct format, well organized</td>
</tr>
</tbody>
</table>
INDEX

A
Angiogenesis · 3
Apoptosis · 1, 2, 3, 4, 5

C
Chemiluminescence · 18, 19, 20, 21, 22, 24, 25
Chemotaxis · 2, 3, 5

E
Erythrocytes · 18, 19, 20, 23, 24, 25

H
Histocompatibility · 2, 5
Hyaluronan · 2

L
Laryngeal · 2, 6

M
Mesenchymal · 1, 2, 6

O
Osteopontin · 2, 6

P
Pancreatic · 2, 7
Peroxidation · 18, 19, 20, 23, 24, 25
Proliferation, · 1, 2, 3, 5