Online ISSN: 2249-4618
Print ISSN: 0975-5888

Global Journal

of Medical Research: K

Interdisciplinary

A Review and Emphasis

Impacts of Asthma-Obesity

Highlights

Vigorous Physical Activities

Generalized Linear Mixed Mode

Discovering Thoughts, Inventing Future

VOLUME 15 ISSUE 1 VERSION 1.0

Global Journal of Medical Research: K
INTERDISCIPLINARY

Global Journal of Medical Research: K
INTERDISCIPLINARY
Volume 15 Issue 1 (Ver. 1.0)

Open Association of Research Society

Incorporation No.: 0423089
License No.: 42125/022010/1186
Registration No.: 430374
Import-Export Code: 1109007027
Employer Identification Number (EIN):
USA Tax ID: 98-0673427

Global Journals Inc.

*(A Delaware USA Incorporation with "Good Standing"; **Reg. Number: 0423089**)*

Sponsors: Open Association of Research Society
Open Scientific Standards

Publisher's Headquarters office

Global Journals Headquarters
301st Edgewater Place Suite, 100 Edgewater Dr.-Pl,
Wakefield MASSACHUSETTS, Pin: 01880,
United States of America
USA Toll Free: +001-888-839-7392
USA Toll Free Fax: +001-888-839-7392

Offset Typesetting

Global Journals Incorporated
2nd, Lansdowne, Lansdowne Rd., Croydon-Surrey,
Pin: CR9 2ER, United Kingdom

Packaging & Continental Dispatching

Global Journals
E-3130 Sudama Nagar, Near Gopur Square,
Indore, M.P., Pin:452009, India

Find a correspondence nodal officer near you

To find nodal officer of your country, please email us at *local@globaljournals.org*

eContacts

Press Inquiries: *press@globaljournals.org*
Investor Inquiries: *investors@globaljournals.org*
Technical Support: *technology@globaljournals.org*
Media & Releases: *media@globaljournals.org*

Pricing (Including by Air Parcel Charges):

For Authors:
22 USD (B/W) & 50 USD (Color)
Yearly Subscription (Personal & Institutional):
200 USD (B/W) & 250 USD (Color)

Integrated Editorial Board
(Computer Science, Engineering, Medical, Management, Natural Science, Social Science)

Dr. Bart Lambrecht
Director of Research in Accounting and FinanceProfessor of Finance
Lancaster University Management School
BA (Antwerp); MPhil, MA, PhD (Cambridge)

Dr. Carlos García Pont
Associate Professor of Marketing
IESE Business School, University of Navarra
Doctor of Philosophy (Management), Massachusetts Institute of Technology (MIT)
Master in Business Administration, IESE, University of Navarra
Degree in Industrial Engineering, Universitat Politècnica de Catalunya

Dr. Fotini Labropulu
Mathematics - Luther College
University of ReginaPh.D., M.Sc. in Mathematics
B.A. (Honors) in Mathematics
University of Windso

Dr. Lynn Lim
Reader in Business and Marketing
Roehampton University, London
BCom, PGDip, MBA (Distinction), PhD, FHEA

Dr. Mihaly Mezei
ASSOCIATE PROFESSOR
Department of Structural and Chemical Biology, Mount Sinai School of Medical Center
Ph.D., Etvs Lornd University
Postdoctoral Training,
New York University

Dr. Söhnke M. Bartram
Department of Accounting and FinanceLancaster University Management SchoolPh.D. (WHU Koblenz)
MBA/BBA (University of Saarbrücken)

Dr. Miguel Angel Ariño
Professor of Decision Sciences
IESE Business School
Barcelona, Spain (Universidad de Navarra)
CEIBS (China Europe International Business School).
Beijing, Shanghai and Shenzhen
Ph.D. in Mathematics
University of Barcelona
BA in Mathematics (Licenciatura)
University of Barcelona

Philip G. Moscoso
Technology and Operations Management
IESE Business School, University of Navarra
Ph.D in Industrial Engineering and Management, ETH Zurich
M.Sc. in Chemical Engineering, ETH Zurich

Dr. Sanjay Dixit, M.D.
Director, EP Laboratories, Philadelphia VA Medical Center
Cardiovascular Medicine - Cardiac Arrhythmia
Univ of Penn School of Medicine

Dr. Han-Xiang Deng
MD., Ph.D
Associate Professor and Research
Department Division of Neuromuscular Medicine
Davee Department of Neurology and Clinical NeuroscienceNorthwestern University
Feinberg School of Medicine

Dr. Pina C. Sanelli
Associate Professor of Public Health
Weill Cornell Medical College
Associate Attending Radiologist
NewYork-Presbyterian Hospital
MRI, MRA, CT, and CTA
Neuroradiology and Diagnostic Radiology
M.D., State University of New York at Buffalo,School of Medicine and Biomedical Sciences

Dr. Roberto Sanchez
Associate Professor
Department of Structural and Chemical Biology
Mount Sinai School of Medicine
Ph.D., The Rockefeller University

Dr. Wen-Yih Sun
Professor of Earth and Atmospheric SciencesPurdue University Director
National Center for Typhoon and Flooding Research, Taiwan
University Chair Professor
Department of Atmospheric Sciences, National Central University, Chung-Li, TaiwanUniversity 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
Associate Professor of Radiology

Dr. Michael R. Rudnick
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

Dr. Bassey Benjamin Esu
B.Sc. Marketing; MBA Marketing; Ph.D Marketing
Lecturer, Department of Marketing, University of Calabar
Tourism Consultant, Cross River State Tourism Development Department
Co-ordinator , Sustainable Tourism Initiative, Calabar, Nigeria

Dr. Aziz M. Barbar, Ph.D.
IEEE Senior Member
Chairperson, Department of Computer Science
AUST - American University of Science & Technology
Alfred Naccash Avenue – Ashrafieh

Contents of the Issue

Global Journal of Medical Research: K
Interdisciplinary
Volume 15 Issue 1 Version 1.0 Year 2015
Type: Double Blind Peer Reviewed International Research Journal
Publisher: Global Journals Inc. (USA)
Online ISSN: 2249-4618 & Print ISSN: 0975-5888

Impacts of Asthma-Obesity Association's on Children's Moderate and Vigorous Physical Activities

By Abdulraouf Y. Lamoshi & Lesley E. Cottrell
West Virginia University/ Tripoli Medical Center, United States

Abstract- *Background:* This study was developed to explore the relationship between asthma and obesity and the impact of that association on children's physical activities. Potential age and gender differences in the association between asthma, obesity, and activity were also examined.

Methods: Children were recruited from outpatient physician clinics to participate in a cross-sectional study. Child body mass index percentile and asthma severity were clinically assessed. Children's physical activity was assessed through parent report and assigned appropriate metabolic equivalent task (MET) scores.

Results: 75 children participated in the study. Regardless of their asthmatic and weight statuses, boys and girls significantly differed based on their average MET scores ($p = .007$), respectively. Younger, mildly asthmatic children had significantly higher MET scores than older, mildly asthmatics ($p<.05$); younger, severe asthmatics had moderately higher average MET scores than older, severe asthmatics ($p<.05$).

Conclusion: Young asthmatic children and boys overall are more physically active than the older, asthmatic children and girls overall, respectively.

Keywords: *asthma-obesity association, moderate and vigorous physical activities, children.*

GJMR-K Classification: *NLMC Code: WD 300*

Strictly as per the compliance and regulations of:

Impacts of Asthma-Obesity Association's on Children's Moderate and Vigorous Physical Activities

Abdulraouf Y. Lamoshi [α] & Lesley E. Cottrell [σ]

Abstract - ***Background:*** This study was developed to explore the relationship between asthma and obesity and the impact of that association on children's physical activities. Potential age and gender differences in the association between asthma, obesity, and activity were also examined.

Methods: Children were recruited from outpatient physician clinics to participate in a cross-sectional study. Child body mass index percentile and asthma severity were clinically assessed. Children's physical activity was assessed through parent report and assigned appropriate metabolic equivalent task (MET) scores.

Results: 75 children participated in the study. Regardless of their asthmatic and weight statuses, boys and girls significantly differed based on their average MET scores ($p = .007$), respectively. Younger, mildly asthmatic children had significantly higher MET scores than older, mildly asthmatics ($p<.05$); younger, severe asthmatics had moderately higher average MET scores than older, severe asthmatics ($p<.05$).

Conclusion: Young asthmatic children and boys overall are more physically active than the older, asthmatic children and girls overall, respectively. Established age and gender differences in physical activity may be found more readily among specific samples of children, particularly those with asthma.

Keywords: asthma-obesity association, moderate and vigorous physical activities, children.

I. Introduction

Many studies show that asthma and obesity are important public health problems because of their high prevalence among children; these medical problems affect the quality of life of the patients and consume significant amounts of money to provide the necessary medical care [22]. Researchers have postulated and established a positive association between obesity and asthma; however, a definitive causal relationship and an understanding of which condition comes first remain unobvious [4,16]. Moreover, patients who are obese and have asthma symptoms do not respond in the same manner to asthma medications as non obese patients [7].

Author α: Pediatric Surgery Department, Tripoli Medical Center, Tripoli, Libya. e-mail: raofdr@yahoo.com

Author σ: Department of Pediatrics, School of Medicine, West Virginia University.

The main asthma-obesity potential mechanism is the significant pressure from the overall weight gain. Overweight children carry extra pounds making it harder for some to be physically active, particularly asthmatic children [24]. Tidal volume and functional residual capacity also decrease due to mechanical impact of the fat tissue [4]. This, in turn, affects the lung function especially when the body demands for oxygen increase [4]. Obesity also leads to loss of the tightening of gastroesophageal sphincter which causes gastroesophageal reflux, in turn leading to aspiration of the stomach contents [14]. As a result the lung airways get constricted which makes the respiratory process a hard task [4]. The other potential mechanism is that increase in body weight causes the immune system to secret some inflammatory substances which could result in over reaction of the airways that in turn leads to constriction of those air passages and difficulty in breathing [3]. Other targeted mechanisms for the association between asthma and obesity are related to immunological changes, dietary modifications, genetic factors, and activated sex hormones [4,14].

Early teen-age girls' asthma symptoms and obesity risk measured by body mass index (BMI) are significantly associated [6]. A similar conclusion has been drawn by another study which stated that girls who develop early menarche are at a higher risk of developing asthma and obesity [8]. Only obese or overweight girls between 6 and 11 years are seven times at a higher risk of developing asthma [19]. Asthma prevalence was higher among girls who are younger than 11 years and developed early puberty [4]. There is some controversy about which gender is at a higher risk in some studies' conclusions. However, they are more inclined toward the girls' side, and the difference in these studies could be due to the children's ages at which the association was reported [4,21,22]. The prevalence of obesity and overweight among children was 6.87% in boys and 9.5% in girls [12]. The most acceptable hypothesis for the higher prevalence of asthma among females is that adipose tissue's aromatase converts androgens into estrogens, which in turn change lung development and airway tone responsiveness at the age of puberty [4].

Asthma-obesity association has negative impact on children's physical activity where children with asthma have higher mean BMI (20.78 vs. 18.82) and higher rates of obesity (21.4% vs. 6.6%); children with asthma reported fewer physical activities than the nonasthma group (median 4 per day vs. 6 per day) [9]. Also, they found that asthma is the strongest predictor of lower activity scores, and the asthma group has higher levels of emotional problems and, within this group, more active children have better mental status [9]. Parents in the asthma group identified the child's health as an obstacle to exercise (60.7% vs. 11%) and the same is true of children (66.1% vs. 11.5%) [9]. Asthma was identified as a barrier to exercise by parents and children [25]. Strategies to promote exercise within pediatric asthma care are needed to protect both mental and physical health [5]. Furthermore, physical activity is influenced negatively by asthma and obesity, and it can become worse because of their additive effect [20]. However, there are some other studies which show no association between asthma and physical activity [20] or asthmatic children do more physical activities than non asthmatic children [17,18].

Types of physical activity, and their MET scores, are subjected to change when children are divided into two groups, 6 -9 years and 10- 14 years. The first group is more inclined to participate in anaerobic activities, and the older children tend to participate in more organized activities [23]. Children between ages of 6 to 11 year spent more time doing moderate to vigorous physical activities than older children who are between ages of 12 to 15 years, and girls spent less time doing moderate to vigorous physical activities than boys of the same age [1]. Guerra et al.'s study finding could be one potential indicator of decreasing physical activities between these groups where it showed that BMI increases progressively with age after the age of 6 years until the age of 11 years [10].

In general, the concomitant increase in prevalence of both disorders in children has led to interest in the relationship between these two epidemics [22]. The debate about the nature of the asthma-obesity relationship is ongoing and some possible explanations should be considered to comprehend the reality of that association [14]. However, working to decrease the BMI would improve the status of asthma patients in terms of frequencies of the attacks, need to treatment, and side effects of those medications [6]. Based on what stated above, meticulous exploration of asthma-obesity association effect on children physical activities could be the first step to manage this issue. We don't know how the combination of being asthmatic and obese might influence physical activity? What are the gaps based on the current research for these three variables and why should we look at them now?

The research aspect of this study aimed to provide several benefits to the research community and society as a whole. The main goal was to will identify ways in which childhood obesity and/or asthma, age, and gender impacts a child´s physical.

II. Methods

An observational cross-sectional study of 145 children (7-12 years) was conducted to examine the impact of asthma obesity association on children's physical activities. This study was a secondary analysis of a larger cross sectional clinical study that examined children's the psychological, physiological, and cognitive impact of obesity and asthma. The ultimate goal of this work is to decrease asthma and obesity prevalence and maintain or increase physical activity among all children, regardless of asthma or obesity condition. The short-term goal of this study was to examine obesity-asthma association impact on children physical activities. Based on the existing literature, we hypothesis that:

1. asthma and obesity are associated together;
2. the amount of physical activities will be less among asthmatic children;
3. the amount of physical activity will be less among children who are obese; and
4. asthma and obesity have will have an additive effect on children's physical activity

This study was designed to explore the impact of asthma-obesity association on children's physical activities. This topic has not been examined in this sense closely and thoroughly before.

Measures: In this study, we focused on certain items in some questionnaires such as how often the children do exercise per week, from parents' perspective, and severity of asthma based on number asthmatic attacks during the daytimes and at nighttimes per week and month. From pulmonary function test's items, forced expiratory volume of the first second (FEV1) was used to categorize the severity of asthma from laboratory view. Reviewing the history form and case report form show the BMI% and whether the children have been diagnosed as asthmatic before or not.

Study variables were gathered by survey and clinical assessment during a scheduled clinic visit. The following measures were incorporated into the present study:

Childhood Obesity: Children´s height (inches) and weight (pounds) measured using the SECA Road Rod stadiometer (78"/200 cm) and the SECA 840 Personal Digital Scale. Children asked to remove their shoes and jackets prior to assessing their height and weight. Body mass index for each child calculated using the recommended equation by the Centers for Disease Control. All weight percentile categories (e.g., normal, overweight, obese) were based on the age and gender, specific growth charts recommended by the Centers for

Disease Control and Prevention (CDC) [11]. We used MBI% to classify the participants into: < 5th percentile under weight, 5-85th percentile normal weight, 85-95th percentile are overweight, and > 95th percentile are obese.

Childhood Asthma : The standard lung function test was carried out according to the recommended standards. The main value which was used in this study is the forced expiratory volume in one second (FEV1). FEV1 < 60 is severe asthma, 60-80 moderate asthma, and > 80 mild asthma and normal.

Asthma Severity : Asthma Assessment Form was used to assess the severity of asthma symptoms in terms of number of attacks per week during the day time and night time. Mild: 1-6 days /week and 3-4 nights/month, moderate: daily during days and 5-9 nights/ month, and severe: continuous during daytime and 10 nights/ month.

Children physical activities were collected from parents who were asked to recall what their children´s activities were over the past week. MET is "the ratio of the metabolic rate of the average person while seated and resting, to the metabolic rate of a particular person while performing some task" [2]. MET stands for Metabolic Equivalents of Task. One MET is "equivalent to a metabolic rate consuming: 3.5 milliliters of oxygen or 1 kilocalorie, per kilogram of body weight per minute" [2]. For that purpose we used the CDC and American College of Sports Medicine (ACSM) guidelines for the definition of the activities, 3-6 METs are moderate and greater than 6 METs are vigorous (Martin, Morrow, Jackson, and Dunn, 2000), Table 2. MET scores for children's physical activities is measured based on this form. Physical activities score is calculated by multiplying the times of each activity by hours of each activity by the assigned MET value for that activity. The sum of the scores gave the overall value for each activity over the last week before filling the form [15].

Children's age was collected as a continuous variable and later grouped into two categories younger (7-10 years) and older (11-13 years).

Statistical Analysis: SPSS for Windows Version 20.0 was used for data analysis. Descriptive statistics were summarized as mean (with SD) and frequency (%). Chi-square test and Student's t test were used to compare differences between groups. MANOVA analysis was conducted with total MET's scores as the dependent variable and group (asthma vs. nonasthma) and BMI% (healthy weight vs. overweight and obese) as independent variables. An interaction between asthmatic status and BMI% of the children was created and placed in the model as an independent variable. Basic model-fitting techniques for regression analysis, including goodness-of-fit assessment and regression diagnostics (e.g., residual analysis, detection of influential cases, and check for multicollinearity) were applied. Because physical activity data were not distributed normally, two outliers were removed before t tests and regression analyses were carried out. For all tests, p-values of 0.05 were considered statistically significant. Approval was obtained from the Institutional Review Board.

III. Results

Sample: A total of 145 children were recruited into the study; 75 children completed the physical activity data. Fifty-eight percent (43) of the sample was males, and the majority of the sample was Caucasian (85.5%). Seventy-nine (54.5%) children were of healthy weights; 66 (45.5%) were either obese or overweight. Seventy-seven (53.1%) were non-asthmatics and 68 (46.9%) were asthmatics (28 mild, 33 moderate, and 7 severe).

Obesity and Asthma Prevalence: Out of the 75 children who completed the physical activity form 41 (54.7%) were non-asthmatic, 15 (20%) were mild asthmatics, 14 (18.7%) were moderate asthmatics, and 5 (6.7%) were severe asthmatics. In terms of body composition, 43 (58 %) were under- or healthy weight and 31 (42%) were overweight or obese. Based on gender, more girls (48.39%) were asthmatic than boys (44.19%); on the other hand, boys (44.19%) were more likely to be overweight or obese than girls (31.71%). When grouped by their asthma and body composition status, 29 (38.7%) were non-asthmatic and non-obese/overweight, 18 (24%) were non-asthmatic and obese/overweight, 15 (20%) were asthmatic and non-obese/overweight, and 13 (17.3%) were asthmatic and obese/overweight, Table 1. The mean MET score of all children was 49.82 (SE = 4.62).

Table 1 : Participants' Demographic

Characteristic	Participants' # (%)
Gender	
Boys	43 (58%)
Girls	31 (42%)
Age	9.59 year
Group 1 (7-10 years)	44 (59.5%)
Group 2 (11-13 years)	30 (40.5%)
Race	
White	65 (87.8 %)

Black	3 (4.1%)
Hispanic	2 (2.7%)
Asian	2 (2.7%)
Family history of Asthma	
Yes	29 (38.6%)
No	42 (56%)
Missing	4 (5.4%)
Asthma	
Yes	34 (45.3%)
No	41 (54.7%)
Height	49.34 (9.07)
Weight	89.78 (39.86)
BMI %	60.51(31.74)

Obesity and Asthmatics and Physical Activity: Regardless of their asthmatic and weight statuses, boys and girls significantly differed based on their average MET scores (63.32 vs. 43.77) respectively ($F = 7.87$, $P = .007$) (Figure 1). Concerning the age, there was no significant difference in MET scores where the younger group had insignificantly higher MET scores (60.97 vs. 43.09) ($F = 1.05$, $P = .311$). Asthmatic participants, regardless of the severity, did not differ in terms of their MET scores from non-asthmatics: non-asthmatics' mean MET score was 37.27 (SE = 6.47), mild asthmatics' mean MET score was 61.03 (SE = 11.03), moderate asthmatics' mean MET score was 64.26 (SE = 11.25), and severe asthmatics' mean MET score was 63.81 (SE = 18.59) ($P = .284$). Overweight and obese children, regardless of their asthma status, had slightly higher mean MET scores than the healthy weight children (X = 56.93 and X= 51.70 respectively) but this was not a significant difference ($p = .331$).

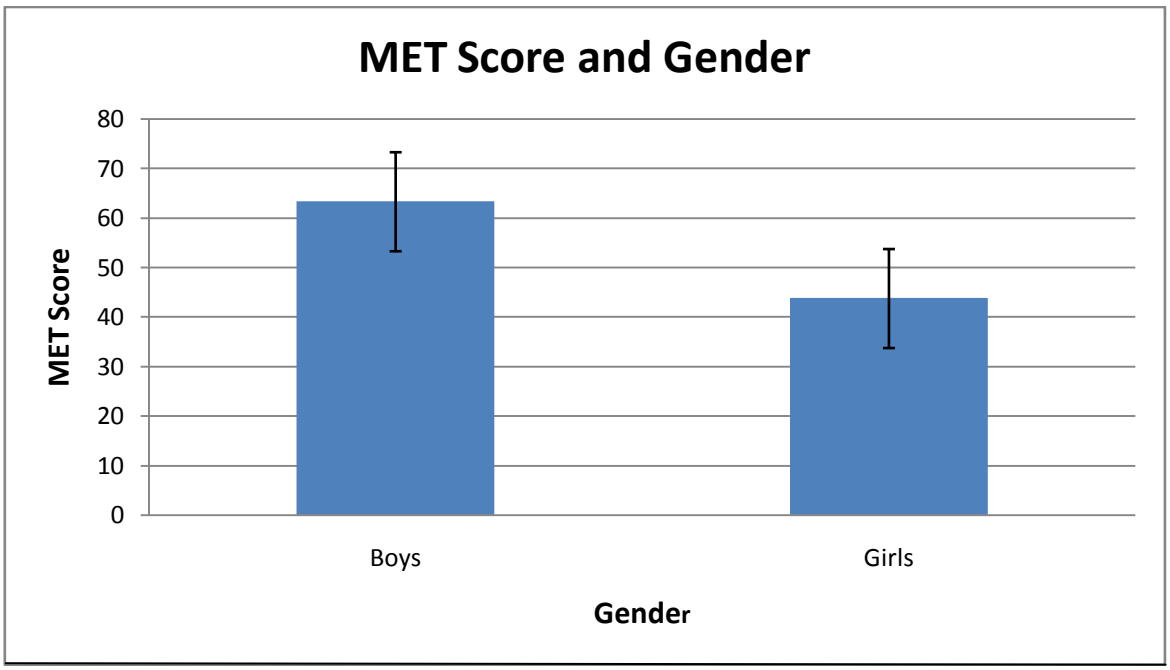


Figure 1 : Metabolic Equivalent Task Score of the Participants According to Gender

Analysis of the Composite Group: An interaction effect between participant age and asthma diagnosis was found with regard to average MET scores ($F = 3.08$, $P = .036$). Specifically, younger mildly asthmatic children had significantly higher MET scores than older mildly asthmatics (81.25 vs. 20.60, $p<.05$). Younger severe asthmatics also had moderately higher average MET scores than older severe asthmatics (65.71 vs. 60.00, $p<.05$), Figure 2.

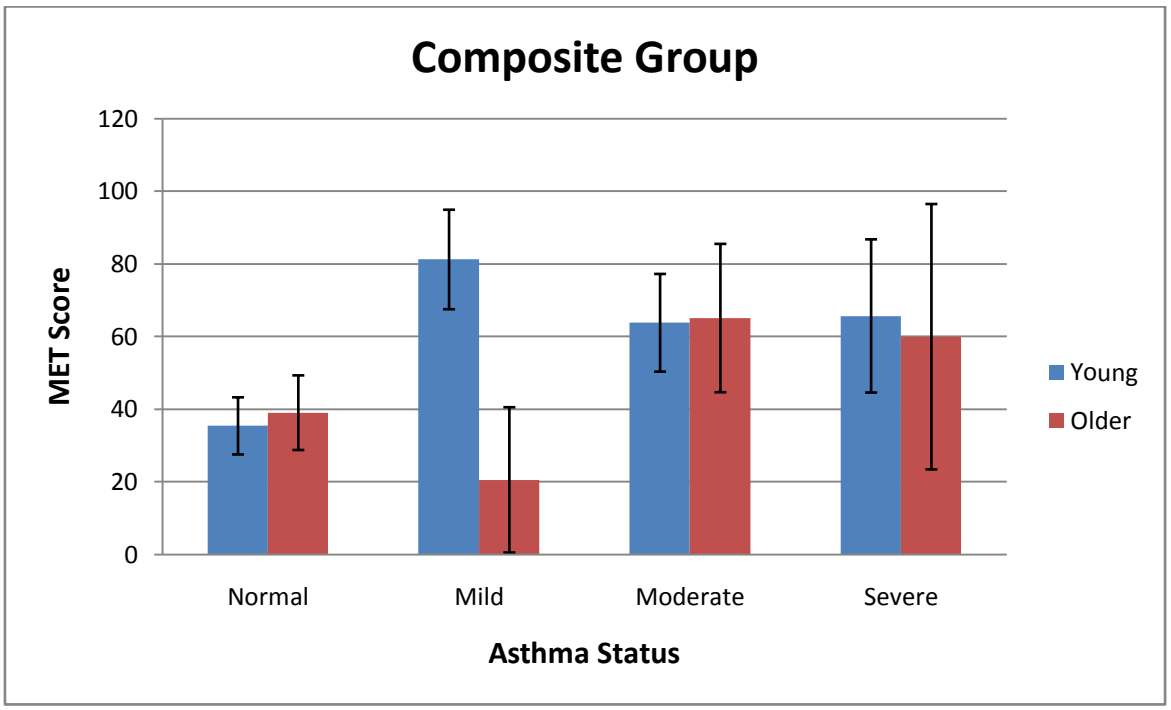


Figure 2 : Metabolic Equivalent Task Score of the Participants According to the Age and Asthma Statuses

IV. Discussion

The main findings of this study were that mild and severe asthmatic young children and boys, in general, were significantly involved in moderate to vigorous physical activity than mild and severe asthmatic older children and girls, respectively. BMI alone had no significant influence on children's moderate to vigorous physical activities.

Table 2 : The Survey was used to Assess Children Moderate and Vigorous Physical Activities

	Activities' List	MET
1.	Ride bike, Skate (roller, inline, ice, skateboard)	4
2.	T-ball/Baseball/Softball, Basketball, Golf, Dodge ball	4.5
3.	Play on playground, chase/tag, climb trees	3.5
4.	Jump rope, hopscotch, Trampoline, Bounce house	8
5.	Football, Soccer, Hockey, Tennis, Kickball	7
6.	Martial arts (karate, judo, etc.)	4
7.	ATV, dirt bike	5
8.	Dance, cheerleading, gymnastics	4
9.	Swimming	4

Our results, about gender and age differences in asthma and obesity, are supported by two studies, at least, which showed that asthmatic children do more physical activities than non asthmatic children [13,18]. Also, girls are less moderately to vigorously active than boys ($p < .001$) [1]. These findings are also underpinned by older girls' higher risk of developing asthma, which could hinder them from being physically active [4]. Moreover, children after age of 6 years tend to have higher BMI [10]. Additionally, there are some studies that found asthma and obesity in general to have no significant impact on children's physical activity [9,25]. In addition, Belcher et al.'s study revealed that children between 6 and 11 years are significantly more moderately to vigorously active than those children between 12 and 14 years ($p < .001$) [1].

Significance of this study finding is that asthmatic young children who see their doctors in POC could be more adherent to their physicians' advice about increasing their physical activities, in comparison to older asthmatic children. Well controlled asthma patients may have normal lives and they are recommended to increase their exercise to decrease their weights or to keep their weights within the normal range to avoid asthma exacerbations [27]. As a matter of fact, if a student's asthma is under well controlled, s/he can participate fully in any physical activity most of the time. Furthermore, there are many famous athletes who have had asthma and have succeeded because they followed their asthma action plans [26]. Moreover, Lang et al. concluded that children whose parents

believed exercise may alleviate their asthma symptoms tended to be highly active [13].

Our exclusion of sedentary activities aimed to focus on those activities that can be easily noticed and not be over-estimated or under-estimated and affect children's weights or inducing asthma. This hypothesis is supported by other studies which excluded low-MET activities, such as watching TV because they found that those activities contribute disproportionately to the total METs, which cause them to limit their consideration to activities which would obviously increase deep inspirations [18].

This study has a number of strengths. First, this was the first study up to our knowledge explored the shared impact of asthma and obesity on children's physical activities. There are many studies have studied either of those effect on children activities. However, we think, it is difficult to separate between asthma and obesity in the clinical setting and getting recommendation for asthmatics or obese children after controlling the other factor may not practical enough when it comes to talk with the parents about the best regimens for their children. Second, we studied the effect of asthma alone, obesity alone, and their shared effect on our participants and impact of age and gender on children moderate to vigorous physical activities. Third, most of the reviewed studies results showed that asthmatic or obese children tend to have lower levels of physical activities. However, the tools that are used to measure the physical activities are not detailed as ours. For instance, the Glazebrook's study asked the children to "rate a range of activities, both active and sedentary, on a 3-point scale (none, a little, or a lot) at 3 time points in the previous 24 hours (today before school, yesterday after school, and yesterday during school)" [9]. Scores were added together to give a total score for both kinds of activities and higher scores indicating higher activity [5,9,25]. In comparison, the questionnaire used in this study examined the entire week of activities and the duration of time on average. The MET scores of the moderate and vigorous activities were then calculated only to exclude the sedentary ones such watching TV or doing home work which could be exaggerated by some parents and underestimated by others. For that purpose we used the CDC and ACSM guidelines for the definition of the activities, 3-6 METs are moderate and greater than 6 METs are vigorous. Fourth strength was that most of the reviewed studied depended only self-report questionnaire to assess the severity of asthma which could be subjected to recall bias. On the other hand, our study used both self-report questionnaire [5,25] and lung function test to evaluate the severity of asthma which gives more strength to this study.

Limitations: First, this study was a cross sectional retrospective study. Second, selection bias because all participants have been recruited from the outpatients clinic. We expect that those patients have medical insurance, better socioeconomic status, and high educational parents' statuses, so they are more committed to the doctors' recommendations regarding encouraging their children to increase their physical activities in order to lose weight and improve their respiratory symptoms especially in advanced stage, moderate to severe asthma and high BMI%. Third constrain was the low number of participants who filled the physical activity form 75 children (55%). Further research should be prospective and try to recruit participants from the whole community to reflect the real situation of physical activities of asthmatic and non-asthmatic children.

All in all, mild and severe asthmatic young children are more physically active than the mild and severe asthmatic older children. The established declines in the physical activity are more prevalent among the asthmatic children in this sample. Regardless of their asthma diagnosis, girls were less physically active than boys, in general.

The main implication of this study is to bring clinicians' attention to focus on the children who are less physically active. These findings provide additional evidence for working with older asthmatic children and girls as they age to improve their physical activity. Clinicians may wish to encourage these particular groups to be more active and inform them about the benefits of physical activities on the asthma symptoms and the health in general. Through clear understanding of the relationship between physical activity and asthma, weight status, age, and gender, this study may provide some guidelines for future intervention to target the most vulnerable groups in a way that can improve their current health statuses through designing a multidimensional view of different points available for intervention (e.g., behavior programs, medical intervention). Also, these results provide an opportunity to offer the building blocks parents could use to ensure their children maintain a healthy weight, gain the proper nutrients, and engage in activity that will reduce their risks of health problems as adults.

References Références Referencias

1. Belcher B, Berrigan D, Dodd K, et al. Physical activity in US youth: Impact of race/ethnicity, age, gender, & weight status. Medicine and science in sports and exercise 2010;42:2211
2. Byrne N, Hills A, Hunter G, et al. Metabolic equivalent: one size does not fit all. Journal of Applied physiology 2005; 99:1112-1119
3. Canöz M, Erdenen F, Uzun H, et al. The relationship of inflammatory cytokines with asthma and obesity. Clin Invest Med 2008; 31:E373-379
4. Castro-Rodríguez J. Relationship between Obesity and Asthma. Arch Bronconeumol 2007; 43:171-175

5. Chiang L, Huang J, Fu L.Physical activity and physical self-concept: comparison between children with and without asthma. J Adv Nurs 2006;54:653-662
6. Chinn S, Downs S, Anto J, et al. Incidence of asthma and net change in symptoms in relation to changes in obesity. Eur Respir J 2006;28:763-771
7. Delgado J, Barranco P, Quirce S. Obesity and asthma. J Investig Allergol Clin Immunol 2008; 18:420-425
8. Farah S, Salome C. Asthma and obesity: a known association but unknown mechanism. Respirology 2012;17:412-21
9. Glazebrook C, Mcpherson A, Macdonald I, et al. Asthma as a barrier to children's physical activity: implications for body mass index and mental health. Pediatrics 2006; 18:2443-9
10. Guerra S, Wright A, Morgan W, et al. Persistence of asthma symptoms during adolescence: role of obesity and age at the onset of puberty. Am J Respir Crit Care Med 2004;170:78-85
11. Hammer L, Kraemer H, Wilson D, et al. Standardized percentile curves of body-mass index for children and adolescents. Am J Dis Child 1991;145:259-263
12. Kajbaf T, Asar S, Alipoor M. Relationship between obesity and asthma symptoms among children in Ahvaz, Iran: a cross sectional study. Ital J Pediatr 2011;37:1
13. Lang D, Butz A, Duggan A, et al. Physical activity in urban school-aged children with asthma. Pediatrics 2004;113:e341-346
14. Luder, E. Obesity and Asthma. Adipose Tissue and Adipokines in Health and Disease: 2007;341-349
15. Mindell J, Holmes B. Physical activity. In: Nelson M, Erens B, Bates B, Church S, Boshier T, eds. Food Standards Agency. Low income diet and nutrition survey, Nutritional status Physical activity Economic, social and other factors. Vol 3. 1st ed. Edinburgh, UK: The Stationery Office 2007;101-129
16. Navarro B, Eslava A, Monge J. Relationship among obesity, asthma and pulmonary function. Bol Med Hosp Infant Mex 2011;68:157-168
17. Nystad W. The physical activity level in children with asthma based on a survey among 7-16 year old school children. Scand J Med Sci Sports 1997;7:331-335
18. Ownby D, Peterson E, Nelson D, et al. The relationship of physical activity and percentage of body fat to the risk of asthma in 8- to 10-year-old children. J Asthma 2007;44:885-889
19. Peroni D, Pietrobelli A, Boner A. Asthma and obesity in childhood: on the road ahead. Int J Obes (Lond) 2010;34:599-605
20. Rundle A, Goldstein I, Mellins R, et al. Physical activity and asthma symptoms among New York City Head Start Children. J Asthma 2009;46:803-809
21. Schaub, B., von Mutius, E. Obesity and asthma, what are the links? Current opinion in allergy and clinical immunology 2005;5:185-193
22. Story R. Asthma and obesity in children. Current Opinion in Pediatrics 2007;19: 680–684
23. Strong W, Malina R, Blimkie C, et al. Evidence based physical activity for school-age youth. J Pediatr12005;46:732-737
24. Sutherland T, Cowan J, Young S, et al. The Association between Obesity and Asthma. Am J Respir Crit Care Med 2008;178:469–475
25. Tsai S, Ward T, Lentz M, et al. Daytime physical activity levels in school-age children with and without asthma. Nurs Res 2012;61:252-259
26. U.S. Department of Health and Human Service (2012) U.S. Department of Health and Human Service, National Institute of Health. Asthma and physical activity in the school: Making a difference http://www.nhlbi.nih.gov/health/public/lung/asthma/phy_asth.pdf Accessed June 13, 2013
27. Worsnop C. Asthma and physical activity. Chest Journal 2003;124:421-422

This page is intentionally left blank

Global Journal of Medical Research: K
Interdisciplinary
Volume 15 Issue 1 Version 1.0 Year 2015
Type: Double Blind Peer Reviewed International Research Journal
Publisher: Global Journals Inc. (USA)
Online ISSN: 2249-4618 & Print ISSN: 0975-5888

Risk of Inter-Related Health Issues among Children with ASD in Bangladesh

By Dr. Samiul Parvez Ahmed & Mahmuda Shahzabeen Ahmed

Independent University, Bangladesh

Abstract- In recent time, autism has become a major concern, globally. Due to its rapid growth, the healthcare professionals and medical researchers have been relentlessly working to identify the causes of ASD (Autism Spectrum Disorder); though the reasons are still unclear. In light of the contemporary research paradigm on ASD, the inter-related health issues of ASD also have raised significant concerns in the field. It is very recent that the researchers are interested in the dimensions and dynamics of inter-related health issues among people with ASD. Keeping in mind the global research advancements, this empirical research focuses on exploring and examining inter-related health issues among the children with autism in Bangladesh. The results of this research clearly show that there is evidence of various forms of inter-related health issues among the children with autism in Bangladesh.

Keywords: autism, autism spectrum disorder, ASD, inter-related health issues and autism.

GJMR-K Classification: NLMC Code: WY 108

Strictly as per the compliance and regulations of:

Risk of Inter-Related Health Issues among Children with ASD in Bangladesh

Dr. Samiul Parvez Ahmed [α] & Mahmuda Shahzabeen Ahmed [σ]

Abstract- In recent time, autism has become a major concern, globally. Due to its rapid growth, the healthcare professionals and medical researchers have been relentlessly working to identify the causes of ASD (Autism Spectrum Disorder); though the reasons are still unclear. In light of the contemporary research paradigm on ASD, the inter-related health issues of ASD also have raised significant concerns in the field. It is very recent that the researchers are interested in the dimensions and dynamics of inter-related health issues among people with ASD. Keeping in mind the global research advancements, this empirical research focuses on exploring and examining inter-related health issues among the children with autism in Bangladesh. The results of this research clearly show that there is evidence of various forms of inter-related health issues among the children with autism in Bangladesh.

Keywords: autism, autism spectrum disorder, ASD, inter-related health issues and autism.

I. Introduction

In recent time, autism has become a major concern, globally. To be more specific, *"…it is the fastest growing serious developmental disability and since 2002 through 2006 its growth rate is around 57 per cent"* (Autism Speaks, 2011)[1] . Though the rate of autism is increasing to a greater extent, the reasons/causes behind autism haven't been identified clearly (Trottier et al. 1999). Several arguments can be observed regarding causes of autism (e.g. hereditary, environmental factors, genetics) but, none of them is conclusive and their claim is often disproportionate (e.g. some issues are overstated and some are understated) (Hallmayer et al. 2011). Some also argue that there is link between autism and childhood vaccination, though there is no scientific proof for this claim (Freitag, 2007). Irrespective of the causes of autism, it is for real that the autistic people suffer a lot of problems in terms of various forms of physical and mental issues and, thus, one of the primary concerns is to identify the common problems that the autistic people face and how to treat them.

Author α: Faculty, Independent University, Bangladesh, (IUB), Plot: 16, Block: B, Aftabuddin Ahmed Road, Bashundhara R/A, Dhaka, Bangladesh. e-mail: samiul@iub.edu.bd

Author σ: Consultant, Beautiful Mind, Plot: 1145, Road: 6/A, Dolipara, Sector 5, Uttara, Dhaka, Bangladesh.
e-mail: sumana_amd @yahoo .com

[1] It is estimated that 1% of the world's population or 67 million are affected by autism (Autism Speaks, 2011).

II. Autism: Concept and Relevant Issues

It is difficult to define autism with a single universally accepted definition. Medical professionals and relevant academics/researchers hold vast range of concepts regarding autism. Firstly, autism, rather than a well-defined medical condition, it is considered as a "spectrum of disorders" that ranges from biological dysfunctions to psychological disorders. Hence, from technical perspective, autism can be defined as a *"…behavioural syndrome of multiple neurological injuries associated with a wide variety of medical conditions"* (Gillberg, 1990). In more non-technical words it can be defined as *"…a spectrum of behavioral anomalies characterized by impaired social interaction and communication, often accompanied by repetitive and stereotyped behavior"* (Ashwood and Water, 2004). It means that, in broader sense, autism affects a person's overall social skills – speech competencies, encoding and decoding language skills, socio-relational skills and overall socio-communicative skills. Though the major focus is always given to the psychological aspects while defining autism, its biological anomalies cannot be ignored. In some cases severe biological anomalies (e.g. inadequate motor skills, tics issues, hearing and vision issues) can even make an autistics person physically disable. In short, it can be sated that the "fundamental problems" that directly results from autism are broadly various forms of mental problems (e.g. social and learning problem); physical problems (e.g. lack of motor skills, feeding and eating problem); and behavioural problems (e.g. repetitive patterns of behaviour problem).

a) Contemporary Issues

Currently, it is widely argued that children with Autism Spectrum Disorder (ASD) prone to experience "other inter-related", both mental and physical, health issues than that of the core "fundamental problems" (as mentioned in the previous section). In recent time, a researcher of health psychology and a clinical child psychologist, University of Missouri, USA, Micah Mazurek, argued that adolescents with ASD also have chronic gastrointestinal problems, such as constipation, abdominal pain, bloating or nausea (Saracino, 2012). In line with this argument, a recent study conducted by her found that many children with autism also experience anxiety, chronic gastrointestinal (GI) problems and atypical sensory responses, which are heightened

reactions to light, sound or particular textures (McIntyre, 2012). Another study found that children with autism have sleeping disorder (Mayes, Calhoun, 2009). Similarly, various health organizations state that autism often associated with other inter-related health specific issues, such as, epilepsy, dental issues, tics and other mental issues[2] .

Therefore, the main objective of this research paper is to examine and discuss a range of inter-related health problems of autism and, subsequently, explore inter-related health problems among autistic people, particularly among the autistic children, in the Bangladeshi context.

III. Autism and other Inter-Related Health Issues

As mentioned earlier, it is often argued that the autism may associated with various interrelated health problems which, based on their nature, can be categorized into physical and mental issues.

a) Prevalence of Physical Issues among ASD

i. *Sleeping disorder*

One of the concerns regarding health issues among ASD children is that they often suffer from various forms of sleeping disorders (Mayes and Calhoun, 2009). According to a study conducted by Mayes and Calhoun (2009) with 477 autistic children, it was found that, in most of the cases, the children not only suffer from sleeping disorders, but also this tendency increases as the level of the severity of ASD increases. According to another study, children with ASD sleep less (e.g. insomnia) than their typical peers (Rudy, 2009a).

b) Poor nutrition due to Food Selectivity & other Feeding Problems

According Matson and Fodstat (2009), "food selectivity and other feeding problems are endemic in children with autism spectrum disorders (ASD)". To be more specific, the authors stated that autistic children, due to their food selectivity issue, often suffer from poor nutrition. Moreover, in many cases, autistic children with food selectivity problem show aggression in refusing food.

c) Anxiety, Sensory Over-Responsivity and Gastrointestinal Problems

It is known that in many cases children with autism spectrum disorders (ASD) suffers from Anxiety, Sensory Over-Responsivity and Gastrointestinal Problems (Mazurek et. al., 2013; Rudy, 2009b, Molly, 2003). However, a recent study (conducted in 2013) points out that these variables haven't been examined before in light of their association within themselves and, thus, the study revealed their degree and nature of association (Mazurek et. al., 2013). According to the study—

> *"…twenty-four percent of the sample experienced at least one type of chronic GI problem (constipation, abdominal pain, bloating, diarrhea, and/or nausea lasting three or more months). Children with each type of GI problem had significantly higher rates of both anxiety and sensory over-responsivity. Sensory over-responsivity and anxiety were highly associated, and each provided unique contributions to the prediction of chronic GI problems in logistic regression analyses. The results indicate that anxiety, sensory over-responsivity and GI problems are possibly interrelated phenomenon for children with ASD, and may have common underlying mechanisms" (Mazurek et. al., 2013:165).*

d) Epilepsy & Autism

In Australia, it is estimated that around thirty percent of people with ASD develop epilepsy (Autism Help)[3] . According to Autism Help--"Children with a severe intellectual disability are most likely to have seizures. Seizures most often develop during early childhood, with puberty being the next peak onset time, however onset can occur at any age".

e) Sexuality & Autism

It is argued that many people with ASD become sexually active, but often do not understand the consequences (Autism Help). In many cases, though the autistic people become sexually active (biologically), but these people lack maturity and social skills to properly deal with sexual skills.

f) Dental Issues

Autistic children often suffer from poor dental health (Autism Help). They usually have high level of tolerance for any kind of pain and, hence, when they suffer from dental pain it is difficult to notice their problems. Behavioural differences/changes may be taken as indications of their problems.

g) Prevalence of Mental Issues among ASD

It is obvious that the Autistic children have mental issues; however, they often victim of other inter-related mental problems which results from their lack of integration to their social surroundings or to their normal counter peer groups. The common problems that they face are low self-esteem, depression and various forms of anxieties (Autism Help).

[2] Source: Autism Help: A health organization that work in the Autism area known as Gateway Support Services, Australia. http://www.autismhelp.info/default.aspx

[3] Source: Autism Help: A health organization that work in the Autism area known as Gateway Support Services, Australia. http://www.autismhelp.info/default.aspx

IV. Empirical Study

a) Background of the Empirical Study: Autism & Inter-Related Health Issues in Bangladesh

In Bangladesh, there are no exact statistics on how many children is experiencing autism (Hossain, 2011). However, Ranjit Kumar Biswas, secretary to Social Welfare Ministry, claims that about 10% of the country's people could be challenged where 1% to be affected by ASD[4] . Moreover, till now, in Bangladesh, we do not have sufficient data (secondary data) or research work regarding prevalence of other health related issues among children having ASD. Therefore, the purpose of this research paper is to explore other health related issues among children with ASD in Bangladesh based on primary data.

b) Methodology

i. *Central Research Question*

Do autistic children suffer from inter-related health problems?

ii. *Objective*

The objective of this report is to explore whether autistic children suffer from inter-related health problems or not, and, subsequently, their implications among autistic children of the Bangladesh.

iii. *Hypothesis*

Six particular alleged inter-related health problems (as discussed in the literature review section) among children with ASD are considered in this study; they are sleeping disorder, constipation, stomach pain, gastrotestinal problem, obesity, and epilepsy. Thus, six sub-hypothesis were tested in order to answer the central question:

Association of ASD and Sleeping Disorder

H_0: ASD is not associated with sleeping disorder
H_1: ASD is associated with sleeping disorder

Association of ASD and Constipation

H_0: ASD is not associated with constipation
H_1: ASD is associated with constipation

Association of ASD and Stomach Pain

H_0: ASD is not associated with stomach pain
H_1: ASD is associated with stomach pain

Association of ASD and Gastrotestinal Issue

H_0: ASD is not associated with gastrotestinal issue
H_1: ASD is associated with gastrotestinal issue

Association of ASD and Obesity

H_0: ASD is not associated with Obesity
H_1: ASD is associated with Obesity

Association of ASD and Epilepsy

H_0: ASD is not associated with Epilepsy
H_1: ASD is associated with Epilepsy

iv. *Research Approach*

Considering the scope and resource, a case study approach was followed. As a case, one particular centre/institute that deals with autism was considered as "case subject"; and the autistic children that are registered in that centre were considered as "research elements". In order to compare the prevalence of the alleged inter-related health issued among children with ASD, a group of non-autistic children (children who do not have ASD) were considered as "comparison group" in the study.

v. *Case Subject*

Beautiful Mind (A Special Centre for Autistic & Mentally Challenged Children), Uttara, Dhaka, Bangladesh.

vi. *Research Elements (Autistic Children)*

The registered autistic children at Beautiful Mind, Uttara, Dhaka, Bangladesh.

vii. *Comparison Group (non-Autistic Children)*

Children who are enrolled in various mainstream education institutes and who do not have ASD.

viii. *Sample Size*

50 children with ASD and 25 ordinary (non-autistic) children.

ix. *Sampling Technique*

Total population of the case subject (Beautiful Mind) was considered for the study. Total population was approached for the study; however, parents of 50 children with ASD of the institute participated in the study. For the "comparison group", convenient sampling was used. The questionnaire was developed in such a way that it is self explanatory and thus the questionnaires were distributed among the parents, who agreed to participate in the study. Subsequently, the respondents returned the completed questionnaires afterwards. The parents were given the flexibility to consult the researcher in case they are not clear about any aspect of the questionnaire.

x. *Data Collection Tool*

Semi-Structured Questionnaire.

xi. *Ethical Consideration*

As the subject of the study (children) are minor, their parents and/guardians were considered as respondents for this study. Moreover, due to privacy protection issue, anonymity of the respondents is ensured throughout the research.

xii. *Testing Hypothesis*

Chi-square test is performed to test the hypothesis.

[4] The Daily Star, Sunday, July 24, 2011. Source: http://archive .thedailystar.net/newDesign/news-details.php?nid=195486

V. Results & Discussions

a) Overview of the Case-Subject: Beautiful Mind

Beautiful Mind is a private organization registered under the Ministry of Social Welfare, Bangladesh. The center is situated at Dolipara North of Uttara Model Town, Dhaka. The area is in a semi-rural with urban development closing in around the center. This centre was established in July 2004 by the founder chairperson Dr. Shamim Matin Chowdhury – a child and adolescence psychiatrist and an autism specialist in Bangladesh. Since then the centre is offering wide range of flexible programs for autistic and mentally challenged children. The centre responds specific needs of each individual depending on their issues. The student population of special needs comes from varied socio economic and cultural backgrounds with no apparent majority group. The centre has modern equipped physiotherapy, speech-therapy and occupational-therapy laboratories to support children's clinical needs. Academically this centre follows the National Curriculum and the Foundation Stage but modified by centre staff to meet the needs of pupils with autism and mental retardation. Moreover special approaches are followed to teach the special children, such as Verbal Prompt, TEACCH, PECS and ABA system are used to provide individualized methodology for each pupil. [5]

b) Data Analysis and Findings

In relation to the earlier discussion regarding autism and inter-related health issues, the primary data of the autistic children of the Beautiful Mind also shows that there is prevalence of some inter-related health issues among the autistic children (see figure 1).

i. *Sleeping Disorder*

64% of the respondents highlighted the fact that their children have sleeping disorder, though the nature of the problems varies among the children. The major issues are: (i) less sleeping hours compare to normal sleeping standards; (ii) difficulty in sleeping normally (medication needed); (iii) if sleeps few hours at day time, do not sleep at night. In few cases, the problem is quite serious; for instance, one of the respondents stated that:

> *"…Yes, he has various issues with his sleeping. Firstly, he has sleeping disorder. He doesn't have deep sleep. A slight sound wakes him up. Moreover, he doesn't sleep at all at night if there are any irregularities with his medications" (Interview: respondent code: 15)*

[5] Source: Beautiful Mind Website: http://www.beautifulmindbd.net/

Figure 1. Inter-related Health Problems among Children with ASD in Bangladesh

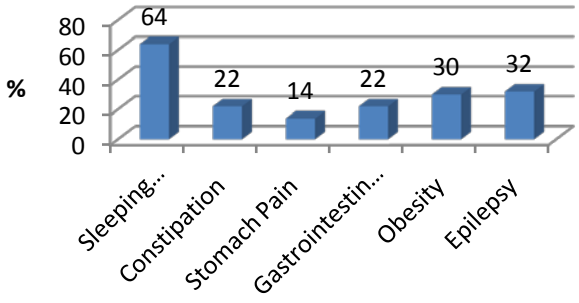


Figure 1 : Inter-related Health Problems among Children with ASD in Bangladesh

ii. *Constipation*

Around 22% respondents said that their children have constipation problem. Most of them said that their children do not want to eat fruits and vegetables. They prefer to eat chips, crisps and unhealthy fast food. So they suffer from constipation.

iii. *Stomach Pain*

According to the primary data, 14% respondents said that their children suffer from stomach pain. Some said that though their children cannot speak clearly but they could communicate through other means of communications to make them understand that they have stomach pain.

iv. *Gastrointestinal Problem*

Around 22% parents said that their children are suffering from Gastrointestinal problem. Some said that their children seriously suffer from gastric. Some said that they suffer occasionally.

v. *Obesity*

30% patients are obese. Some mother said that their children eat a lot. They do not understand that whether their stomachs are full or not. That might be the reason that these children suffer from obesity.

vi. *Epilepsy*

According to the data we can see that 32% children are suffering from epilepsy. One of the respondents said that, "when my child suffers from fever then he suffers from epilepsy". Most of the patients are under medication for epilepsy.

The above discussion is descriptive and that does not signify the statistical relationships of the concerned inter-related health issues and ASD. Thus, in order to answer the central question of the study, hypothesis testing is conducted in the following section.

c) Hypothesis Tests

Table 1 : Prevalence of Sleeping Disorder among ASD and Non-ASD Children

	Positive Sleeping Disorder	Sleeping Disorder Negative	Total
ASD	32	18	50
Non-ASD	1	24	25
Total	33	42	75

Chi-square value

24.35; Result: Failed to accept null hypothesis; (α=0.05; df=1).

Decision

Evidence support that ASD may be associated sleeping disorder.

Table 2 : Prevalence of Constipation among ASD and Non-ASD Children

	Positive Constipation	Constipation Negative	Total
ASD	11	39	50
Non-ASD	0	25	25
Total	11	64	75

Chi-square value

6.45; Result: Failed to accept null hypothesis; (α=0.05; df=1).

Decision

Evidence support that ASD may be associated with constipation.

Table 3 : Prevalence of Stomach Pain among ASD and Non-ASD Children

	Positive Stomach Pain	Stomach Pain Negative	Total
ASD	7	43	50
Non-ASD	2	23	25
Total	9	66	75

Chi-square value

0.57; Result: Null hypothesis cannot be rejected; (α=0.05; df=1)

Decision

Evidence does not support that ASD and stomach pains are associated

Table 4 : Prevalence of Gastrotestinal problem among ASD and Non-ASD Children

	Positive Gastrotestinal Problems	Gastrotestinal Problem Negative	Total
ASD	11	39	50
Non-ASD	4	21	25
Total	15	60	75

Chi-square value

0.38; Result: Null hypothesis cannot be rejected; (α=0.05; df=1)

Decision

Evidence does not support that ASD and gastrotestinal problems are associated

Table 5 : Prevalence of Obesity among ASD and Non-ASD Children

	Positive Obesity	Obesity N/A	Total
ASD	15	35	50
Non-ASD	7	18	25
Total	22	53	75

Chi-square value

0.03; Result: Null hypothesis cannot be rejected; (α=0.05; df=1)

Decision

Evidence does not support that ASD and obesity are associated

Table 6 : Prevalence of Epilepsy among ASD and Non-ASD Children

	Positive Epilepsy	Epilepsy N/A	Total
ASD	16	34	50
Non-ASD	0	25	25
Total	16	59	75

Chi-square value

10.17; Result: Failed to accept null hypothesis; (α=0.05; df=1)

Decision

Evidence support that ASD may be associated epilepsy.

The above results show that, statistically ASD does have association with sleeping disorder, constipation and epilepsy. This findings support the argument that children with ASD are prone to experience other inter-related health issues. However, it is to be noted that the results for other factors (stomach pain, obesity and gastrotestinal issues) do not support this argument.

VI. Treatment

An Autistic child is a big problem for a family. Not only the autism but also the interrelated health issues have a negative effect for the patient. The inter-related health issues can critically influence the regular life of a person subject to autism and moreover these issues can have significant effects on their functioning at home and in school.

Clinicians should be aware that anxiety, GI problems and sensory sensitivity often co-occur in individuals with ASD. Effectively managing these concurrent issues may improve children's quality of life and their responses to treatment. Parents need to be aware that these problems may underlie some of their children's difficulties, so if they notice any symptoms, they should talk to their doctors or therapist about treatment options (Mazurek et al. 2013).

It is not possible to cure autism with any type of medication. But the associated health issues like anxiety, aggressive behaviour, sleeping disorder, epilepsy can be controlled with medication. Parents and doctors should be careful about medications; because all medications have short term or long term side effects. The side effects that occur from medications are- weight gain, nausea, sleepiness, increased aggression, headaches and long term liver or kidney problem. So parents and doctors should be very careful to use medicines for autistic children.

VII. Conclusion

The health care services regarding autism and standard of diagnosis in this field in our country is still very basic (Ethirajan, 2011). Moreover, it is quite unfortunate that there is a dearth of nationwide statistical data in this field[6] . It is good that in 2001 Bangladesh government passed Disability Act and, in addition, the Government established the 'Centre for Neurodevelopment and Autism in Children' at the Bangabandhu Sheikh Mujib Medical University (Autism Speaks[7]). It is true that the awareness regarding autism is increasing but the current health services mainly focus

[6] Bangladesh does not have specific data on those affected by autism but officials estimate that around 150,000 children may be classified as autistic (Ethirajan, 2011).

[7] http://www.autismspeaks.org/site-wide/bangladesh

on the fundamental issues of autism in our country. There is not much concern regarding the inter-related health issues among the autistic people among the health professionals in this field. But this study clearly shows that there is evidence of various forms of inter-related health issues among the children with autism in Bangladesh. Thus, along with all other critical issues of autism, the inter-related health issues of autism should be brought into the limelight of contemporary autism research and these issues should be addressed through the local autism health care facilities.

VIII. Acknowledgement

Special thanks to Dr. Shamim Matin Chowdhury, founder chairperson of the Beautiful Mind, for providing invaluable remarks for our research.

References Références Referencias

1. Ashwood P. and Water J. V. D., (2004), Is Autism an Autoimmune Disease?, Autoimmunity Reviews, Vol. 3, Issues 7-8, November 2004, pp. 557-562.
2. Autism Help (Website), www.autismhelp.info.com
3. Ethirajan A., (2011), Meeting on Autism Begins in Dhaka, BBC News. Source:http://www.bbc. co. uk/news/world-south-asia-14271677
4. Freitag C.M. (2007), The genetics of autistic disorders and its clinical relevance: a review of the literature. Mol Psychiatry. 2007;12(1):2–22. doi:10. 1038/sj.mp.4001896.
5. Gillberg C., (1990), What is Autism?, International Review of Psychiatry, Vol. 2, No. 1, Pp. 61-66.
6. Hallmayer, J.; Cleveland, S., Torres, A., Phillips, J., Cohen, B., Torigoe, T., Miller, J., Fedele, A., Collins, J., Smith, K., Lotspeich, L., Croen, L. A., Ozonoff, S., Lajonchere, C., Grether, J. K., Risch, N. (2011). "Genetic Heritability and Shared Environmental Factors Among Twin Pairs With Autism". Archives of General Psychiatry 68 (11): 1095–1102. Do i: 10.1001/archgenpsychiatry.2011.76.
7. Hossain S. W., (2011), Solving the Autism Public health Puzzle, Regional and International Collaboration, UN Head Quarters. Source: http://www.un.int/wcm/webdav/site/bangladesh/shared/files/Saima%20Wazed%20Hossain%20on%20Autism.pdf
8. Matson J. L. and Fodstat J. C., (2008), The treatment of food selectivity and other feeding problems in children with autism spectrum disorders, Research in Autism Spectrum Disorders, Vol. 3, Issue. 2, April-June 2009, pp. 455-461.
9. Mayes S. D. And Calhoun S. L., (2009), Variables related to sleep problems in children with autism, Research in Autism Spectrum Disorder, Vol. 3, Issue 4, pg. 931-941.
10. Mazurek M. O., Vasa R. A., Kalb L. G., Kanne S. M., Rosenberg D., Keefer A., Murray D. S., Freedman B., and Lowery L. A., (January, 2013), Anxiety, Sensory Over-Responsivity, and Gastrointestinal Problems in Children with Autism Spectrum Disorders, Journal of Abnormal Child Psychology, Vol. 41, Issue 1, pp. 465-176.
11. McIntyre K., (2012), Clinicians, parents should watch for concurrent medical and psychiatric problems that affect treatment of ASD, News Bureau, University of Missouri, USA.
12. Molly C. A., (2003), Prevalence of Chronic Gastrointestinal Symptoms in Children with Autism and Autistic Spectrum Disorders, Autism, Vol. 7, No. 2, pp. 165-171.
13. Rudy L. J., (2009a), Do Children with Autism Sleep Less Than Their Typical Peers?, Article Reviewed by Medical Review Board, Updated July 21, 2009. Source: http://autism.about.com/od autismgiissues/a/METgene.htm
14. Rudy L. J., (2009b), Research Finds Gene Linking Autism and Gastrointestinal Problems, About.com Guide, Article Reviewed by Medical Review Board, Updated March 24, 2009. Source:http://autism about.com/od/autismgiissues/a/METgene.htm
15. Saracino L., (2012), Anxiety and other disorders common in children with Autism, International Centre for Autism Research & Education, Online Publication, September, 2012.
16. The Beautiful Mind: A Special Center for Autistic & Mentally Challenged Children: Source: Website: http://www.beautifulmindbd.net/
17. Trottier G, Srivastava L, Walker CD (1999), Etiology of infantile autism: a review of recent advances in genetic and neurobiological research. Journal of Psychiatry, Neuroscience. 1999; Vol. 24, issue 2, pp. 103–115.

This page is intentionally left blank

Global Journal of Medical Research: K
Interdisciplinary
Volume 15 Issue 1 Version 1.0 Year 2015
Type: Double Blind Peer Reviewed International Research Journal
Publisher: Global Journals Inc. (USA)
Online ISSN: 2249-4618 & Print ISSN: 0975-5888

Semiparametric Estimation of AUC from Generalized Linear Mixed Model

By Okeh UM & Oyeka ICA
Ebonyi State University, Nigeria

Abstract- Methods of evaluating the performance of diagnostic tests are of increasing importance in medical science. When a test is based on an observed variable that lies on a continuous scale, an assessment of the overall value of the test can be made through the use of a Receiver Operating Characteristic (ROC) curve. The ROC curve describes the discrimination ability of a diagnosis test for the diseased subjects from the non-diseased subjects. The area under the ROC curve (AUC) represents the probability that a randomly chosen diseased subject will have higher probability of having disease than a randomly chosen non-diseased subject. Semi-parametric being a ROC curve estimation method is widely used in making inferences from diagnostic test results that are at least measurements on ordinal scale. In this paper, we proposed a method of semi-parametric estimation in which predicted probabilities of discordant pairs of observation are obtained from generalized linear mixed model (GLMM) and used in modeling ROC and AUC. The AUC obtained which is time dependent is equivalent to the Mann-Whitney statistic (Hanley and McNeil, 1982) often applied for comparing distributions of values from the two samples.

Keywords: *AUC, ROC, GLMM, GDM, semi-parametric, mann-whitney.*

GJMR-K Classification: *NLMC Code: QZ 241*

Strictly as per the compliance and regulations of:

Semiparametric Estimation of AUC from Generalized Linear Mixed Model

Okeh UM [α] & Oyeka ICA [σ]

Abstract- Methods of evaluating the performance of diagnostic tests are of increasing importance in medical science. When a test is based on an observed variable that lies on a continuous scale, an assessment of the overall value of the test can be made through the use of a Receiver Operating Characteristic (ROC) curve. The ROC curve describes the discrimination ability of a diagnosis test for the diseased subjects from the non-diseased subjects. The area under the ROC curve (AUC) represents the probability that a randomly chosen diseased subject will have higher probability of having disease than a randomly chosen non_diseased subject. Semi-parametric being a ROC curve estimation method is widely used in making inferences from diagnostic test results that are at least measurements on ordinal scale. In this paper, we proposed a method of semi-parametric estimation in which predicted probabilities of discordant pairs of observation are obtained from generalized linear mixed model (GLMM) and used in modeling ROC and AUC. The AUC obtained which is time dependent is equivalent to the Mann-Whitney statistic (Hanley and McNeil, 1982) often applied for comparing distributions of values from the two samples. The proposed methods are illustrated using data on women at risk for gestational diabetes mellitus. Result indicates that varying cutoff values for screening pregnant women exists for different time period while an optimal cutoff value is recommended for screening all women at risk for GDM given that the procedure yielded smooth ROC curves. The predicted probabilities obtained from GLMM method has a high statistical efficiency since for all the trimesters, there exists statistical significance. This study therefore demonstrated that the semi parametric GLMM method provided reliable, unbiased, and consistent estimates for the parameters while the AUCs are all statistically significant. The computations are supported by SAS version 9.0.

Keywords: *AUC, ROC, GLMM, GDM, semi-parametric, mann-whitney.*

I. Introduction

In health studies, the diagnosis of a patient are very often based on some classification errors calibrated based on the sensitivity and specificity. An individual presenting for a screening test for a disease, is discriminated based on a cut-off value c whether he/she is healthy or diseased when test results are measurements on at least the ordinal scale. Many procedures exist for estimating the accuracy of test measurements such as the parametric, nonparametric and semi-parametric methods and their associated summary measures. In this paper, we will propose a semi-parametric regression type method of obtaining predicted probabilities from the Generalized Linear Mixed Model (GLMM) and using them to model the receiver operating characteristic (ROC) curve and area under the ROC curve(AUC) for continuous binary test results that are time dependent.

Suppose Y and X denotes the test result of subjects with and without disease respectively. Let c be cut-off value. Then P(X > c) = G(c) and P (Y > c)= F(c) where F(c) is sensitivity and 1-G(c) represents specificity. Therefore ROC is a plot of F(c) versus G(c) for all possible thresholds, c. In terms of TPR and FPR at c,

$$ROC(.) = \{(FPR(c), TPR(c)), c \in (-\infty, \infty)\} \quad (1)$$

The accuracy of ROC is summarized by the AUC given as

$$AUC = P(X > Y) = \int_0^1 ROC(t)\,dt. \quad (2)$$

This is the probability that a randomly chosen diseased subject will have higher probability of having disease than a randomly chosen non-diseased subject.

Since different estimation methods can provide a span of estimated AUC values on the same data set, their properties are always examined in order to provide a recommendation as to the preferred approach.

Dorfman and Alf (1969) proposed a parametric iterative method for obtaining the maximum likelihood estimates of the parameters of a bi-normal ROC curve to model ordinal data. They assumed that test results for the diseased (X) and non-diseased (Y) populations are normally distributed respectively as

Author α : Deparment of Industrial Mathematics and Applied Statistics, Ebonyi State University, Abakaliki ,Nigeria.
email: uzomaokey @gmail.com
Author σ : Department of Statistics, Nnamdi Azikiwe University Awka, Nigeria.

$$X \sim N\left(\mu_X, \sigma_X^2\right) \text{ and } Y \sim N\left(\mu_Y, \sigma_Y^2\right). \quad (3)$$

While parametric binormal ROC curve is given as

$$ROC(t) = \Phi\left(a + b\Phi^{-1}(t)\right), 0 \le t \le 1, \quad (4)$$

$$\text{where } a = \frac{\mu_X - \mu_Y}{\sigma_X}, b = \frac{\sigma_Y}{\sigma_X}. \quad (5)$$

Here a and b are parameter estimates which gives the statistical inference while denotes the standard normal cumulative distribution function. By algebraic simplification, the AUC is given as:

$$AUC = \Phi\left(\frac{(\mu_X - \mu_Y)}{\sqrt{\left(\sigma_X^2 + \sigma_Y^2\right)}}\right) = \Phi\left(\frac{a}{\sqrt{1+b^2}}\right) \quad (6)$$

Reiser and Faraggi(2002) and Goddard and Hinberg (1990) proposed the transformation (say logarithmically) of test results and making it normal due to the violation of the normality assumption. They proposed the transformed normal (TN) approach which is a parametric estimation method based on the normal theory. It involves applying a Box-Cox power transformation (Box and Cox,1964) to the data and subsequently using the N estimator to the transformed data.

In general, the problems identified with maximum likelihood method of estimating parameters in parametric method is the inability of the parameter estimates to quickly attain convergence because it is an of iterative method. There exists also the restrictive assumptions of normality or transformation to normality of the parametric method about the distribution of test results making the estimates inconsistent thereby giving a misleading picture of the regression relationship when the assumption is violated (Pepe,2003).

According to Hanley and McNeil (1982), the empirical non-parametric method uses the MW statistic in estimating ROC curves. As usual, they are used when the normality assumption for test results is violated. Here AUC is calculated using the MW version of the two-sample rank-sum statistic of Wilcoxon as

$$\hat{AUC} = \frac{1}{n_1 n_0}\sum_{i=1}^{n_1}\sum_{j=1}^{n_0}\Omega\left(Y_i^+, Y_j^-\right) \quad (7)$$

$$\text{where } \Omega\left(Y_i^+, Y_j^-\right) = \begin{cases} 1 \text{ if } Y_i^+ > Y_j^- \\ \frac{1}{2} \text{ if } Y_i^+ = Y_j^- \\ 0 \text{ if } Y_i^+ < Y_j^- \end{cases} \quad (8)$$

Where are number of subjects that are diseased and non-diseased respectively.

while is the ith diagnostic test results for the diseased individuals and is the jth diagnostic test results for the non-diseased individuals. The AUC just like the MW statistic is suitable for comparing two populations (n1 and n0) by taking covariate effects into account. Equation 8 provides an unbiased estimate given as.

$$P\left(Y_i^+ > Y_j^-\right) + \frac{1}{2}P\left(Y_j^- = Y_i^+\right) \quad (9)$$

Therefore

$$\hat{AUC} = \frac{1}{n_1 n_0}\sum_{i=1}^{n_1}\sum_{j=1}^{n_0}P\left(Y_i^+ > Y_j^-\right) + \frac{1}{2}P\left(Y_j^- = Y_i^+\right) \quad (10)$$

In general, nonparametric estimation method does not yield smooth curve, especially in small samples (Zou et al, 1998). They models avoid restrictive assumptions of the functional form of the regression function. There is also lack of a one to one correspondence between TPR and FPR values makes inference awkward (Zou et al, 1998).

Dodd and Pepe (2003) proposed a semi-parametric AUC regression model for data with a non-normally distributed response variable which can adjust for continuous and discrete covariates. Assume that one needs to adjust the AUC for a covariate X, the covariate-specific AUC can be expressed as

$$AUC_{ij} = P\left(Y_i^D > Y_j^{\bar{D}} \middle| X_i, X_j\right) \tag{11}$$

Where is the ith response in diseased (or treatment) group with covariate value and is the jth response in non-diseased (or control) group with covariate value Often one is interested in estimating the AUC at a specified covariate level, i.e.

$$P\left(Y_i^D > Y_j^{\bar{D}} \middle| X_i = X_j = X\right). \tag{12}$$

Dodd and Pepe applied this model to the GLM framework which allows one to model the AUC with covariates, in which case their model can be written as,

$$g\left(AUC_{ij}\right) = X_{ij}^T \beta, \tag{13}$$

where g is a monotone link function such as the probit or logit link, X_i j is a vector function of X_i and X_j and β is a vector fixed and unknown parameters to be estimated. Note that

$$E\left(I(Y_i^D > Y_j^{\bar{D}}) \middle| X_{ij}\right) = AUC_{ij}. \tag{14}$$

Thus, for estimating the parameters in the model, Dodd and Pepe proposed the use of the logistic regression model where the response variable is a Bernoulli variable Dodd and Pepe demonstrated that the estimates of parameters are found as solution to the usual score equations given by

$$\sum_{i}^{N_D} \sum_{j}^{N_{\bar{D}}} \frac{\left(I_{ij} - AUC_{ij}\right)}{V\left(I_{ij}\right)} \frac{\partial AUC_{ij}}{\partial \beta}, \tag{15}$$

Where $I_{ij} = I\left(Y_i^D > Y_j^{\bar{D}}\right)$. Therefore, one obtains this estimate using standard statistical software.

According to Colak et al (2012) as well as Wolfgang et al(2004),the most preferred method of estimation is the semi-parametric method because it combines the flexibility of the nonparametric method with the advantages accruable to the parametric procedure in achieving better results. Semi-parametric (SP) approach is an intermediate strategy between parametric and non-parametric methods for estimating the ROC curve in the sense that it assumes a parametric bi-normal form for the ROC curve, but does not assume that the diagnostic test results follow any particular distribution. This informed the choice of the method in this work.

II. Linear Regression Model

A linear regression model by matrix notation is given as:

$$\underline{Y} = X\underline{\beta} + \underline{\varepsilon} \tag{16}$$

Where $\underline{Y} = n \times 1$ is a column vector of observations, $X = n \times (p+1)$ is a design matrix of regressors, $\underline{\beta} = p \times 1$ is a column vector of regression coefficients and $\varepsilon = n \times 1$ is a column vector of error term which is independent and identically distributed such that $\varepsilon(0, \sigma^2 I)$. Note that for linear regression model, $E(Y) = X\underline{\beta}$ is actually the expected probability that on the average a randomly selected subject from the population test or respond positive to the condition under study while the variance is given as $\sigma^2 I$, where I is an n x n identity matrix. The estimation of β can be carried out using the least square method by obtaining $\hat{\beta}$ as the best estimate of β through the minimization of the sum of squared errors. The result is

$$\underline{\hat{\beta}} = (X'X)^{-1} X'\underline{Y} \qquad (17)$$

Where $\underline{\hat{\beta}} \sim N(\underline{\beta}, (X'X)^{-1}\sigma^2)$ and $(X'X)^{-1}$ is the inverse of the nonsingular variance-covariance matrix.

III. Generalized Linear Model (GLM)

GLM is an extension of the linear regression model and for modeling binary data, GLM is made up of a linear predictor given as

$$\eta = X\beta \qquad (18)$$

And inverse link function (g^{-1}) which describes how the mean, $E(Y) = \mu$ depends on the linear predictor thus converting a linear predictor into a mean. It is given as

$$g^{-1}(\eta) = \mu \qquad (19)$$

This link function a smooth and invertible linearizing function which transforms the expectation of the response variable to the linear predictor . The third component of GLM is a variance function that describes how the variance, depends on the mean and it is

$$Var(Y) = V\left(g^{-1}(X\beta)\right) = V\left(g^{-1}(\eta)\right) \qquad (20)$$

Meanwhile, GLMM is a model extension of GLM in which the linear predictor contains both fixed effects and random effects (McCullagh and Nelder, 1989). In matrix notation, it is given as

$$Y = \eta + \varepsilon = X\beta + Zu + \varepsilon \qquad (21)$$

where

$$u \sim N(0, G); \varepsilon \sim N(0, R); E(u, \varepsilon) = 0; Cov(\varepsilon, u) = 0.$$

As defined previously for Y, β is a p x 1 column vector of fixed effects, u is a q x 1 vector of random effects, ε is a n x 1 vector of random error terms, X is the n x p design matrix for the fixed effects relating to β, Z is the n x q design matrix for the random effects relating to u. The structure of the covariance matrices of G and R specifies the structure of correlation among the random effects and error term respectively. The variance of Y for GLMM is given as:

$$V(Y) = ZGZ' + R \qquad (22)$$

Where Z is a diagonal matrix and A is a diagonal matrix that contains the variance functions of the model.

IV. The Proposed Method

To obtain the predicted probability from GLMM, we incorporate the time of measurement of binary data for subjects having n observations. Since the binary logistic model is a linear relationship between the natural logarithm and the linear component. Then

$$In\left(\frac{\pi_{it}}{1-\pi_{it}}\right)=\eta_{it}=X_{it}\underline{\beta}+Z_{it}\underline{u_i} \qquad (23)$$

where π_{it} is the predicted probability of the positivity of ith randomly selected subject at time t for $i=1,2,...,n;t=1,2,...,T$. Here T is total time period and η_{it} is the linear predictor for ith subject at time t. Simplifying equation gives

$$\hat{\pi}_{it}=\frac{e^{X_{it}\underline{\hat{\beta}}+Z_{it}\underline{\hat{u}_i}}}{1+e^{X_{it}\underline{\hat{\beta}}+Z_{it}\underline{\hat{u}_i}}} \qquad (24)$$

This estimated predicted probability results from fitting the values of the parameter estimates of $\hat{\beta}$ *and* $\hat{u}$ evaluated through the application of Henderson (1953) mixed model equations given as

$$\begin{pmatrix} X'R^{-1}X & X'R^{-1}Z \\ ZR^{-1}X & Z'R^{-1}Z+G^{-1} \end{pmatrix}\begin{pmatrix}\beta\\ u\end{pmatrix}=\begin{pmatrix} X'RY \\ Z'R^{-1}Y\end{pmatrix} \qquad (25)$$

These estimates are respectively obtained and the solution is given as

$$\hat{\beta}=\left(X'V^{-1}X\right)^{-1}X'V^{-1}Y,\ \hat{u}=GZ'V^{-1}\left(Y-X\hat{\beta}\right) \qquad (26)$$

$$where\ \ V=ZGZ'+R$$

V. Constructing Roc Curve

The estimated predicted probability will then serve as a bio-marker for constructing the ROC curve for discriminating a diseased subject from a non-diseased subject longitudinally. The procedure is first to obtain estimates of sensitivity and specificity from a four-fold table so as to have insufficient pairs of sensitivity and 1-specificity that are incapable of producing the actual ROC curve analysis. To obtain sufficient pairs capable of generating the actual smooth ROC curve, a series of pairs of sensitivity and 1-specificity up to the sample size under consideration (sn(1),1- sp(1)),...,(sn(n),1-sp(n)) is calculated from varying cuts of positivity escalated by increments of 0.005 in predicted probability. The ROC curve is created by plotting for n number of subjects at t time, n pairs of sensitivity and 1-specificity data points starting with the strictest positive criterion of 1 to the loosest positive criterion of 0.005.

VI. Estimating AUC from Estimated Predicted Probability

The AUC is given in a closed form for the purpose of this study as:

$$AUC=\int_0^1 ROC\left(t_{X,Z}\right)dt_{X,Z}, \qquad (27)$$

This is the ROC value with false-positive rate t that is associated with the fixed effect predictor X and random effects predictor Z where the integration limits run from 0 to 1. Due to the difficult nature of obtaining the result as seen by other authors (Dorfman et al,1969), we will alternatively construct AUC based on predicted probabilities from binary measure models, by adapting the MW method to compare the size of the predicted probabilities of each discordant pair. This is achieved by dichotomizing the predicted probability so that two probabilities given as π_{it}^{+} *and* $\left(1-\pi_{it}^{+}\right)$ is assumed to

represent predicted probability of the diseased and non-diseased responses for the ith subject respectively at time t for the binary measure design. The MW method is the choice because under the GLMM framework, there is no simple closed-form solution of the ROC curve and the MW method yields ROC estimates with a good precision. Here the AUC is given as

$$AUC = \frac{1}{n_D n_{\bar{D}}} \sum_{i=1}^{n} \sum_{t=1}^{T} u_{it} \qquad (28)$$

Where n_D *and* $n_{\bar{D}}$ are the numbers of observed values for the diseased and non-diseased subjects respectively while t and T are time of test measurement and total time period of measurement respectively.

Also u_{it} is a function comparing the test result of ith subject with and without disease at time t. The total number of (discordant pairs) sample observations, n as:

$$n = n_D + n_{\bar{D}} \qquad (29)$$

The difference between the AUC given above and that suggested by other authors such as Hanley and McNeil (1982) is that here AUC is calculated from predicted probabilities that are time dependent instead of test scores. For each discordant pair, ordering of the corresponding predicted probabilities are compared in relation to the observed outcome values, and the AUC is calculated based on these ordering results so as to compare the size of the predicted probabilities of each discordant pair. In binary measure design, where there exist complete discrimination of health status, each subject has two possible mutually exclusive outcomes either Yes (diseased coded1) or No (non-diseased usually coded 0) whose values may vary from time to time. This is represented as

$$u_{it} = \begin{cases} 1, \textit{if } x_{it} \textit{ is the test score in the ith subject screened at} \\ \textit{time t that tested positive} \\ 0, \textit{otherwise} \end{cases} \qquad (30)$$

$$\textit{for } i = 1, 2, \ldots, n; t = 1, 2, \ldots, T$$

The values of 0 and 1 as outcomes of this function shows that the subjects health status are well discriminated (Bernd et al, 2003; Colak et al, 2012). Evaluation of this function through the ordering procedure gives the unbiased estimate suitable for use in calculating the AUC.

VII. Illustrative Example

The data for this study were obtained from the medical record units of five randomly selected hospitals in Ebonyi State, Nigeria. The data represents binary test results of 1114 pregnant women susceptible for gestational diabetic mellitus (GDM).These are measurements taken at various time periods (trimesters).

Table 1 : Table showing screening test results and final diagnosis using OGTT by trimesters OGTT (Gold standard)

	1st Trimester GDM present =B; GDM absent= $\bar{B}$			2nd Trimester GDM present =B; GDM absent= $\bar{B}$			3rd Trimester GDM present =B; GDM absent= $\bar{B}$			All Trimester GDM present =B; GDM absent= $\bar{B}$		
Test result of GCT FOR GDM	B	$\bar{B}$	Total	B	$\bar{B}$	Total	B	$\bar{B}$	Total	B	$\bar{B}$	Total
Positive (A)	18	18	36	31	20	51	47	13	60	96	51	147
Negative($\bar{A}$)	35	230	265	85	255	340	124	238	362	248	719	967
Total	53	248	301	116	275	391	171	251	422	344	770	1114

VIII. Data Analysis and Results

The data analysis was assisted using SAS version 8 software and the results of semi-parametric roc analysis with their graphs are shown in table 2 below.

Table 2 : Results of Semi-Parametric Roc Analysis of The Data

Trimesters	1st	2nd	3rd	All
Cutoff value of GCT with max AUC	184	177	179	179
Sensitivity with 95% CI	50.00 (44.35-55.65)	60.78 (55.94-65.62)	78.33 (74.4-82.26)	65.31 (62.51-68.1)
Specificity with 95% CI	86.79 (82.97-90.62)	75.00 (70.71-79.29)	65.75 (61.22-70.27)	74.35 (71.79-76.92)
PPV with 95% CI	33.96 (28.61-39.31)	26.72 (22.34-31.11)	27.49 (23.23-31.74)	27.91 (25.27-30.54)
NPV with 95% CI	92.74 (89.81-95.67)	92.73 (90.15-95.3)	94.82 (92.71-96.94)	93.38 (91.92-94.84)
Max. AUC with 95% C.I.	0.684(0.59-0.77)	0.6789(0.61-0.75)	0.7204(0.65-0.77)	0.6983(0.66-0.74)
$n_{\bar{D}}$	265	340	362	967
n_D	36	51	60	147
$\hat{\beta}$	1.578	1.446	1.430	1.409
$\hat{u}$	1.170	1.007	0.966	0.932
Predicted Probability(π_{it})	0.6857	0.7101	0.8234	0.9210

χ^2 value at one (1) DF and the 95% C.I indicates highly statistically significant relationship(strong degree of association) between screening test results and state of nature or condition (GDM) for all the trimesters.

For all the trimesters, ROC curve analysis showed that (see Fig.1-Fig 4), results were statistically significant at $p < 0.05$ with 95% of C.I.

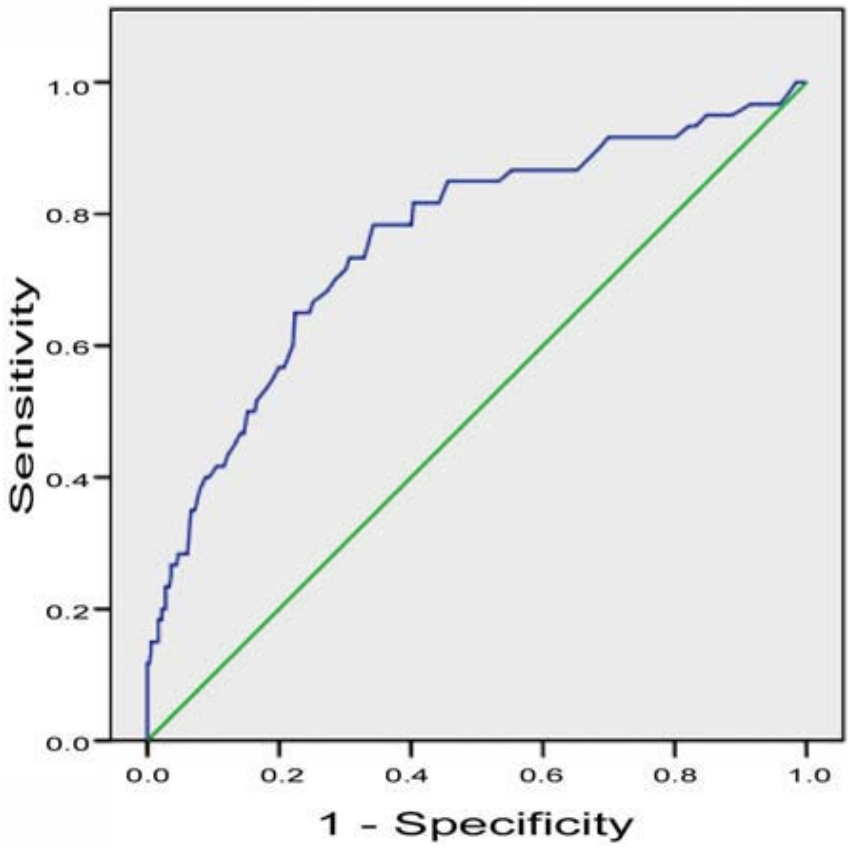


Figure 1 : ROC curve of the 1st trimester,

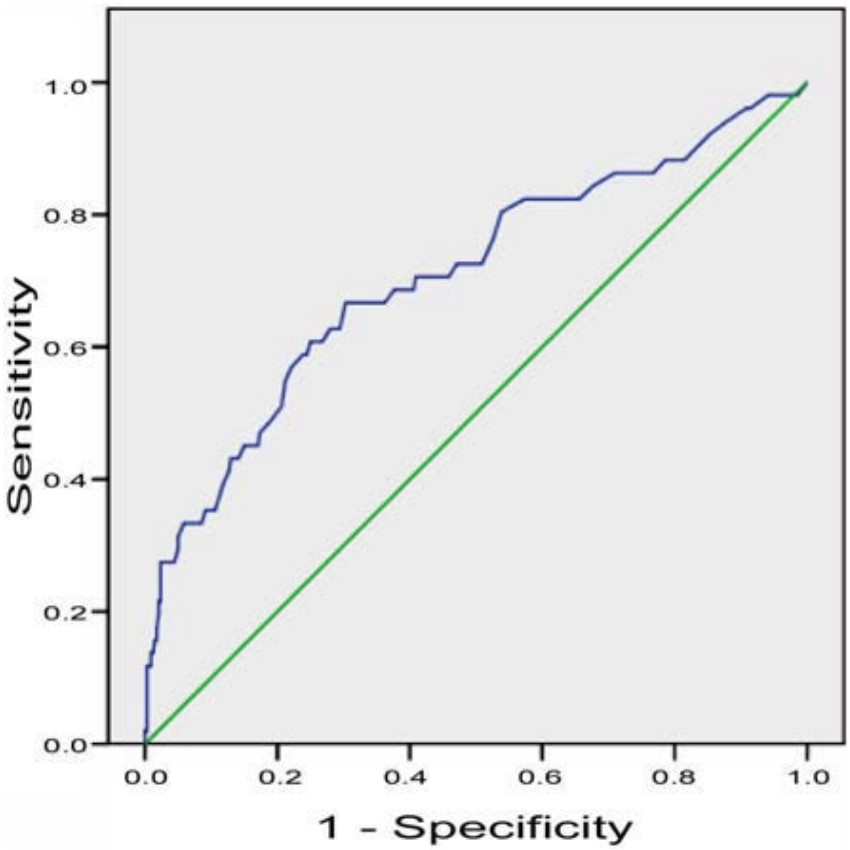


Figure 2 : ROC curve of the 2nd trimester

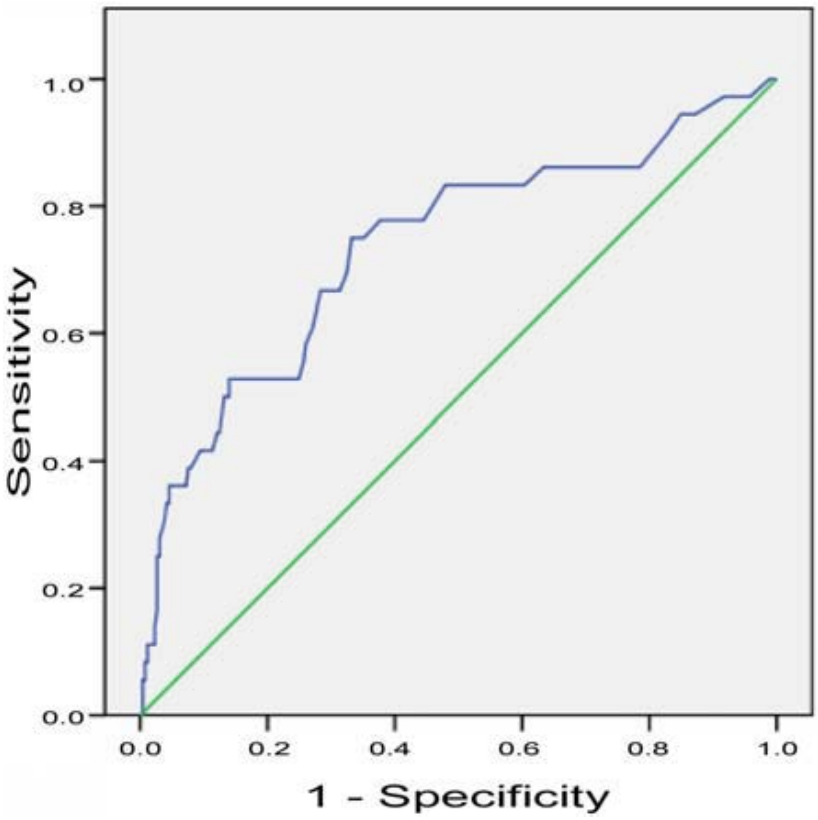


Figure 3 : ROC curve of the 3rd trimester

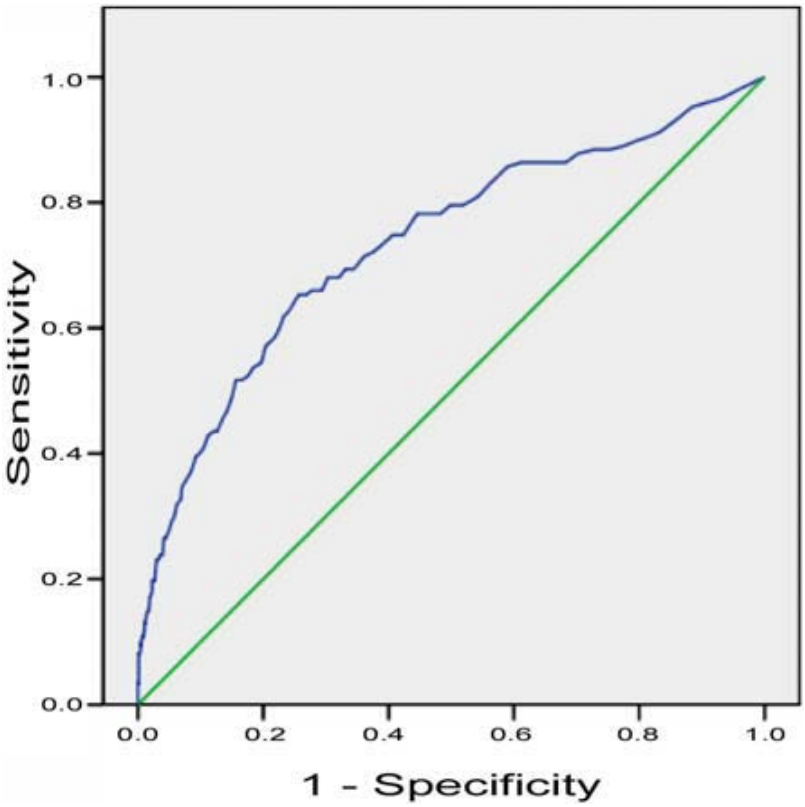


Figure 4 : ROC curve of all trimesters

IX. Discussion

In the present study the cutoff values of GCT in 1st, 2nd, 3rd, and all trimesters were 184, 177, 179, and 179 mg/dl respectively. These values were higher than the previous reports obtained outside Nigeria that recommended the use of 50g GCT level at 130-140 mg/dl for screening of GDM in pregnant women at risk for GDM between 24-28 weeks of gestation (Friedman et al, 2006; Berger et al, 2002; Miyakoshi et al, 2003; Vitoratos et al,1997). Also Vitoratos et al (1997) and Tanir et al (2005) recommended 126 mg/dl and 185 mg/dl respectively in their study. These are due to differences in race and nutrition of the populations involved. This study also showed that semi-parametric GLMM method provided reliable, unbiased, and consistent estimates for the parameters and AUC. Similar results were obtained by Colak et al (2012).

X. Summary and Conclusions

ROC analysis revealed varying cut-off values of 184,177, 179 and 179 mg/gl for the I^{st}, 2^{nd},3^{rd} and all trimesters and a common cut-off value of 177 mg/dl is chosen for screening 50 grams GCT irrespective of the trimester and is rather suitable for high BMI or obese pregnancy. These variable cutoff values of 50g GCT for screening of GDM is because of increasing weight as pregnancy progresses. Race and nutrition of the population causes differences in cut-off values of 50g GCT for screening women at risk for GDM. High values of NPV such as 92.73-94.82%, indicates the existence of low false negative. Semi-parametric procedure of obtaining predicted probabilities from GLMM because the predicted probabilities of this method have a high statistical efficiency since for all the trimesters, there exist statistical significance. These estimators showed high statistical efficiency. A common cut-off value of 177 mg/dl is recommended for screening 50 grams GCT irrespective of the trimester. Based on the findings in this study, pregnant women from thirty years of age, have greater number of risk of getting GDM at their 2^{nd} and 3^{rd} trimester than those in their 1st trimester of gestation age. It is advised that such category of women should start living healthy life style. Semi-parametric method is preferred to other methods for estimating ROC and constructing AUC because it is more superior in terms of simplicity and accuracy of results .It is therefore recommended.

References Références Referencias

1. Bernd Engelmann, Evelyn Hayden and Dirk Tasche .RISK JANUARY 2003 WWW.RISK.NET.
2. Berger H, Crane J, Farine D, Armson A, De La RS, Keenan-Lindsay L, et al. Screening for gestational diabetes mellitus. J Obstet Gynaecol Can 2005; 24: 894-912.
3. Box GEP, Cox DR. An analysis of transformations. Journal of the Royal Statistical Society, Series B 1964;26:211 243.
4. Colak Ertugrul, FezanMutlu, Cengiz Bal, Setenay Oner, Kazim Ozdamar, Bulent Gok, and Yuksel Cavusoglu. (2012).Comparison of Semi-parametric, Parametric, and Nonparametric ROC Analysis for Continuous Diagnostic Tests Using a Simulation Study and Acute Coronary Syndrome Data. Hindawi Publishing Corporation. Computational and Mathematical Methods in Medicine Volume 2012, Article ID 698320, 7 pages doi:10.155/2012/698320.
5. Dodd, L. E. and Pepe, M. S. (2003). Semi-parametric regression for the area under the receiver operating characteristic curve. Journal of the American Statistical Association 98, 409-417.
6. Dorfman, D.D., Alf, E. (1969). Maximum likelihood estimation of parameters of signal detection theory and determination of confidence intervals-rating-method data. J Math Psych 6, 487-496.
7. Friedman S, Khoury-Collado F, Dalloul M, Sherer DM, Abulafia O. Glucose challenge test threshold values in screening for gestational diabetes among black women. Am J Obstet Gynecol 2006; 194: e46-8.
8. Faraggi, D. and Reiser, B. (2002). Estimation of the Area Under the ROC Curve. *Statistics in Medicine*. 21, 3093-3106.
9. Goddard, M.J., Hinberg, I. (1990). Receiver operator characteristic (ROC) curves and non-normal data: An empirical study. *Statistics in Medicine*. 9, 325-337.
10. Hanley JA, McNeil BJ. The meaning and use of the area under a receiver operating characteristic ROC curve. Radiology 1982; 143:29–36.
11. Mann H and D Whitney, (1947).On a test of whether one of two random variables is stochastically larger than the other Annals of Mathematical Statistics 18, pages 50–60.
12. McCullagh, P. and Nelder, J. A. (1989).Generalized linear models, New York: Chapman Hall.
13. Miyakoshi K, Tanaka M, Ueno K, Uehara K, Ishimoto H, Yoshimura Y. Cutoff value of 1 h, 50 g glucose challenge test for screening of gestational diabetes mellitus in a Japanese population. Diabetes Res Clin Pract 2003; 60: 63-7.
14. Pepe, M. S.(2003). The Statistical Evaluation of Medical Tests for Classification and Prediction, Oxford University Press, New York, NY, USA.
15. Tanir HM, Sener T, Gurer H, Kaya M.(2005).A ten-year gestational diabetes mellitus cohort at a university clinic of the mid-Anatolian region of Turkey.Clinical & Experimental Obstetrics & Gynecology 32(4):241-4.
16. Vitoratos N, Salamalekis E, Bettas P, Kalabokis D, Chrisikopoulos A. Which is the threshold glycose

value for further investigation in pregnancy? Clin Exp Obstet Gynecol 1997;24:171-3.

17. Wolfgang Hardle, Marlene Muller, Stefan Sperlich,Axel Werwa Z.(2004). Non-parametric and Semiparametric models.Springer,Berlin Heidelberg New York.
18. Zou KH, Tempany CM, Fielding JR, Silverman SG. Original smooth receiver operating characteristic curves estimation from continuous data: statistical methods for analyzing the predictive value of spiral CT of ureteral stones. Academic Radiology 1998; 5:680–687.

This page is intentionally left blank

Global Journal of Medical Research: K
Interdisciplinary
Volume 15 Issue 1 Version 1.0 Year 2015
Type: Double Blind Peer Reviewed International Research Journal
Publisher: Global Journals Inc. (USA)
Online ISSN: 2249-4618 & Print ISSN: 0975-5888

Prostate Cancer Screening Should Men be Screened for Prostate Cancer?

By Sangeetha Bobba

Introduction- Prostate cancer has the highest incidence of all cancers in Australian men following bowel cancer. Hence prostate cancer screening would be an ideal preventative measure. However, there are both arguments for and against such screening. This report will discuss both arguments and come to a conclusion.

The World Health Organisation (WHO) defines the purpose of screening as to identify the presence of a specific cancer in an individual that does not demonstrate any symptoms. Australia currently employs the WHO's screening program criteria to determine whether a particular illness should be screened.

GJMR-K Classification: NLMC Code: QZ 20.5

Strictly as per the compliance and regulations of:

Prostate Cancer Screening
Should Men be Screened for Prostate Cancer?

Sangeetha Bobba

I. Introduction

Prostate cancer has the highest incidence of all cancers in Australian men following bowel cancer. Hence prostate cancer screening would be an ideal preventative measure. However, there are both arguments for and against such screening. This report will discuss both arguments and come to a conclusion.

The World Health Organisation (WHO) defines the purpose of screening as to identify the presence of a specific cancer in an individual that does not demonstrate any symptoms. Australia currently employs the WHO's screening program criteria to determine whether a particular illness should be screened.

II. World Health Organization Principles of Screening

World Health Organization guidelines were published in 1968, but are still applicable today.

1. The condition should be an important health problem.
2. There should be a treatment for the condition.
3. Facilities for diagnosis and treatment should be available.
4. There should be a latent stage of the disease.
5. There should be a test or examination for the condition.
6. The test should be acceptable to the population.
7. The natural history of the disease should be adequately understood.
8. There should be an agreed policy on who to treat.
9. The total cost of finding a case should be economically balanced in relation to medical expenditure as a whole.
10. Case-finding should be a continuous process, not just a "once and for all" project.

Prostate cancer screening satisfies all these criteria. Consequently it would be advantageous in terms of cost-benefit for Australia to employ a universal prostate cancer screening program.

Most screening procedures are non-invasive in order to make them cost-effective and convenient for individuals. Screening modalities including breast exams, mammography, pelvic exams, digital rectal exams and blood tests require no preparation by the individual needing screening.

As no medical investigations are perfect including screening modalities, there are several adverse effects associated with screening. Consider a case in which an individual's prognosis is the same with or without screening. This individual may experience a longer duration of psychological and physical harm associated with the knowledge of illness and fruitless investigations and treatment. All investigations and screening results have a potential for false negatives and false positives. In the former instance, the individual may become complacent in the identification of symptoms and warning signals while in the latter situation, the individual may be subjected to unnecessary invasive diagnostic tests and procedures. The legal and ethical issues regarding disclosure to insurance companies and potential employers also requires consideration as it may potentially lead to discrimination and psychological harm.

A summary of the potential adverse effects of universal prostate cancer screening (Health Matters, 2013):

- Stress and anxiety caused by false positive screening results
- Unnecessary investigation and treatment of false positive results
- Prolonging knowledge of cancer if no curative treatment can be implemented at that stage in individual cases
- A false sense of security caused by false negatives, which may delay final diagnosis due to individual complacency in recognising symptoms of cancer
- Overuse of scarce medical resources
- Unnecessary and uncomfortable procedures seeking cancer that may be unlikely in individual cases

Prostate Specific Antigen (PSA) used to screen prostate cancer is not 100% specific or sensitive. Randomised Controlled Trials are required to determine the benefit of screening. Of any studies undertaken, both the study design and study analysis must be investigated further before a judgement regarding the effectiveness of screening can be made. Randomised Controlled Trials are considered to produce the most reliable results as they limit bias. The studies must be analysed which ideally should incorporate the

Author: *e-mail: sangeetha.bobba@gmail.com*

investigation of possible biases including lead time bias, length bias, selection bias and overdiagnosis bias.

Due to the high incidence and severity of prostate cancer a screening program implementing universal screening would be beneficial in Australia. Such a screening program satisfies the WHO criteria. However, the outcome of a screening program depends on several other factors such as availability, accessibility, health promotion, cost, community attitudes and knowledge. The General Practitioner possesses a crucial role in determining the effectiveness of screening programs. They are important community educators, health promoters and a vital point of contact for individuals considering being involved in screening. In addition, the process of follow-up of positive test results and urgent referral is an imperative role of the General Practitioner in screening programs.

From investigating the significant impact in terms of incidence and prognosis of prostate cancer in Australia it can be deduced that screening would certainly be advantageous. Many studies have demonstrated the benefits of universal prostate cancer screening. The circumscribed screening program satisfies the WHO criteria. However, barriers and adverse effects of screening do exist. These may be overcome by increasing public awareness via health promotion strategies implemented conjointly by Health Professionals and the Australian Government to maximize the potential participation rates and success of a screening program. Currently the Red Book Clinical Guidelines does not recommend screening without symptoms and a discussion with the patient regarding the pros and cons of testing for prostate cancer.

References Références Referencias

1. Cancer Council Victoria 2013, *Screening For Cancer,* viewed 21/10/13 http://ww w.can cervic .or g.au , 2013
2. Health Matters 2013, *Prostate Cancer Fact File,* viewed 21/10/13 http://www.abc.net .au/health /lib rary/prostatecancer_ff.htm, 2013
3. Prostate Cancer Foundation of Australia 2013, viewed 21/10/13 http://www.prostate.org.au/, 2013
4. Red Book 8th Edition 2013*, Prostate Cancer*, viewed 21/10/13 http://www.racgp.org.au/your-practice /gu idelines/redbook/early-detection-of-ancers/prost ate -cancer/, 2013
5. World Health Organisation 2013, *Early Detection of Cancer,* Viewed 21/10/13 http://www.who.int/en/, 2013

Global Journal of Medical Research: K
Interdisciplinary
Volume 15 Issue 1 Version 1.0 Year 2015
Type: Double Blind Peer Reviewed International Research Journal
Publisher: Global Journals Inc. (USA)
Online ISSN: 2249-4618 & Print ISSN: 0975-5888

A Review and Emphasis on Emergency Healthcare Systems of Turkey

By Görkem Sarıyer & Mustafa Gökalp Ataman
Yasar University, Turkey

Abstract- Emergency health care systems are vitally important. The effective planning of these systems clearly reduces the response time, which is the main factor in saving lives. Thus, it is important to develop this an interactive area of research.

The main goal of this study is to review the state of research on emergency health care systems of Turkey. Furthermore, by highlighting the deficiencies in the Turkish literature in the area, this study aims to stimulate the, interest of researchers.

This study reviews the literature, classifying studies into three areas: evaluation of 112 emergency ambulance services use, determining on optimal ambulance locations, and predictions of call volume.

Although there are some studies related with first two areas subjects, it is important to draw attention to the last of these.

Keywords: ambulance, deployment, emergency medicine, health care, local health, prediction.

GJMR-K Classification: NLMC Code: W 74.1

A Review and Emphasis on Emergency Healthcare Systems of Turkey

Görkem Sarıyer [α] & Mustafa Gökalp Ataman [σ]

Abstract- Emergency health care systems are vitally important. The effective planning of these systems clearly reduces the response time, which is the main factor in saving lives. Thus, it is important to develop this an interactive area of research.

The main goal of this study is to review the state of research on emergency health care systems of Turkey. Furthermore, by highlighting the deficiencies in the Turkish literature in the area, this study aims to stimulate the, interest of researchers.

This study reviews the literature, classifying studies into three areas: evaluation of 112 emergency ambulance services use, determining on optimal ambulance locations, and predictions of call volume.

Although there are some studies related with first two areas subjects, it is important to draw attention to the last of these.

Keywords: ambulance, deployment, emergency medicine, health care, local health, prediction.

I. Introduction

Emergency health-care systems is a chain of different tasks, which start with emergency help and rescue, and are followed by with ambulance transportation, emergency services of hospitals, and rehabilitation services (1). Ambulance transportation plays a key role in this chain. Ambulance transportation of emergency health-care systems exists in all developed and developing countries. In the United States, the emergency call number is 911, while in in European countries and Turkey the number 112 is used (2).

The importance of emergency health-care systems is unquestioned in a society since appropriate and efficient first aid intervention saves lives. Time is the most vital factor which affects the efficiency of first aid intervention; minutes, even seconds can save lives. Therefore, this is an interactive area of research which needs further attention.

In recent years, there has been an increased awareness of emergency health-care systems, especially 112 ambulance systems in Turkey. There are, however, only a limited number of published articles in this area. The main goal of this study is to review this literature, in an attempt to highlight the need for further research which improves the local health.

In following parts of this study, literature is reviewed based on different sub-topics. The categorization of these sub-topics is as follows: evaluation of 112 emergency ambulance services use, determining on optimal ambulance locations, predictions of call volume.

II. Subject Related Topics

a) Evaluation of 112 emergency ambulance services use

In emergency health-care systems, this sub-topic is widely researched in Turkey. In a retrospective study, calls to the number112 received at Bursa State Hospital Emergency Service within the period of January 1993-May 1995 are analyzed. The analysis showed that call frequencies increase according to the age of the patient; almost 50% of the cases involve older people. The analysis also summarized the frequent reasons of calling as: 78.3% cerebrovascular disease, 13% cardiovascular disease, and 7.4% traffic accident (3). Another study was designed to determine the clinical characteristics of patients who applied to 112 services with dermatological disorders in Kayseri in 2011. This study showed that in 112 service calls for dermatological disorders were relatively common (4). The use of 112 emergency ambulance services in Konya and Turkey in general between the years 2007 and 2009 was compared in (5). According to this study, approximately 70% of the ambulance calls were carried out for medical purposes, while the following most frequent reason was traffic accidents. Konya was found to have results that are close to or above the country average for each evaluated criteria, such as timely intervention, transfer to hospital, ex-left onside, ex-transfer to morgue, mission aborted, transfer by another vehicle, wrong calls, transfer from hospital to another (5).A study contucted by Yıldız and Durukan has analyzed patients transported to emergency departments of hospitals via ambulances. Due to the continuous need for ambulances to transport patients to emergency departments, this study aimed to determine the appropriateness of transportation via ambulances. For this aim, a prospective study was prepared, which surveyed 524 patients transported to Fırat University Faculty of Medicine Emergency Department between 26th May of 2004 and 5th September of 2004. The mean

Author α : PhD- Yasar University Business Administration.
e-mail: gorkem.ataman@yasar.edu.tr
Author σ: MD: Bayburt State Hospital Department of Emergency Medicine.

arrival time in this study, was 32.17 minutes. Patients were classified as trauma, medical emergencies, or cardiopulmonary arrest. This study concluded that, during ambulance transportation, transportation rules, airway safety, and cervical immobilization were not taken into consideration appropriately (6). Another study was performed to evaluate 112 call services in another province of Turkey, Tekirdağ. The observations of this retrospective study covering the years 2001, 2002, and 2003 suggested that use of 112 services increased by 33% between 2001 and 2002, and 27% between 2002 and 2003. Most frequent reasons for using these services were determined as trauma and cardiovascular orders (7). In their study, Zenginolet. al. examined ambulance orders between the years 2006-2008 in Gaziantep city. According to this study, the maximum number of calls was observed from 6-25 years old for males and above 65 years old for females, call numbers increased every year, and most frequent reasons were classified as medical reasons and traffic accidents (8). In order to evaluate the level of awareness of the emergency call number and utilization of emergency services, Ekşi and Torlakpiloted studies in two Turkish cities, İzmir and Antalya.616 respondents from İzmir and 291 respondents from Antalya were surveyed using face-to-face interviews.In this study, the level of awareness of the availability of the ambulance emergency service was observed as 89.4%, where it was only 13.5% for the coast guard. Additionally, males, the young and educated were found to use these services more frequently compared to the other sections of the population (9).

Use of 112 services by an older people is specifically analyzed in literature. Among these, the aim of (10) wasto evaluate the ambulance use in İzmir between 2004 and 2005. According to this paper, the use of ambulance services by older people is 5 times higher than younger people, and the most frequent reasons are medical conditions and traffic accidents. Furthermore, ambulance use in Turkey, even in İzmir (1.48%), is much lower compared to developed countries, and therefore it is important to develop pre-hospital emergency services.Another study has mentioned that during the first 50 years of 21st century, the world population aged 65 and older is expected to increase three-fold. Thus, caring for old people is one of the most important goals of health-care systems. This descriptive study surveyed patients 65 years and older, who used the 112 services in a province of Turkey, Samsun. This study has shown that cardiovascular, neurologic, and respiratory problems were the most frequent reasons of 112 ambulances use, and highlighted the importance of monitoring and reporting the use of this service (11). In a final descriptive study, patients of 65 years of age and over who used 112 services in Sivas in 2006 were surveyed. This study has shown that the highest level of requests occurred in January between 10:00 and 12:00 am, and the most common reasons for calls were cardiovascular, neurological, and respiratory problems (12).

b) Determining on optimal ambulance locations

Considerable attention has been paid to the problem of how to best deploy ambulances within a municipality to minimize the response times to emergency calls.In determining the optimal location for ambulances, some optimization models and geographic information systems (GIS) have been proposed in the literature. In their study, Selim and Özkarahan (13) mentioned the need to either increase the number of vehicles or to improve the deployment of existing vehicles in order to decrease the response time of ambulances, which is an important performance measure for emergency service systems. Sinceincreasing the number of vehicles is not always feasible, due to budget constraints, the more efficient deployment of ambulances is more feasible. In their paper, Selim and Özkarahan have proposed a linear deterministic covering-based location model based on two models, the Maximal Backup Coverage Model (14) and the Capacitated Maximal Covering Model (15), respectively created by Hogan and Revelle, and Pirkul and Schilling. Selim and Özkarahan finally tested their model through the sequential solution technique of multiple objective decision making. This model can be used to determine ambulance locations or deployment (13). Another study mentioned that especially for the crowded cities with heavy traffic such as İstanbul, the planning of ambulance location is crucially important. The Backup Double Covering Model, which depends on Set Covering and Maximal Covering location problems, was proposed in the study. It was only possible to obtain the optimal solution for the single period model, whereas for large scale problems with a large number of decision variables and constraints, this model failed to obtain optimal solutions. Thus, a further three heuristic methods have been applied to find the optimal ambulance locations of İstanbul (16).

Geographic Information Systems is also widely used in ambulance deployment. GIS was used in analyses to determine the optimum route for ambulances to reach the incident scene in Isparta. Network topology map of Isparta urban center was constructed to determine optimum routes for ambulances according to various scenarios through ArcGIS 9.0 software. These analyses suggested the creation of new 112 ambulance station points in the required locations (17). In a similar study, a database was developed for traffic accident records of Isparta-Antalya-Burdur national road between 1996-1999, using MS Excel software. Since special coordinates were required, rather than GIS, GPS measurements were made for each traffic accident site. The observations of this study can be summarized as follows: traffic

accidents generally occurred in tangent sections of roads, there was an increase in traffic accidents in day-time and clear weather conditions, , and fatal accidents generally occurred on the periphery of the city of Antalya (18). In their study, Erden and Coşkun determined optimal locations of fire stations, and have conducted a multi-criteria site analysis, based on mentioned criteria weights in GIS environment. Sensitivity and robustness analyses were also given in the study. They concluded that, using these models, decision-makers can find optimal locations of fire stations (19).

c) Predictions on Call Volume

This issue is important in planning of Emergency Health Care Systems. In order to plan ambulances effectively, it is important to know not only the optimal locations of the ambulances, but also demand for a specific time interval. To estimate demand for ambulances for a specific time interval, the total number of emergency calls in this interval needs to be estimated. In addition,accurate predictions on call volume allows effective 112 Call Center planning. Combining these benefits, the conclusion is that accurate call volume predictions considerably reduces the response time of ambulances.

Studies have been developed to predict emergency calls or arrival rate. A benchmark study documented an emergency service, using a simple moving average to twenty previous observations: the previous four weeks, from the previous five years (20). Matteson et. al. introduced a more complex method which combines integer-valued time series models with dynamic latent factor structure, to forecast emergency call arrival rates. In order to quantify the impact of reduced forecast errors, they designed a queueing model simulation. This simulation model performed better when the call volume predictions used were more accurate (21). Another study developed time series models of call volume to the emergency medical service in a Canadian city with the objective of offering simple and effective models which can be used in simulating the emergency services (22). Trudeau et. al. classified four main areas of ambulance service operations planning : demand forecasting, scheduling, optimal locations of ambulance points, and simulation as an evaluation tool (23) .

Although prediction on call volume of emergency services is an important subject, it has not received any attention in Turkey so far. One of the main goals of this paper is to highlight this deficiency in the literature, in order to stimulate research interest.

III. Conclusions

Studies on Emergency Health Care Systems of Turkey are reviewed in this article. Since the awareness of people on these systems has just been started to increase, there are only a few of published studies in this area which are gathered around the two categories of evaluation of 112 emergency ambulance services use, and determining on optimal ambulance locations. However, planning the Emergency Health Care Systems in an effective manner, which sharply decreases the response time of ambulances, considerably depends on demand forecasting or the 112 call volume prediction. Thus, this study aims to draw attention of researchers on this deficiency while reviewing the literature.

a) Conflict of interest

No conflict of interest was declared by the authors.

References

1. Aksoy, F;Ergün, A. Ambulance in emergency medicine. *Turkish Journal of Trauma and Emergency Surgery* 2002; **8** :160-163
2. Çakır, Z;Bayramoğlu, A;Aköz, A;Türkyılmaz, Ş;Emet, M;Uzkeser, M. Analysis of patient forms of pre-hospital emergency medical services. *Journal of Academic Emergency Medicine* 2012;**16** : 23-26.
3. Yurteri, H; Saran, A;Özgün, İ. Evaluation of the patients transported with the emergency service ambulances. *Turkish Journal of Trauma and Emergency Surgery* 1996; **2** (2):204-207.
4. Özyurt, K; Bozkurt, S; Öztürk, P;Baykan, H;Okumuş, M. Evaluation of dermatological disorders among admittances to a 112 emergency services in a year. *Journal of Clinical and Experimental Investigations* 2013; **4** (1):47-50.
5. Özata, M;Toygar, Ş;Yorulmaz, M;Cihangiroğlu, N. Comparative analysis of using 112 emergency ambulance services in Turkey and the province of Konya. European *Journal of General Medicine* 2011; **8** (4):262-267.
6. Yıldız, M;Durukan, P. Analysis of patients transported to emergency department via ambulance. *Turkish Journal of Emergency Medicine* 2004; **4** (4):144-148.
7. Oktay, İ;Kayışoğlu, N. The assessment of emergency health services in Tekirdağ province. *STED* 2005; **14** (2):35-37.
8. Zenginol, M; Al, B;Genç, S;Deveci, İ;Yarbil, P; Yılmaz, D;Sarcan, E; Yıldırım, C. 3 yearly study results of 112 emergency ambulances in the city of Gaziantep. *Journal of Academic Emergency Medicine* 2011; **10** : 27-32.
9. Ekşi, A;Torlak, SE. Utilization of emergency services during the single European emergency call number pilot. *Turkish Journal of Emergency Medicine* 2011; **11**(4):149-154.
10. Kıdak, L;Keskinoğlu, P;Sofuoğlu, T;Ölmezoğlu, Z. The evaluation of 112 emergency ambulance services in İzmir. *Journal of General Medicine* 2009; **19**(3):113-120.

11. Dündar, C;Sunter, AT;Cambaz, S;Çetinoğlu, E. Emergency service use by older people in Samsun, Turkey. *Advances in Therapy* 2006; **23**(1):47-53.
12. Nur, N; Demir, ÖF;Çetinkaya, S;Tirek, N. Evaluation of the 112 emergency service use by older people. *Turkish Journal of Geriatrics* 2008; **11**(1):7-11.
13. Selim, H; Özkarahan, İ. Acilservisaraçlarıyerleşimininbelirlenmesindeyenibir model. *EndüstriMühendisliğiDergisi* **14**(1):18-27.
14. Hogan, K;Revelle, C. Concepts and applications of backup coverage. *Management Science* 1986; **32**:1434-1444.
15. Pirkul, H; Schilling, DA. The maximal covering location problem with capacities on total workload. *Management Science* 1991; **37**:233-248.
16. Çatay, B; Başar, A;Ünlüyurt, T. Planning the locations of the emergency medical service stations in İstanbul. *EndüstriMühendisliğiDergisi* 2008; **19**(4):20-35.
17. Morova, N;Şener, E; Terzi, S. Detremining the optimum routes and querying service areas of 112 ambulance stations of Isparta using Geographic Information Systems. *SDU International Technological Science* 2011; **3**(3):1-13.
18. Karaşahin, M; Terzi, S. Determination of hazarodus locations on Isparta-Antalya-Burdurhigways through GIS.*Journal of Engineering Sciences* 2003;**9**(3):305-311
19. Erden, T;Coşkun, MZ. Acil durum servisleriniyerseçimi: Analitikhiyerarşiyöntemi ve CBS entegrasyonu. *İTÜ Dergisi/Mühendislik* 2010; **9**(6):37-50.
20. Setzler, H;Saydam, C; Park, S. EMS call volume predictions: A comparative study. *ComputOper. Res* 2009; **36**:1843-1851.
21. Matteson, DS; Mathew, W; Dawn, BW; Shane, GH. Forecasting emergency medical service call arrival rates. *The Annals of Applied Statistics* 2011;**5**:1379-1406.
22. Channouf, N;L'Ecuyer, P;Ingolfsson, A;Avramidis, AN. The application of forecasting techniques to modeling emergency medical system calls in Calgary, Albarta. *Health Care Manage Sci* 2007; **10**:25-45.
23. Trudeau, P; Rousseau, JM; Jacques,AF;Choquette, J. An operations research approach for the planning and operation of an ambulance service. *INFORMS* 1989; **27**(1):95-113.

Global Journals Inc. (US) Guidelines Handbook 2015

www.GlobalJournals.org

FELLOWS

FELLOW 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%.

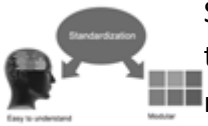
Once FARSM title is accorded, the Fellow is authorized to organize a symposium/seminar/conference on behalf of Global Journal Incorporation (USA). The Fellow can also participate in conference/seminar/symposium organized by another institution as representative of Global Journal. In both the cases, it 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 addres 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 (MARSM)

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

The "MARSM" is a dignified ornament which is accorded to a person's name viz. Dr. John E. Hall, Ph.D., MARSM or William Walldroff, M.S., MARSM.

MARSM accrediting is an honor. It authenticates your research activities. Afterbecoming MARSM,you can add 'MARSM' 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 benefitscan be availed by you only for next three years from the date of certification.

MARSM 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 MARSM, you willbe 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.

AUXILIARY MEMBERSHIPS

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 conveninet , 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 acknowledgement. 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 let 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 straight forward. 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.

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.

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.

Criterion for Grading a Research Paper (Compilation) by Global Journals Inc. (US)

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).

Topics	Grades		
	A-B	**C-D**	**E-F**
Abstract	Clear and concise with appropriate content, Correct format. 200 words or below	Unclear summary and no specific data, Incorrect form Above 200 words	No specific data with ambiguous information Above 250 words
Introduction	Containing all background details with clear goal and appropriate details, flow specification, no grammar and spelling mistake, well organized sentence and paragraph, reference cited	Unclear and confusing data, appropriate format, grammar and spelling errors with unorganized matter	Out of place depth and content, hazy format
Methods and Procedures	Clear and to the point with well arranged paragraph, precision and accuracy of facts and figures, well organized subheads	Difficult to comprehend with embarrassed text, too much explanation but completed	Incorrect and unorganized structure with hazy meaning
Result	Well organized, Clear and specific, Correct units with precision, correct data, well structuring of paragraph, no grammar and spelling mistake	Complete and embarrassed text, difficult to comprehend	Irregular format with wrong facts and figures
Discussion	Well organized, meaningful specification, sound conclusion, logical and concise explanation, highly structured paragraph reference cited	Wordy, unclear conclusion, spurious	Conclusion is not cited, unorganized, difficult to comprehend
References	Complete and correct format, well organized	Beside the point, Incomplete	Wrong format and structuring

INDEX

save our planet

Global Journal of Medical Research

Visit us on the Web at www.GlobalJournals.org | www.MedicalResearchJournal.org
or email us at helpdesk@globaljournals.org

ISSN 9755896