Green Leafy Vegetables

Compliance to Prenatal Iron

A Cross-Sectional Study

Triple Burden of Malnutrition

Discovering Thoughts, Inventing Future
Dr. Apostolos Ch. Zarros
DM, Degree (Psycho) holder in Medicine, National and Kapodistrian University of Athens MRes, Master of Research in Molecular Functions in Disease, University of Glasgow FRNS, Fellow, Royal Numismatic Society Member, European Society for Neurochemistry Member, Royal Institute of Philosophy Scotland, United Kingdom

Dr. William Chi-shing Cho
Ph.D., Department of Clinical Oncology Queen Elizabeth Hospital Hong Kong

Dr. Alfio Ferlito
Professor Department of Surgical Sciences University of Udine School of Medicine, Italy

Dr. Michael Wink
Ph.D., Technical University Braunschweig, Germany Head of Department Institute of Pharmacy and Molecular Biotechnology, Heidelberg University, Germany

Dr. Jixin Zhong
Department of Medicine, Affiliated Hospital of Guangdong Medical College, Zhanjiang, China, Davis Heart and Lung Research Institute, The Ohio State University, Columbus, OH 43210, US

Dr. Pejçic Ana
Assistant Medical Faculty Department of Periodontology and Oral Medicine University of Nis, Serbia

Rama Rao Ganga
MBBS MS (University of Health Sciences, Vijayawada, India) MRCS (Royal College of Surgeons of Edinburgh, UK) United States

Dr. Izzet Yavuz
MSc, Ph.D., D Ped Dent. Associate Professor, Pediatric Dentistry Faculty of Dentistry, University of Dicle Diyarbakir, Turkey

Sanguansak Rerksuppaphol
Department of Pediatrics Faculty of Medicine Srinakharinwirot University NakornNayok, Thailand

Dr. Ivandro Soares Monteiro
M.Sc., Ph.D. in Psychology Clinic, Professor University of Minho, Portugal

Dr. Sanjay Dixit, M.D.
Director, EP Laboratories, Philadelphia VA Medical Center Cardiovascular Medicine - Cardiac Arrhythmia Univ of Penn School of Medicine Web: pennmedicine.org/wagform/MainPage.aspx?

Antonio Simone Laganà
M.D. Unit of Gynecology and Obstetrics Department of Human Pathology in Adulthood and Childhood “G. Barresi” University of Messina, Italy
<table>
<thead>
<tr>
<th><strong>Dr. Han-Xiang Deng</strong></th>
<th><strong>Dr. Pina C. Sanelli</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>MD., Ph.D</td>
<td>Associate Professor of Radiology</td>
</tr>
<tr>
<td>Associate Professor and Research Department</td>
<td>Associate Professor of Public Health</td>
</tr>
<tr>
<td>Division of Neuromuscular Medicine</td>
<td>Weill Cornell Medical College</td>
</tr>
<tr>
<td>Davee Department of Neurology and Clinical Neurosciences</td>
<td>Associate Attending Radiologist</td>
</tr>
<tr>
<td>Northwestern University Feinberg School of Medicine</td>
<td>NewYork-Presbyterian Hospital</td>
</tr>
<tr>
<td>Web: neurology.northwestern.edu/faculty/deng.html</td>
<td>MRI, MRA, CT, and CTA</td>
</tr>
<tr>
<td></td>
<td>Neuroradiology and Diagnostic Radiology</td>
</tr>
<tr>
<td></td>
<td>M.D., State University of New York at Buffalo, School of Medicine and Biomedical Sciences</td>
</tr>
<tr>
<td></td>
<td>Web: weillcornell.org/pinasanelli/</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Dr. Roberto Sanchez</strong></th>
<th><strong>Dr. Michael R. Rudnick</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Associate Professor</td>
<td>M.D., FACP</td>
</tr>
<tr>
<td>Department of Structural and Chemical Biology</td>
<td>Associate Professor of Medicine</td>
</tr>
<tr>
<td>Mount Sinai School of Medicine</td>
<td>Chief, Renal Electrolyte and Hypertension Division (PMC)</td>
</tr>
<tr>
<td>Ph.D., The Rockefeller University</td>
<td>Penn Medicine, University of Pennsylvania</td>
</tr>
<tr>
<td>Web: mountsinai.org/</td>
<td>Presbyterian Medical Center, Philadelphia</td>
</tr>
<tr>
<td></td>
<td>Nephrology and Internal Medicine</td>
</tr>
<tr>
<td></td>
<td>Certified by the American Board of Internal Medicine</td>
</tr>
<tr>
<td></td>
<td>Web: uphs.upenn.edu/</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Dr. Feng Feng</strong></th>
<th><strong>Dr. Seung-Yup Ku</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Boston University</td>
<td>M.D., Ph.D., Seoul National University Medical College, Seoul, Korea</td>
</tr>
<tr>
<td>Microbiology</td>
<td>Department of Obstetrics and Gynecology</td>
</tr>
<tr>
<td>72 East Concord Street R702</td>
<td>Seoul National University Hospital, Seoul, Korea</td>
</tr>
<tr>
<td>Duke University</td>
<td>United States of America</td>
</tr>
<tr>
<td>United States of America</td>
<td></td>
</tr>
</tbody>
</table>
CONTENTS OF THE ISSUE

i. Copyright Notice
ii. Editorial Board Members
iii. Chief Author and Dean
iv. Contents of the Issue

2. Vulnerability of Urban Poor Women and Children to the Triple Burden of Malnutrition: A Scoping Review of the Sub-Saharan Africa Environment. 9-16

v. Fellows
vi. Auxiliary Memberships
vii. Process of Submission of Research Paper
viii. Preferred Author Guidelines
ix. Index
The Effect of Phytochemicals Intake from Green Leafy Vegetables on the Incidence of Gastrointestinal Cancers: A Meta-Analysis

By Dr. Richard Lee Pollock
Lamar State College Port Arthur

Abstract- Study objective was to hypothesize that the consumption of green leafy vegetables (GLV), including cruciferous vegetables (CV), significantly reduces the incidence of gastrointestinal cancers. The hypothesis was answered by using the experimental approach of meta-analysis by synthesizing relevant worldwide studies that address the association between the consumption of GLV and risk of incidence of the disease. The random effect model was used and indicated an overall odds ratio effect size of the ‘almost every day’ highest vs. lowest quartile intake category of GLV on gastrointestinal cancer as: OR = 0.651 (95% CI. 558 to .760), p<.001. These results indicate the highest quartile or quintile of intake of GLV and/or CV compared to lowest in take is associated with a significant 34.9% lower odds of incidence from gastrointestinal cancers.

Keywords: green leafy vegetables, cruciferous vegetables, random effect model, effect size, forest plot.

GJMR-L Classification: NLMC Code: QV 66, QU 145
The Effect of Phytochemicals Intake from Green Leafy Vegetables on the Incidence of Gastrointestinal Cancers: A Meta-Analysis

Dr. Richard Lee Pollock

Abstract- The objective was to hypothesize that the consumption of green leafy vegetables (GLV), including cruciferous vegetables (CV), significantly reduces the incidence of gastrointestinal cancers. The hypothesis was answered by using the experimental approach of meta-analysis by synthesizing relevant worldwide studies that address the association between the consumption of GLV and risk of incidence of the disease. The random effect model was used and indicated an overall odds ratio effect size of the ‘almost every day’ highest vs. lowest quintile intake category of GLV on gastrointestinal cancer as: OR = 0.651 (95% CI: 0.558 to .780), p<.001. These results indicate the highest quintile or quintile of intake of GLV and/or CV compared to lowest in take is associated with a significant 34.9% lower odds of incidence from gastrointestinal cancers.

Keywords: green leafy vegetables, cruciferous vegetables, random effect model, effect size, forest plot.

I. INTRODUCTION

Gastroenterology is the branch of medicine focused on the digestive system and its disorders. Diseases affecting the gastrointestinal (GI) tract, which include the organs from mouth to anus, normally include pharynx, esophagus, stomach, pancreas, liver, gallbladder, small and large intestines. Physicians practicing in the field of gastroenterology are called gastroenterologists and have additional specialized training (fellowship) in Gastroenterology. Cancer can invade or spread to all organs of the GI tract. Reducing incidence of these cancers should be a worldwide concern.

Colorectal cancer is also known as colon cancer, rectal cancer, or bowel cancer and develops in the colon sections or rectum which are divisions of the large intestine. This type of cancer is caused by abnormal growth of cells that can invade and spread to other parts of the body (Colon Cancer Treatment (PDQ®), 2014)[1]. This same website lists symptoms that may include weight loss, blood in stool, change in bowel movements, and weights loss causing fatigue. Most colorectal cancers are caused by lifestyle factors and increasing age, with only a small number of incidences due to genetics and the most common risk factors are diet, lack of exercise, obesity, smoking, and alcoholism (Colon Cancer Treatment (PDQ®), 2014)[1]. Worldwide, colorectal cancer is reported as the third-most common cancer in men, the second-most common cancer in women, and the fourth-most common cause of cancer mortality (Xie & Chang, 2016)[2]. In 2015, these same authors reported that there were about 1.5 million patients worldwide, which accounted for about 10% of total cancer cases, and estimated colorectal cancer caused deaths were an estimated 753,000. It is imperative that medical doctors and surgeons should emphasize on this failure of existing chemotherapeutics against GI cancers and start using complementary/alternative therapeutics to prevent and treat these deadly cancers.

Pancreatic cancer progresses quickly and has an extremely high mortality rate in the U.S. and is the fourth highest cancer fatality rate of all cancers (Chan, Wang, & Holly, 2005)[3]. In 2005, it was estimated that about 32,180 pancreatic cancer patients will be diagnosed, with most of them dying from this cancer with the 5-year survival rate being only 4% (Chan et al., 2005)[3]. These high mortality rates are due to late-stage diagnosis, including lack of effective treatment. Not much is known about the epidemiology of this deadly disease, and like many cancers, it is age-dependent with over 90% of the patients diagnosed at age 50 and older (Chan et al., 2005)[3]. Pancreatic cancer is one of the most rapidly fatal cancers, yet little is known about the primary cause and prevention of this devastating disease.

Pharyngeal cancers originate in the epithelial cells lining the nasopharynx, oropharynx, and/or the laryngopharynx. These cancers are relatively rare, with 130,000 new cases diagnosed worldwide each year (Heck et al., 2008)[4]. The Indian subcontinent has among the highest rates of hypo pharyngeal cancer worldwide; due in part to the common use of chewing tobacco products, and the purpose of their study was to examine the associations between the Indian diet and hypo pharyngeal cancer(Heck et al., 2008)[4].

Based on estimates, a total of 989,600 new cancers of the stomach (gastric cancer) cases and 738,000 deaths occurred in 2008, which accounted for 10% of the total cancer deaths worldwide (Zhao et al., 2016)[5]. Despite advances in treatment, survival rate of...
patients with gastric cancer remains low and it is vital to detect early stages of this cancer by developing new diagnostic and therapeutic strategies for this disease (Zhao et al., 2014)[5]. Esophageal cancer is the sixth most common cancer worldwide, and large geographical variations in its occurrence indicates that environmental exposures are casually important (Phukan, Chetia, Ali, & Mahanta, 2001)[6]. Squamous cell carcinoma of the esophagus occurs at a high frequency in many developing countries such as Iran and northcentral China (Yamaji et al., 2008)[7]. Prevalence of tobacco smoking and alcohol drinking in these regions are not markedly high, so attention has focused on roles of diet, particularly the tendency toward low intake of fruits and vegetables, and the relationship of esophageal cancer incidence.

In recent years, the role of dietary habits in the development of GI tract cancers has received much attention in the scientific community (Zanini, Marzotto, Giovinazzo, et al. 2015)[8]. Dietary habits as risk factors of cancer have been studied by several researchers in relation to the consumption of foodstuffs. This study will contribute to people’s understanding of the importance of a daily intake of green leafy vegetables (GLV), including cruciferous vegetables (CV). Studies indicate long-term intake of GLV, CV, and the micronutrients they contain may reduce risk of Type 2 diabetes, cardiovascular disease and some types of cancers (Carter, Gray, Troughton, et al. [9], 2010; Joshipura et al.[10] 2009; Smith-Warner et al., 2001)[11]. Limited knowledge about the importance of GLV consumption appears to be a serious worldwide health problem. This meta-analysis study further emphasized the importance of this association by synthesizing multiple source studies researched worldwide on the topic of GLV intake and incidence of GI tract cancers.

GLV are leaf vegetables, greens, vegetable greens, leafy greens or salad greens. They come from a very wide variety of plants all over the world, with nearly one thousand species of plants with edible leaves are known. GLV contain elements and phytochemicals that may reduce the incidence of cancer, and these same GLV are high in Vitamin C, Vitamin E, Vitamin K, and Vitamin A (USDA National Nutrient Database for Standard Reference, Release 24, 2002)[12].

CV are from the family Cruciferae which are widely cultivated, with many genera, species, and cultivars being raised for food production such as cauliflower, cabbage, cress, bok choy, broccoli, kale, collard greens and similar leafy vegetables and their roots such as turnips and radishes. Most researchers evaluating the association of fruit and vegetable intake with the risk of cancer place GLV and CV into two separate food categories even though most CV have edible green leaves. They are separated because only CV contain isothiocyanates which are plant phytochemicals that are known to possess the ability to prevent and inhibit tumorigenesis (Överby, Thangstad, & Bones, 2015)[13].

Will the consumption of GLV including CV will significantly reduce the incidence of GI tract cancers is the research question of this study? There is a need to research peer-reviewed journals to investigate case-control studies dealing with GLV intake and the incidence of these deadly diseases. This meta-analysis was used to investigate the effects of daily GLV, including CV, intake on the incidence of these type cancers, not just in the United States but worldwide, and to show if this relationship is a significant one. This meta-analysis research approach filled a knowledge gap by combining data from multiple studies to a common effect size and statistically examining relations between study characteristics and findings. Findings between these different studies were compared by transforming the results into a single common effect size to better understand the apparent contradictions in prior research findings.

II. Methods and Materials

Searching for relevant studies was primarily performed by computer search engines. PubMed Central, Academic Search Complete, Medline, ProQuest Central, Science Direct, Google, and Yahoo online were the most frequently used online periodical databases. The criteria for including studies in the meta-analysis included: (1) those occurring between 1980 to 2016; (2) those appearing full-text in scholarly journals; (3) the collection of primary studies had to be a collaborative case-control design; (4) those including relations between similar independent variables (GLV intake levels including CV) and dependent variables (incidence of GI tract cancers); (5) all studies had to measure GLV consumption, which was estimated by highest versus lowest quantiles (quintiles, or quartiles, or tertiles); (6) those that reported an effect size of: odds ratio (OR)and their respective 95% confidence intervals (CI) data; and (7) source studies collected in this meta-analysis had to use logistic regression or Cox regression models to control for confounding or interaction variables and the results were expressed as adjusted effect size ratios if needed.

All meta-analysis calculations were performed by the software package Comprehensive Meta-Analysis Version 2 by Biostat (CMA v.2). CMA v.2 was developed specifically for use in meta-analysis. These calculations include determining effect sizes OR and their 95% CI), heterogeneity of the studies, relative weights for each study, significance (p) for each study, and for determining methods for detecting the presence of publication bias and assessing its impact on the meta-analysis. CMA v.2 was also used to create a high-resolution plot (Forest plot) that shows all the combined studies, their p-value, common effect size, 95% CI for
each study, relative weights for each study, and either a fixed effect model or random effect model. Borenstein, Hedges, Higgins, et al. (2009)[14] write that the selection of a model must be based on the question of which model fits the distribution of effect sizes, and when studies are collected from published literature, the random-effects model is a more plausible match for the meta-analysis. Since all studies were collected from full-text in scholarly journals, the random-effects model was chosen for this study.

The relative weights for each study were calculated by the CMA v.2 software package. Small studies tend to have wide confidence intervals and large studies tend to have narrow confidence intervals with larger studies given greater percent relative weights (Higgins, Hedges, Borenstein, et al., 2009)[15]. An effect size of 1.00 represents no treatment effect. Whereas when the effect size falls below 1.00, this indicates participants who consumed GLV in the highest quartile were less likely to develop cancer. If the effect size falls above 1.00, this indicates study subjects were more likely to develop the disease due to GLV intake in the highest intake quartile. The 95% CI bounding in each study reflects the precision of the estimate, with small studies tending to have wide 95% CI and large studies tending to have narrow 95% CI (Higgins et al., 2009)[15]. The use of 95% CI in this meta-analysis was used, so each meta-analysis performed in this study was statistically significant ($p < .05$) if and only if the confidence interval excluded the null value of 1.0 for each effect model synthesized (Higgins et al., 2009)[15]. The conventional value of significance level for this meta-analysis was pre-set to an alpha of 0.05 (Stigler, 2008)[16].

CMA v.2 allows the meta-analyst to record data by subgroups within the study. Some studies collected in this meta-analysis used subgroups, e.g., male, female, GLV, CV, never smoked or chewed tobacco, and ever smoked or chewed tobacco. In this study, it emerged that the effect sizes were not comparable for each subgroup and that the treatment effect varied as a function of each subgroup, so it was decided to use the subgroup as the unit of analysis. This required calculating separate effect size (utilizing the CMA v.2 software) for subgroups within each study, which recorded as many as four treatment effects for each study. CMA v.2 was also used to detect the possible presence of publication bias. All studies used in this meta-analysis were examined using a funnel plot of the natural logarithm of the effect size versus its precision (1/standard error). The plot by precision is the traditional form (Borenstein, Hedges, Higgins, et al., 2009)[14]. Note in Figure 1 that the large studies appear toward the top of the funnel plot graph, and tend to cluster near the mean of the log odds ratios in the relationship between the studies. The smaller studies appear toward the bottom of the funnel plot, and since there is more random variation in smaller studies, they are dispersed across a wide range of log odds ratios. In the presence of publication bias, the bottom of the funnel plot would tend to show a higher concentration of studies on one side of the mean than the other (Borenstein et al.2009)[14]. These same authors write that this would reflect the fact that smaller studies are more likely to be published if they have smaller than average OR, which makes them more likely to meet the criterion for statistical significance. In the absence of publication bias the studies will be distributed symmetrically about the mean of the log odds ratios.

## III. Data Analysis and Results

Over a four-year search period (2012-2016), thousands of scientific papers were reviewed for this meta-analysis. Table 1 shows the total number of collected studies ($N=14$) that were relevant and reviewed in this meta-analysis. Fourteen case control studies were combined in meta-analysis that examined the relationship between GLV and CV intake and the incidence of GI tract cancers and used OR as the effect size.

**Research Question:** Does an increased intake of GLV and/or CV significantly reduce incidence of GI tract cancers? Fourteen studies met the inclusion criteria that investigated the relationship between the incidences of GI tract cancers with the consumption of GLV and/or CV. The seven cancers were rectal, colon, colorectal, pancreatic, pharyngeal, stomach, and esophageal. Figure 2 is a Forest plot showing relative weight percentages of the 14 studies with similar odds ratios and a random effect model was used to combine results from the studies. Table 1 lists the 14 studies, locations of the participants, subgroups, number ($N$) of participants for each study ($N =$ cases + controls), and cancer types. The random effect model was selected for combining the source studies. Subgroups GLV, CV, men only, women only, colon cancer, rectal cancer, ever tobacco, never tobacco, colorectal cancer, and stomach cancer, were not combined in six of the studies to calculate as many as four treatment effects for each study as shown in Figure 2 and Table 1. The random effect model results, $OR = 0.651 (95\% CI .558 to .760)$, $p<.001$, indicates the highest quartile or quintile of intake of GLV and/or CV compared to lowest in take is associated with a significant 34.9% lower odds of incidence from these seven different cancers. Figure 1 shows possible absence of publication bias in the 14 cancer studies with the studies distributed symmetrically about the mean of the log odds ratios.

## IV. Discussion

A noteworthy finding of this meta-analysis study is the protective effect associated with high consumption of GLV including CV. These vegetables are...
a characteristic and traditional dietary habit of worldwide populations. It has been previously postulated that this could help explain the low cancer incidence rates observed in populations that consume these vegetables. The role of diet in the causation of human disease is complex, partly because diet and dietary habits include a wide variety of foods and because the methods by which these habits can be measured are cumbersome as well as difficult to apply to many individuals. This study has provided some clues for further investigation into the role of GLV intake and how it affects gastroenterological cancer occurrence. Meta-Analysis is a collection of systematic techniques for resolving apparent contradictions in research findings. This meta-analysis translated results from 14 different studies to a common metric and statistically explore relations between study characteristics and findings. Ametanlisis on a given research topic is directed toward the quantitative integration of findings from various studies, where each study serves as the unit of analysis. The findings between studies are compared by transforming the results to a common single metric called an effect size (Shachar, 2008, pp. 3-4)[17]. Advantages of this meta-analysis is to increase validity of research by applying objective formulas to synthesize data across studies rather than using data from a single study and control for between-study variation (Borenstein, Hedges, Higgins, et al. 2009)[14].

The fourteen case-control studies included 24,205 case participants and controls, with 8,182 case participants having seven different type cancers. The random effect model indicated an overall OR effect size of the ‘almost every day’ highest vs. lowest quantile intake category of GLV on cancer as: OR = 0.651 (95% CI .558 to .760), p<.001, showing 34.9% lower odds that an intake of GLV significantly reduces the incidence of these seven cancers? The random effect model indicated an overall OR effect size of the ‘almost every day’ highest vs. lowest quantile intake category of GLV on cancer as: OR = 0.651 (95% CI .558 to .760), p<.001, showing 34.9% lower odds that an intake of GLV significantly reduces the incidence of these seven cancers.

a) Aggregation of Studies Encompassing Various Cancer Diseases

This meta-analysis study could be limited by the aggregation of studies encompassing various cancer diseases. It is important to know which specific cancers are affected by a dietary factor to gain further knowledge into potential disease causes. However, the prevention of overall cancer diseases by diet may be of higher interest for any healthy population than the targeted recommendations for prevention of a specific cancer (Von Ruesten, Feller, Bergmann, et al, 2013)[18]. Hun et al. (2004)[19] evaluated the relationship between fruit and vegetable intake and the incidence of CVD, total cancer, and other deaths from other causes in two prospective cohort studies. Von Ruesten et al. (2013)[18]also combined overall chronic diseases, type 2 diabetes, overall CVD, and overall cancers in their published article on the relationship of diet and disease incidence which concluded that from a public health perspective, it would be better to pursue the primary prevention of several types of aggregated disease outcomes. This meta-analysis presented both overall and disease-specific results.

b) Incidence of Cancers and GLV Intake

Cancer is a group of over 100 different types of malignancies and there are several potential substances in GLV and CV that may exhibit anticancer effects (Rajalakshmi & Agalyaa, 2010)[20]. GLV are typically high in dietary fiber, iron, calcium, and very high in phytochemicals and nutrients such as vitamin C, carotenoids, lutein, folate, magnesium as well as vitamin K. The primary dietary source of vitamin K is generally GLV and both in vitro in vivo studies have shown that vitamin K exhibits anticancer effects (Chlebowski, Akaman, & Block, 1985) [21]. Vitamin K has also been shown to inhibit the growth of mammalian tumor cells in culture (Prasad, Edwards-Prasad, & Sakamoto, 1981)[22]. Also, GLV are high in carotenoids such as beta-carotene and in animal experiments they were shown to suppress liver carcinogenesis (Moreno et al., 2002)[23]. Carotenoids have antioxidant potential in the scavenging of harmful free radicals (Krisnky, 1989)[24] and they appear to play an important role in the prevention of hepatitis virus-related liver carcinogenesis (Kurahashi et al., 2009)[25]. Rajalakshmi and Agalyaa (2010)[20] found that watercress (Nasturtium officinale) has an anti-cancer effect in their study of oral cancer. Watercress is one of the richest sources of dietary phenethyl isothiocyanates and they found it inhibited a chemical in tobacco that may cause oral cancer. Also, in several epidemiological studies, high intake of calcium has been associated with reduced risk of colorectal and breast cancer (Martinez et al., 1996[26]; Shin et al., 2002)[27]. It has been hypothesized that calcium could be the mechanism behind these protective effects by reducing fat induced cell proliferation by maintaining intercellular calcium concentrations (Lipkin & Newmark, 1999)[28].

c) Phytochemicals

Further study in the twenty first century should be focused on conducting extensive research to discover phytochemicals connections to disease prevention because solid evidence is lacking (DeBruyne, Pinna, & Whitney, 2011)[29]. Researchers are just beginning to understand and theorize how a small percent of the different phytochemicals in GLV work. There are potentially thousands of phytochemical compounds from extracts of plant roots, leaves, and stems that have shown promising potential as anticancer drugs, or for serving as lead compounds in the synthesis of new drugs (Smith, 1998[30]; Buring &
Hennekens, 1995[31]; Park et al., 2013[32]. The potential is here just waiting for new researchers to cure cancer, type 2 diabetes, and CVD via new phytochemical drug discoveries. Table 2 shows a small sampling of phytochemical compounds and their possible effects on reducing incidence of cancers.

Acknowledgements

Theory and editing were improved in this paper by my dissertation committee which included Dr Mickey Shachar, Dr Frank Gomez, and Dr Kyung-Ae Son-Guidry.

Author Contributions

Dr. Richard Lee Pollock was sole author of this manuscript and was sole writer and researcher.

Conflicts of Interests

No conflict of interests is declared with this research.

Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Ethical Approval

IRB at Trident University International ethically approved the content of this meta-analysis (no human subjects used).

References Références Referencias

20. Rajalakshmi PA, Agalyaa S. Docking analysis of phenethyl isothiocyanates from nasturtium officinale (watercress), on 4- (methylnitrosamino) - (3-


Table 1: Number (N) of participants per study (N = cases + controls), location of studies, cancer type, and subgroups for each study

<table>
<thead>
<tr>
<th>Study</th>
<th>Location</th>
<th>N</th>
<th>Type of Cancer &amp; Subgroups</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glynn et al. (1996)1</td>
<td>Finland</td>
<td>420</td>
<td>Colon, GLV</td>
</tr>
<tr>
<td>Glynn et al. (1996)2</td>
<td>Finland</td>
<td>420</td>
<td>Rectal, GLV</td>
</tr>
<tr>
<td>Wu et al. (2009)1</td>
<td>USA</td>
<td>2281</td>
<td>Colorectal, GLV</td>
</tr>
<tr>
<td>Wu et al. (2009)2</td>
<td>USA</td>
<td>2281</td>
<td>Colorectal, CV</td>
</tr>
<tr>
<td>Slattery et al. (2000)</td>
<td>USA</td>
<td>3838</td>
<td>Colon, CV</td>
</tr>
<tr>
<td>Annema et al. (2011)</td>
<td>Australia</td>
<td>1773</td>
<td>Colorectal, GLV</td>
</tr>
<tr>
<td>Vogtmann et al. (2014)</td>
<td>China</td>
<td>1013</td>
<td>Colorectal, CV</td>
</tr>
<tr>
<td>Hu et al. (2007)1</td>
<td>Canada</td>
<td>4477</td>
<td>Rectal, Women, CV</td>
</tr>
<tr>
<td>Hu et al. (2007)2</td>
<td>Canada</td>
<td>4477</td>
<td>Rectal, Women, GLV</td>
</tr>
<tr>
<td>Hu et al. (2007)3</td>
<td>Canada</td>
<td>4477</td>
<td>Rectal, Men, CV</td>
</tr>
<tr>
<td>Hu et al. (2007)4</td>
<td>Canada</td>
<td>4477</td>
<td>Rectal, Men, GLV</td>
</tr>
<tr>
<td>Chan et al. (2005)1</td>
<td>USA</td>
<td>2233</td>
<td>Pancreatic, GLV</td>
</tr>
<tr>
<td>Chan et al. (2005)2</td>
<td>USA</td>
<td>2233</td>
<td>Pancreatic, CV</td>
</tr>
<tr>
<td>Olsen et al. (1989)</td>
<td>USA</td>
<td>432</td>
<td>Pancreatic, CV</td>
</tr>
<tr>
<td>Jansen et al. (2011)</td>
<td>USA</td>
<td>1367</td>
<td>Pancreatic, GLV</td>
</tr>
<tr>
<td>Heck et al. (2008)1</td>
<td>India</td>
<td>1231</td>
<td>Pharyngeal, GLV, Never Smoked</td>
</tr>
<tr>
<td>Heck et al. (2008)2</td>
<td>India</td>
<td>1231</td>
<td>Pharyngeal, CV, Never Smoked</td>
</tr>
<tr>
<td>Heck et al. (2008)3</td>
<td>India</td>
<td>1231</td>
<td>Pharyngeal, GLV, Ever Smoked</td>
</tr>
<tr>
<td>Heck et al. (2008)4</td>
<td>India</td>
<td>1231</td>
<td>Pharyngeal, CV, Ever Smoked</td>
</tr>
<tr>
<td>Liu et al. (2012)</td>
<td>China</td>
<td>1200</td>
<td>Nasopharyngeal, GLV</td>
</tr>
<tr>
<td>Hara et al. (2003)1</td>
<td>Japan</td>
<td>436</td>
<td>Gastric, CV</td>
</tr>
<tr>
<td>Hara et al. (2003)2</td>
<td>Japan</td>
<td>436</td>
<td>Colorectal, CV</td>
</tr>
<tr>
<td>Phukan et al. (2001)</td>
<td>India</td>
<td>1506</td>
<td>Esophageal, GLV</td>
</tr>
<tr>
<td>Cheng et al. (1992)</td>
<td>China</td>
<td>1998</td>
<td>Esophageal, GLV</td>
</tr>
</tbody>
</table>
Table 2: Sampling of phytochemicals and possible cancer reducing effects (from DeBruyne, Pinna & Whitney, 2011)

<table>
<thead>
<tr>
<th>Name</th>
<th>Possible Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carotenoids</td>
<td>Act as antioxidants; possibly reduce risk of cancer</td>
</tr>
<tr>
<td>Flavonoids</td>
<td>Act as antioxidants; may scavenge carcinogens</td>
</tr>
<tr>
<td>Indoles</td>
<td>May trigger production of enzymes that block DNA damage from carcinogens</td>
</tr>
<tr>
<td>Isothiocyanates</td>
<td>May inhibit enzymes that activate carcinogens and detoxify carcinogens</td>
</tr>
<tr>
<td>Organosulfur</td>
<td>May speed production of carcinogen-destroying enzymes</td>
</tr>
<tr>
<td>Phenolic acids</td>
<td>May trigger enzyme production to make carcinogens water soluble to excrete</td>
</tr>
<tr>
<td>Phytoestrogens</td>
<td>Block estrogen activity in cells, possibly reducing risk of colon cancer</td>
</tr>
<tr>
<td>Protease inhibitors</td>
<td>May suppress enzyme production in cancer cells, slowing tumor growth</td>
</tr>
<tr>
<td>Saponins</td>
<td>May interfere with DNA replication, preventing cancer cell from multiplying</td>
</tr>
<tr>
<td>Tannins</td>
<td>May inhibit carcinogen activation and cancer promotion; act as antioxidants</td>
</tr>
</tbody>
</table>

Figure 1: Funnel plot showing 14 case-control studies with 10 study results on the left of mean log odds ratio (-0.536) and 14 study results on the right signifying possible absence of publication bias.
The Effect of Phytochemicals Intake from Green Leafy Vegetables on the Incidence of Gastrointestinal Cancers: A Meta-Analysis

**Figure 2**: Forest plot showing a significant 34.9% lower odds of incidence of cancer by consuming a high quantile intake of GLV and/or CV as compared to the lowest intake.

<table>
<thead>
<tr>
<th>Study name</th>
<th>Odds ratio</th>
<th>Lower limit</th>
<th>Upper limit</th>
<th>p-Value</th>
<th>Relative weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amema et al. (2011)</td>
<td>0.770</td>
<td>0.570</td>
<td>1.040</td>
<td>0.008</td>
<td></td>
</tr>
<tr>
<td>Chan et al. (2005)1</td>
<td>0.630</td>
<td>0.474</td>
<td>0.837</td>
<td>0.001</td>
<td></td>
</tr>
<tr>
<td>Chan et al. (2005)2</td>
<td>0.760</td>
<td>0.566</td>
<td>1.021</td>
<td>0.008</td>
<td></td>
</tr>
<tr>
<td>Cheng et al. (1992)</td>
<td>0.430</td>
<td>0.260</td>
<td>0.711</td>
<td>0.001</td>
<td></td>
</tr>
<tr>
<td>Glynn et al. (1996)1</td>
<td>0.510</td>
<td>0.199</td>
<td>1.305</td>
<td>0.160</td>
<td></td>
</tr>
<tr>
<td>Glynn et al. (1996)2</td>
<td>2.120</td>
<td>0.428</td>
<td>10.496</td>
<td>0.357</td>
<td></td>
</tr>
<tr>
<td>Hara et al. (2003)1</td>
<td>1.110</td>
<td>0.579</td>
<td>2.127</td>
<td>0.753</td>
<td></td>
</tr>
<tr>
<td>Hara et al. (2003)2</td>
<td>0.640</td>
<td>0.251</td>
<td>1.634</td>
<td>0.351</td>
<td></td>
</tr>
<tr>
<td>Heck et al. (2008)1</td>
<td>0.130</td>
<td>0.032</td>
<td>0.531</td>
<td>0.004</td>
<td></td>
</tr>
<tr>
<td>Heck et al. (2008)2</td>
<td>0.360</td>
<td>0.109</td>
<td>1.127</td>
<td>0.078</td>
<td></td>
</tr>
<tr>
<td>Heck et al. (2008)3</td>
<td>0.260</td>
<td>0.126</td>
<td>0.465</td>
<td>0.000</td>
<td></td>
</tr>
<tr>
<td>Heck et al. (2008)4</td>
<td>0.410</td>
<td>0.200</td>
<td>0.840</td>
<td>0.015</td>
<td></td>
</tr>
<tr>
<td>Hu et al. (2007)1</td>
<td>0.630</td>
<td>0.474</td>
<td>0.837</td>
<td>0.001</td>
<td></td>
</tr>
<tr>
<td>Hu et al. (2007)2</td>
<td>0.870</td>
<td>0.591</td>
<td>1.281</td>
<td>0.480</td>
<td></td>
</tr>
<tr>
<td>Hu et al. (2007)3</td>
<td>0.910</td>
<td>0.629</td>
<td>1.316</td>
<td>0.698</td>
<td></td>
</tr>
<tr>
<td>Hu et al. (2007)4</td>
<td>0.886</td>
<td>0.660</td>
<td>1.190</td>
<td>0.421</td>
<td></td>
</tr>
<tr>
<td>Jansen et al. (2011)</td>
<td>0.430</td>
<td>0.282</td>
<td>0.655</td>
<td>0.000</td>
<td></td>
</tr>
<tr>
<td>Liu et al. (2012)</td>
<td>0.310</td>
<td>0.237</td>
<td>0.464</td>
<td>0.000</td>
<td></td>
</tr>
<tr>
<td>Olsen et al. (1989)</td>
<td>0.570</td>
<td>0.311</td>
<td>1.044</td>
<td>0.069</td>
<td></td>
</tr>
<tr>
<td>Phukan et al. (2001)</td>
<td>0.260</td>
<td>0.022</td>
<td>3.065</td>
<td>0.284</td>
<td></td>
</tr>
<tr>
<td>Slattery et al. (2000)</td>
<td>0.700</td>
<td>0.496</td>
<td>0.990</td>
<td>0.044</td>
<td></td>
</tr>
<tr>
<td>Vogtmann et al. (2014)</td>
<td>1.080</td>
<td>0.755</td>
<td>1.489</td>
<td>0.737</td>
<td></td>
</tr>
<tr>
<td>Wu et al. (2009)1</td>
<td>0.740</td>
<td>0.575</td>
<td>0.952</td>
<td>0.019</td>
<td></td>
</tr>
<tr>
<td>Wu et al. (2009)2</td>
<td>0.940</td>
<td>0.733</td>
<td>1.205</td>
<td>0.685</td>
<td></td>
</tr>
</tbody>
</table>

Random Effect Model = .651 (.558 to 0.76)
Vulnerability of Urban Poor Women and Children to the Triple Burden of Malnutrition: A Scoping Review of the Sub-Saharan Africa Environment

By Collins Mukanya Mudogo

University of Nairobi

Abstract - Research in sub-Saharan Africa (SSA) show a rapidly increasing trend in co-existence of hunger, micronutrients deficiency as well as overweight/obesity. The paper, vulnerability of urban poor women and children to the triple burden of malnutrition aims at exploring the situation of poor urban women and children in regard to the triple burden of malnutrition in SSA. 65 sources of information were retrieved for review. Many socio-economic and systemic factors appear to put poor urban women and children in SSA slums at a greater risk of the triple burden of malnutrition. The triple burden of malnutrition has devouring effects on the growth and development of women and children. Evidence suggests high prevalence of the existence and effects of the three tier complexity of malnutrition (hunger, micronutrients deficiency and over nutrition) among urban poor women and children in SSA.

Keywords: nutrition, nutrition in women, nutritional health, hunger, micronutrients deficiency, maternal and child nutrition health, overweight and obesity.

GJMR-L Classification: NLMC Code: QU 145.5

Strictly as per the compliance and regulations of:
Vulnerability of Urban Poor Women and Children to the Triple Burden of Malnutrition: A Scoping Review of the Sub-Saharan Africa Environment

Collins Mukanya Mudogo

Abstract: Research in sub-Saharan Africa (SSA) show a rapidly increasing trend in co-existence of hunger, micronutrient deficiency as well as overweight/obesity. The paper, vulnerability of urban poor women and children to the triple burden of malnutrition aims at exploring the situation of poor urban women and children in regard to the triple burden of malnutrition in SSA. 65 sources of information were retrieved for review. Many socio-economic and systemic factors appear to put poor urban women and children in SSA slums at a greater risk of the triple burden of malnutrition. The triple burden of malnutrition has devouring effects on the growth and development of women and children. Evidence suggests high prevalence of the existence and effects of the three tier complexity of malnutrition (hunger, micronutrient deficiency and over nutrition) among urban poor women and children in SSA.

Keywords: nutrition, nutrition in women, nutritional health, hunger, micronutrients deficiency, maternal and child nutrition health, overweight and obesity.

1. Introduction

In conceptualizing nutrition health, it is important to think beyond just the aspects of food intake, absorption and metabolism, hence consider the balance between what is eaten vis-a-vis what the body requires(1). It is only then that the two hazardous concepts of over- and under-nutrition make sense. Food security is based on four main processes. These include: food availability; food access; food utilization; and food stability (2)(3). However in many low to middle income countries, little attention is usually paid on the quality of food available or rather accessed.

In its African regional nutritional strategy (2005-2015), the African Union notes with concern that malnutrition is one of the most important health and social challenges facing Africa and one of the leading causes of deaths among children below five years(1). Overtaken by events, it is evident that Africa is far from what was then target 1.C of the millennium development goals which sought to halve the proportion of people who suffer from hunger by 2015(4). Thus, the Sustainable Development Goal 2 on zero hunger continue to envision an end to hunger, achieve food security, improve nutrition and promote sustainable agriculture by 2030(5).

The 20th century’s rapid growth of cities in SSA came with a mixed bag of advantages and drawbacks. Whereas urbanization has continued to generate and attract investments, higher incomes, basic facilities, stronger institutions and economic opportunities to inhabitants, the urban expansion and related benefits continue to be uneven. As a consequence, millions of the urban poor in slums are marginalized in an effort to confront the day to day challenges and deprivations of their rights. Whereas efforts in humanitarian and food security sectors have focused on rural drier regions in many SSA countries, it is appearing that the urban poor are unrecognizably faced with both acute and chronic food insecurity (6).

Estimates suggest that by 2020, 75% of all urban dwellers across the world will be from the low and middle income countries of Africa, Asia and Latin America. Worryingly it is also estimated that by 2020, 40-45% of the poor in Africa and Asia will be concentrated in towns and cities(7). Since the 1990s, trends have shown that poverty, hunger and malnutrition were on the increase in SSA(4)(2). Studies show that SSA is home to some of the most food insecure populations in the world. This is attributed to factors including poor policies, inequality, poor infrastructure, limited resources, coupled with conflict, diseases and poor access to health services(3)(7).

Findings from many studies show that women in resource poor countries are at risk of inadequate intakes of multiple micronutrients. Findings in a review of studies published between 1988 and 2008 show that in most studies that were reviewed, intakes of folate, iron and zinc were very low in Africa, Asia and Latin America. For instance, folate intake was found to be predominantly below the estimated average requirement in most studies among non-pregnant women (82%). According to the review, the mean/median intakes of iron were more often below estimated average requirements in studies among non-pregnant women (93%) compared with studies among pregnant women (78%) (8). Beyond the processes of availability, access and utilization, the issue of high quality diet has become a major challenge among majority of populations in SSA. Diets in many parts of SSA have been found to be largely composed of cereal or root staple foods but little of vitamins rich animal products and vegetables(3).

Author: Mudfish Consultancy, Nairobi Kenya.
e-mail: collinsmukanya@gmail.com
For example, a national assessment of the level of anemia, iron, vitamin A, and zinc in Kenya revealed notably high prevalence rates of these micronutrients deficiencies among Kenyan children based on environmental and many other socio-economic factors (9).

The imbalance in micronutrient content in foods, nutrition transition, poor eating habits and change in lifestyle in urban settings across SSA has led to an alarming upsurge in risk factors to, and related chronic diseases such as over weight/obesity, diabetes, cancer, hypertension, liver diseases and cardiovascular diseases (CVDs). Apparently the prevalence of risk factors for chronic diseases such as CVDs is high among urban populations compared with rural populations (10)(11)(12). Statistics from many developing countries including Kenya are showing a contradictory, yet worrying and confusing foursome increase in: urban population; urban poor; urban food poverty and over-nutrition (overweight/obesity).

Worryingly, women represent 49% of the urban poor. Implying that if the urban poor are at risk of hunger, micronutrients deficiency and overweight, then within that population, women are the majority (13).

II. Aim of the Paper

Hitherto, there exists isolated data and unsystematic information on the triple burden of malnutrition in SSA. The aim of this scoping review is to map available evidence on nutritional status in SSA within a three dimensional perspective of hunger, micronutrients deficiency and over nutrition. The paper focuses on the state of urban poor women and children in SSA within the spectrum of hunger, micronutrients deficiency and over nutrition.

III. Methods

The paper is built on a desktop review of literature on hunger, micronutrient deficiency and over nutrition. More than 630 documents were obtained via various scientific online databases including PubMed, Medline, Cochrane, Popline, and google scholar. The search was done by two researchers using key words such as nutrition, nutrition in women, nutritional health, hunger, micronutrients deficiency, maternal and child nutrition health, overweight and obesity. Only literature that focuses on nutrition status in SSA and further to women and children in urban poor settings were included. This resulted to 65 documents being considered relevant. The documents were stored in a Mendeley library specifically created for the purpose of coming up with an annotated bibliography and drafting the paper. The reviewed literature includes published articles in peer reviewed journals, research reports, national and regional policy documents, and presentations from conferences, meetings and events in SSA.

IV. Limitations of the Paper

The paper uses existing literature. However a lot of the existing literature focuses mainly on either one or two components of the triple paradox of malnutrition. This situation limited the desired vigorous level of analysis of available data and information within similar settings and populations from which the available evidence was collected.

V. Results

Only 65 documents out 630 retrieved met the inclusion criteria. This is only about 10.3%.

a) State of hunger in urban cities of SSA

The rising, volatile food prices and food insecurity commonly referred to as the food crisis is a global phenomenon. There has been an alarming increase in both international and local prices of basic foodstuffs particularly since 2003. For example in March 2008, Food Agriculture Organization’s food index showed that food prices for cereals, dairy products,
meat sugar and oils had increased by 57% compared with their level in March 2007(14). The surging food prices is of particular concern to the urban poor in SSA given that the poor spend large portions of their household income on food(15). In Kenya, major increase in food prices began being experienced in 2006 and has tremendously continued to increase year in, year out. The Kenyan food prices increasing trend as is the case in many other countries in SSA, does not waver even during seasons when world food prices are on a decline(16)(17).

In its African regional nutritional strategy (2005-2015), the African Union notes with concern that malnutrition is one of the most important health and social challenges facing Africa and one of the leading causes of deaths among children below five years (1). It is evident that Africa is far from what was then target 1.C of the millennium development goals which sought to halve the proportion of people who suffer from hunger by 2015 (4). Thus, the Sustainable Development Goal 2 on zero hunger continue to envision an end to hunger, achieve food security, improve nutrition and promote sustainable agriculture by 2030 (5).

b) Factors contributing to urban hunger in SSA

Most of the factors that contribute to urban hunger result from the reality of overdependence on food purchasing as the main system of food in urban settings(18). As it was noted in the 1980s, during the green revolution, a decrease in food purchasing power has the potential to lead to food emergencies and famines(2)(19)(6). Most of the inhabitants in urban cities in SSA live in rented houses and do not own any land. This implies that urban agriculture is never an option to the majority of the urban inhabitants. On the other hand, as buildings and infrastructure continue to be developed alongside a rapidly bulging urban population, agricultural land in most urban cities is dwindling to almost unavailable. In many urban cities, relationships are organized on economic and/or political basis thus social systems through which food donations and borrowing were thriving in traditional African society have faded away. Time constraints in urban settings also stimulate the habit of ready to eat non-home prepared foods(20). However the increase in food prices and sometimes unavailability of high quality foods in urban markets make access to food through purchasing a real problem. An underlying factor to limited power to food purchasing is poverty. With notable economic development in the last one to two decades, SSA has the largest population of the poor, accounting to about 30% of the most poor in the world (18).

c) Urban Women and children as the most at risk of hunger

Many countries in SSA continue to experience high rates of unemployment and underemployment. In many SSA countries, women suffer more from unemployment than men. In addition, the available job opportunities in the vast of urban cities in SSA are manual job which are unfavorable to women who might be lacking the knowledge and skills required for the hardly available white collar better paying jobs. Research in SSA show higher rates of unemployment and underemployment among women than national rates (21)(22). Low income, low assets, lack of opportunities and social exclusion put women and their children on the vicious circle of poverty. Poverty then results in hunger, lack of shelter, illiteracy, and poor access to health care. Women in SSA are highly predisposed to both contingent and structural poverty(23).

On the flip side, majority of the few urban women who are employed, work outside their homes. This implies that caring for children and optimal feeding practices become difficult(7).

Whereas single motherhood has rapidly grown in most urban centers in SSA, it is also emerging that the erosion of the African family gender roles between men and women, coupled with hard economic times are slowly leading to men figureheads faced with the challenge of providing for their wives and families. Thus women are single handedly left with the double burden of taking care of selves and their children (24). A study on health effects of single motherhood on children in SSA revealed that compared with children whose mothers were in union, children of single mothers who were not widows were more likely to be stunted. Fewer economic resources and limited parental care were also significantly associated with higher odds of stunting in single mother households. The study concluded that single motherhood was a risk factor for children’s nutritional status and chances of survival before five years(25). Research show that improving income among women can greatly improve household community food security (26). Several demographic and health factors of mothers are associative with different indicators of nutritional status among their children. In one study, increasing maternal education attainment and Body Mass Index (BMI) were significantly linked with decreasing stunting among their children. On the other hand children of mothers who had not worked in the last four weeks had significantly lower proportions of stunting. However these same children were assessed with significantly high proportions of wasting, overweight and obesity(27).

d) Effects of hunger in women and children

Worsening food insecurity in urban settings in many countries in SSA is one of the leading direct and indirect causes of morbidity and mortality among women and children. The nature, extent and duration of coping strategies to food insecurity in urban settings by women determine the magnitude and severity of their
suffering and their children (18). Studies in many countries including Kenya, Ethiopia, Swaziland, Brazil, and Nigeria indicate that hunger is a key factor in pushing women into sex work. The two pathways in relation to entry into sex work as a result of hunger are that one, men who have means takes advantage of desperate women so that while they, men provide support in terms of money and food to women, women reciprocate with sex. Two, hungry women are forced to aggressively go out to sell sex in search for food or majorly money for food lest they and their children die of hunger(28)(29)(30). As indicated above, depending on the severity of the hunger, food insecurity has been proven to not only lead women into sex work but also increase their chances of engaging in unprotected sex (31).

Considered as a key indicator of childhood undernutrition, stunted linear growth is highly prevalent in most low to middle income countries in SSA. This has been found to have damaging consequences on development and health of children in many developing countries. Globally, statistics show that there has been a decreasing trend in the number of stunted children (253 million in 1978, 178 million in 2005 and 165 million in 2011). However the slow reduction rate of (2.1% per year) has been a concern to partners. Globally, 8% of children under 5 were in 2011 considered as wasted. Considering 2010 as the baseline year, the World Health Assembly (WHA) called for a 40% reduction in the number of stunted children by 2025(32).

e) Micronutrients deficiency among urban poor women and children in SSA

Using the concept of hidden hunger, which is associated with micronutrient deficiencies, the Food and Agricultural Organization (FAO) estimates that 850 million people across the world are hungry. FAO states that malnutrition is purported to affect up to a half of the world’s population(33). Iron deficiency is the most prevalent single nutrient deficiency affecting an estimated 2 billion people worldwide. Iron deficiency and anemia are known to be most prevalent in developing countries. Although Iron deficiency can occur at any stage in a life cycle(34), the most vulnerable groups include women and children. Globally 469 million women of reproductive ages are anemic with at least 50% resulting from dietary iron deficiency(35). In South Africa studies have reported iron deficiency in 7-29% of pregnant women, 57% in pregnant teenage girls, 21% in infants and 26% in non-pregnant teenage girls(36).

In many SSA countries, under nutrition is associated with wide spread micronutrient deficiencies (3,13,14,27,37,38). Kenya’s nutritional profile indicates that iron and Vitamin A deficiencies are the most prevalent in the country. For example, just over half (55%) of pregnant women experience iron deficiency anemia compared to 47.9% of non-pregnant women. Approximately 40% of women experience vitamin A deficiency. 17% of pregnant women in Kenya are Vitamin A deficient with about 52% of mothers being zinc deficient. Although there is a dearth of information, iodine deficiency disorders are still prevalent in Kenya (39)(40).

Studies conducted at antenal clinics in many developing countries paint a picture of a population that is severely malnourished in terms of essential minerals and vitamins (3,8,16,28,41–45). This situation is worsened in the event of HIV positive prospective mothers. One study in Mombasa Kenya conducted in a prevention from mother to child antenatal clinic revealed that throughout the study period, the overall prevalence of anemia (Hb < 11 g/dl) at the first antenatal clinic (ANC) visit remained stable: 84.2% in 2004, 86.6% in 2005 and 84.1% in 2006. Even though the study displayed marked differences between urban and rural populations [about four in five rural women (7461/9441; 79.0%) and two in three (2822 / 4248; 66.4%) urban women had a Haemoglobin between 7 and 11 g/dl (P < 0.001). An additional 10.2% of rural and 9.8% of urban women were severely anemic (Hb < 7 g/dl)](46). It is important to note that with rapid increase in food prices since 2004 in Kenya the figures could have worsened in both populations by now(47)(48).

f) Effects of micronutrients deficiency on women and children

Micronutrients deficiency is known to have staggering consequences for human health and wellbeing as well as hampering economic productivity. In women of reproductive ages micronutrients deficiency lead to increased pregnancy complications and maternal mortality(49)(50)(51).

It is evident that essential minerals’ and vitamins’ deficiencies have wide spread adverse effects on child survival and development. Deficiencies of vitamin A and zinc inhibit child survival and health. Attaining Developmental potential in many children in SSA is curtailed by deficiencies in iron and iodine coupled with stunting (32).

g) Over nutrition among women and children in SSA

Women and children within settings of high vulnerability to food security are more likely to rely on street based high energy dense foods which predispose them to obesity. Moreover access to low quality food limited in dietary diversity may lead to obesity, conditions typical of the urban poor women and children in SSA (52,53).

Overweight and Obesity (O/O) are modifiable risk factors for the development of non-communicable diseases (NCDs). With the current increasing rates in O/O of about 5% per year across SSA, there are high predictions of accompanying increase in NCDs and diabetes mellitus 2. Across SSA, the prevalence of
overweight obesity appear to be most visible among populations in urban settings. Factors such as dependence on ready and fast foods, reduced physical activity, and poverty, predispose urban populations to O/O more than their rural counterparts (10,20,27,38, 54,55). A study in Kenya showed that O/O are usually more prevalent in women specifically in the 25 to 40 age range. This is mainly attributable to the retention of gestational weight gain and also the outcome of numerous lifestyle factors such poor diets, inactive lifestyles, urbanization and adoption of diets that veer away from traditional menus(56).

By 2003, already almost one-quarter of women in Kenya were overweight or obese(56). Seemingly a positive trend was observed with advancing age. Prevalence of O/O were much higher in the urban sector (38%) compared with the rural sector (18%)(57). In 2009 the Kenya Demographic Health Survey (KDHS) indicated that the national prevalence of overweight and obesity was 23%. Across the country, urban areas had higher prevalence rates compared with the rural areas (58).

Although there is a dearth of information on childhood overweight/obesity in SSA, the little available research show that child overweight/obesity SSA is on the increase. This situation is associated with factors such sex of the child, age of the child, mother’s Body Mass Index and work status of the mother (59).

h) **Effects of over nutrition in women and children**

Overweight obesity causes poor health, negatively affects quality of life and shortens the quantity of life. Uniquely in women, obesity causes conditions such as osteoarthritis, birth defects, breast and endometrial cancers, cardiovascular and gall bladder diseases, infertility, gynecological complications, urinary stress incontinence, stigma and discrimination(56). Childhood overweight is associated with negative health and psychological effects as evidenced in overweight children. Although preventable, childhood overweight leads to lifetime health problems which are expensive and painful to manage(59).

i) **Policies, services and programs**

Global and national agrarian policies have been reported to have significant social and economic consequences in SSA. For instance whereas there has been rapid increase urbanization and inequalities in land ownership, SSA countries still have high levels of participation in the agricultural sector. However this has not improved access to resources and better diets among urban poor women and children in SSA(26).

The conception of the idea of food for development was significantly marked by the formation of World Food Programme (WFP) in 1963. This provided an understanding of food as necessity for development and of course development as necessity for food security. In the 1990s concrete plans were put in place to ensure reduction in hunger and malnutrition. The human right approach to adequate food security was reaffirmed. However few committed national governments have taken up more proactive roles(2). Many countries in SSA lack policies and implementing frameworks for targeted and holistic nutrition interventions. In addition there is limited capacity and expertise in SSA to handle emerging nutritional challenges.

**VI. Discussion**

Many countries in SSA have found themselves in the mix-up of hunger, micronutrients deficiency and overweight unawares. The petite available relevant literature review indicates that there is limited knowledge and information on malnutrition focusing on malnutrition among the urban poor. There is need for rigorous research in this area. Studies show that the possible co-existence of the three conditions in an individual, household or community has dire health and developmental effects(54). The co-occurrence of overweight obese mothers and undernourished children in the same household is now considered an important common phenomenon in many countries in SSA including Kenya. This has been associated with an increase in consumption of high energy dense foods with reduced physical activity. Contrary, the high energy dense foods are those that are of low nutrient content hence do not provide enough quality nutrients to children and women(60). For instance, many studies in SSA have proven the significantly high level of co-existence between iron deficiency (a result of dietary deficiency or hunger) and overweight in study populations. Evidence suggest that iron deficiency and overweight do not only co-exist but interact with adverse consequences. Consistent study findings indicate that overweight individuals at all ages have a significantly high likelihood of having higher rates of iron deficiency compared with their normal weight counterparts(61)(62). Whereas hunger and micronutrient deficiency continue to devour poor women in urban slums and informal settlements, studies continue to show that these women have higher rates of overweight than their male and female counterparts in both similar urban settings and even rural areas(10). It is estimated that 53% of deaths associated with infectious diseases among children in developing countries, majority of which are in SSA, are associated with poor nutrition(55).Whereas the effects of the triple burden of malnutrition are glaringly hazardous, many governments, partners in development and individuals in SSA have not awaken to the realization that the future survival and health of urban poor women in SSA is more than ever before jeopardized. There remains poor or no policies and programs to address the whole spectrum of malnutrition and individuals, particularly the urban poor women and their children.
VII. Recommendations

Given that food security is a human right, policies and programs need to adopt the three dimensional definition and perspective in addressing the challenges of food and nutrition insecurity. This would provide holistic long term solutions to the nutritional and health challenges in SSA. Providing a hungry child with food that does not contain necessary micronutrients is not enough, just like providing a hungry pregnant woman with an iron supplement or tablet without food may not be enough. Concerted efforts are required to ensure preventive mechanisms are put in place to deter chronic diseases as a result of preventable lifestyle risky behaviors including food choices and eating habits. The World Bank generally states that the cost of inaction towards preventable conditions and diseases related to diet and lifestyle is clear and unacceptable (65).

Governments and partners in SSA need to conduct assessment of nutritional status to determine the level of hunger, micronutrient deficiency and over nutrition among women and children. This will go a long way in informing planning and implementation of policies, services and programs.

Moreover SSA need to make serious assessments of the current burden and risk factors to lifestyle diseases. Whereas studies have shown that there is a glaring increase in chronic diseases and associated risk factors, governments in many developing countries have not taken any meaningful steps in attempting to address or prevent risk factors to chronic diseases among its populations. It is important for Government and partners in SSA to think prevention since treatment of the of chronic diseases would be more expensive particularly given that health systems in developing countries are still grappling with infectious diseases.

Programmatically, there is need for continued concerted efforts in social and economic empowerment of women to enhance healthy food and nutrition security. Research shows that an empowered woman can contribute to an empowered household and community.

VIII. Conclusion

Although the available data is haphazard and limited, it shows a concentration of the three tier complexity of malnutrition among urban poor women and children in SSA. The vulnerability of women is buttressed by the unfavorable urban social and economic systems in SSA. Operating within very limited policies and programs that are not strategic, concerted efforts seem to be more focused on micronutrients deficiency and hunger and only during emergencies with limited or no focused attention on over nutrition.

References Références Referencias


15. Alonso EB. The impact of culture , religion and traditional knowledge on food and nutrition security in developing countries. 2015.


40. Muthoni MN. Dietary diversity, dietary iron intake and iron status among pregnant women in Embu county, Kenya [Internet]. 2014. Available from: http://ir-library.ku.ac.ke/handle/123456789/107577
44. MQSUN Report. Addressing undernutrition in the context of urbanisation in low- and middle-income countries. 2015.
48. Ndungi FN. The prevalence of overweight, obesity, diagnosed diabetes mellitus and hypertension in the Swahili community of Old town and Kisauni districts in Mombasa.
50. Stoltzfus RJ, Dreyfuss ML. Guidelines for the use of iron supplements to prevent and treat iron deficiency anemia.
52. Eckhardt CL. Micronutrient malnutrition, obesity, and chronic disease in countries undergoing the nutrition transition: Potential links and program / policy implications. 2006.
63. Dominguez-Salas P. Designing practical ways to help the urban poor make choices that improve their nutrition. 29 July 2015. 2015.
Nutritional and Microbial Evaluation of Commercial Apple Juices Available in Market of Peshawar City

By Sana Irshad Khan, Zafar Iqbal, Ubairah, Arsalan Khan, Falak Naz Shah & Abid Shah Shinwari

University of Agriculture

Abstract: The present study was aimed to carry out quality assessment of different commercial apple juices available in the market of Peshawar city. Physiochemical characteristics like moisture, total soluble solids (Brix°), pH, acidity (%), Vit-C (%), total dissolved solids (ppt), reducing sugars (%), non-reducing sugars (%) and SO2 residue concentration (g/Kg) and microbial analysis of six juice samples were carried out. % moisture contents of sample VI was found higher (88.25±1.88) and lowe of sample III having % moisture content (82.67±1.71). Of all the samples, sample III has highest TSS (13.1±0.82), in contrast lowest TSS was found for sample VI (1.17±0.15). pH was found in the range of 3.39±0.05 to 3.08±0.01. Higher pH was observed for sample VI and lower for sample II. Total acidity (%) was observed maximum for sample I (0.83±0.05) and was found minimum for sample VI (0.11±0.03). Sample III has maximum Vit-C concentration (%) of 26.01±0.05 and sample VI has minimum Vit-C content (%) i.e. 14.00±0.10. Total dissolve solids (TDS) of the commercial apple juice samples (I-VI) were recorded in the range of 0.84 to 0.23. Highest TDS was found for sample I and lowest for sample II. Maximum % reducing and non-reducing sugars were observed for sample I i.e. (21.45±0.93) and (2.1±0.74) respectively, while in sample V and VI no content of (0.00) of % reducing and non-reducing sugars were found. Of all the selected juice samples, only samples I and III showed SO2 residues concentration within WHO standard (<0.03 g/Kg) and were found suitable for human consumption. Highest TPC were found in sample VI (30 cfu/mL). TCB was found in normal range (<1.1) and E.Coli were absent in all selected juice samples.

Keywords: apple juices, quality assessment, SO2, physico-chemical analysis, WHO standard.

GJMR-L Classification: NLMC Code: QU 145.5

Strictly as per the compliance and regulations of:

© 2017. Sana Irshad Khan, Zafar Iqbal, Ubairah, Arsalan Khan, Falak Naz Shah & Abid Shah Shinwari. This is a research/review paper, distributed under the terms of the Creative Commons Attribution-Noncommercial 3.0 Unported License http://creativecommons.org/licenses/by-nc/3.0/), permitting all non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.
Nutritional and Microbial Evaluation of Commercial Apple Juices Available in Market of Peshawar City

Sana Irshad Khan a, Zafar Iqbal b, Ubairah c, Arsalan Khan a, Falak Naz Shah a & Abid Shah Shinwari a

Abstract- The present study was aimed to carry out quality assessment of different commercial apple juices available in the market of Peshawar City. Physiochemical characteristics like moisture, total soluble solids (Brix%), pH, acidity (%), Vit-C (%), total dissolved solids (ppt), reducing sugars (%), non-reducing sugars (%) and SO2 residue concentration (g/Kg) and microbial analysis of six juice samples were carried out. % moisture contents of sample VI was found higher (98.25±1.88) and lowe of sample III having % moisture content (92.67±1.71). Of all the samples, sample III has highest TSS (13.1±0.82), in contrast lowest TSS was found for sample VI (1.17±0.15). pH was observed for range of 3.99±0.05 to 3.08±0.01. Higher pH was observed for sample VI and lower for sample II. Total acidity (%) was observed maximum for sample I (0.83±0.05) and was found minimum for sample VI (0.11±0.03). Sample III has maximum Vit-C concentration (%) of 28.01±0.05 and sample VI has minimum Vit-C content (%) i.e. 14.00±0.10. Total dissolve solids (TDS) of the commercial apple juice samples (I-VI) were recorded in the range of 0.84 to 0.23. Highest TDS was found for sample I and lowest for sample II. Maximum % reducing and non-reducing sugars were observed for sample I i.e. (21.45±0.93) and (2.1±0.74) respectively, while in sample V and VI no content of (0.00) of % reducing and non-reducing sugars were found. Of all the selected juice samples, only samples I and III showed SO2 residues concentration within WHO standard (<0.03 g/Kg) and were found suitable for human consumption. Highest TPC were found in sample VI (30 CFU/mL). TCB was found in normal range (<1.1) and E.Coli were absent in all selected juice samples.

Keywords: apple juices, quality assessment, SO2, physico-chemical analysis, WHO standard.

I. Introduction

Apples, a highly nutritious fruit, found abundant of essential food elements including fats (11%), carbohydrates (14.9%), sugars (11%), proteins (0.4%) and balanced level of pectin, dietary fibers and potassium, vitamins (A, B and C) and different types of phenolics (1). Apple can be used raw or processed into juices, jellies, jams, cider and wine etc. (2). Apple juices act as nutritious beverages and are becoming an important part of the modern diet in many communities, essentially available in the same form almost anywhere in the world (3). Several epidemiological studies suggested the antioxidant and detoxification effect of apple juices in the human body and thus playing role to reduce the risk of chronic degenerative diseases (4, 5).

Quality of fruit juices is strictly maintained in developed countries under some law and regulation but in many developing and under developed countries the manufacturer is not concerned about the microbiological safety, hygiene and nutritional importance of fruit juices because of unawareness and lack of legislation (3). Thus the transmission of some human diseases through juice and other drinks are considered a serious problem in these countries today (7).

From our local market survey, it was revealed that although a large number of fruit juices brands (bottles and tetra packs) are available. Some of these juice brands have been found nutritionally low in quality and synthetic. According FDA (2001) reports fruit juices contain water, sugar and natural fruit pulp that could support microbial growth. Several factors encourage, prevent or limit the growth of microorganisms in juices; the most important are pH, hygienic practice storage temperature and concentration of preservatives and water. Industries apply chemical preservatives (including Sulphur Dioxide (SO2) and benzoate) that can inhibit all types of microbial growth (8). However these preservatives can significantly damage the vegetative cells also. In order to develop awareness among the people about commercial fruit juices nutritional quality and health hazard due to microbial contamination, this study was attempted to measure nutritional and microbiological quality and SO2 level of industrially processed apple juices available in the local market of Peshawar city.

II. Materials and Methods

a) Sample Collection

Different commercially available apple juice samples (Two multinational and four national) were
collected from the local market of Peshawar city and were labeled with laboratory code Nos. i.e. I (multinational), II (national), III (national), IV (multinational), V (national) & VI (national) respectively. RTS apple juices were analyzed for the following parameters.

b) Physico-Chemical Analysis

Moisture contents of the commercial apple juice samples were determined by direct heating method (9). Total soluble solids of the commercial apple juice samples were recorded by digital Refractometer (Atago Rx-1000) and results were expressed as soluble solids in °Brix (10). Acidity was estimated by titrating diluted samples (1%) against 0.1% NaOH according to the method as described in AOAC (2012) method no. 94.15 (11). The pH was recorded by pH meter (HANNA, HI 2211, pH/ORP meter) by using standard method of AOAC (2012) method no. 2005.02 (12). Reducing and non-reducing sugar (%) were investigated by Lyan and Eynon methods as reported in AOAC (2012) method no. 2005.02. Reducing sugar (%) was found highest in sample I (0.84±0.03) followed by sample III, II and IV (0.68±0.05), (0.24±0.07) and (0.23±0.03) and minimum acidity (%) was found for sample VI (0.11±0.03) followed by sample V (0.14±0.01) respectively. Vit-C contents of the commercial juice samples were ranged from 14% to 26%. Sample III has maximum Vit-C concentration (%) of 26.01±0.05 followed by samples I, II, IV and VI having % Vit-C contents of 20.00±0.02 and 14.00±0.10. Total dissolve solids (TDS) of the commercial apple juice samples (I-VI) were recorded in the range of 0.84 to 2.31. highest TDS was found for sample I (0.84±0.03) and lowest for sample II 0.23±0.01. Recorded TDS for samples III to VI was 0.67±0.11, 0.48±0.08, 0.56±0.10 and 0.48±0.22. Reducing sugar (%) was found highest in sample I (21.45±0.93) followed by sample III (20.20±0.51), IV (18.3±0.43) and II (8.46±0.55). In contrast, in juice samples V and VI no content of reducing sugar was found. Like reducing sugar (%), non-reducing sugar (%) contents were also found 0.00 in sample V and VI. Sample I contained highest concentration (2.1±0.74) of non-reducing sugar followed by sample III (1.81±0.15). While sample II and IV has 0.26±0.06% and 0.93±0.20 % of non reducing sugars.

c) Sulfur dioxide (SO\textsubscript{2}) Residue Determination (g/Kg)

Sulfur dioxide (SO\textsubscript{2}) concentration (g/Kg) in apple juices was determined as described by Laboratory manual of agricultural Chemistry, The University of Agriculture, Peshawar (14).

d) Microbial Analysis (cfu/mL)

For microbial evaluation of commercial juice samples Total Viable Count was used, by pour plate method (7). Sample (1 mL) was taken from the three dilutions (10\textsuperscript{-1}, 10\textsuperscript{-2} and 10\textsuperscript{-3}) and was added to Petri dish. Then Plate Count Agar (PCA) media was added to each Petri dish. After incubation at 35 °C for 48 hours, colonies were counted by colony counter and results were expressed as cfu/mL.

e) Statistical Analysis

Statistical analysis of results was carried out using CR design. Means of triplicate reading will be represented as mean ± Std.

### III. Result and Discussion

a) Physico-chemical Analysis

Physico-chemical properties of different commercial apple juices available in the market of Peshawar city were shown in Table 1. Maximum % moisture contents was observed in sample VI (88.25±1.88) and minimum % moisture content (82.67±1.71) was observed in sample III of commercial apple juice. Sample I, II, IV and V have moisture content (%) of 84.2±1.13, 86.01±2.01, 83.91±2.17 and 86.12±2.20 respectively. Moisture content affect shelf stability of food samples significantly. Apple juice sample having higher moisture content (%) have low storage life. Of all the samples, sample III has highest TSS 13.1±0.82 followed by sample I (12.23±0.27). In contrast lowest TSS was found for sample VI (1.17±0.15) followed by sample V (2.26±0.05). TSS for samples II and IV are 8.86±0.06 and 10.03±0.20 respectively. TSS for samples III and I fall within acceptable limit of ready to serve drinks (15). PH values for juice samples I to VI were 3.32±0.08, 3.08±0.01, 3.22±0.11, 3.31±0.10, 3.30±0.05 and 3.39±0.05. From pH of juices samples it was clear that sample VI has highest value of 3.39±0.05 and sample II has lowest pH value of 3.08±0.01. Total acidity (%) of the commercial apple juice samples was found in the range of 0.11-0.83. maximum acidity (%) was found for sample I (0.83±0.05) followed by sample III, II and IV (0.68±0.05), (0.24±0.07) and (0.23±0.03) and minimum acidity (%) was found for sample VI (0.11±0.03) followed by sample V (0.14±0.01) respectively. Vit-C contents of the commercial juice samples were ranged from 14% to 26%. Sample III has maximum Vit-C concentration (%) of 26.01±0.05 followed by samples I, II, IV and VI having % Vit-C concentra (0.84±0.03) and lowest for sample II 0.23±0.01. Recorded TDS for samples III to VI was 0.67±0.11, 0.48±0.08, 0.56±0.10 and 0.48±0.22. Reducing sugar (%) was found highest in sample I (21.45±0.93) followed by sample III (20.20±0.51), IV (18.3±0.43) and II (8.46±0.55). In contrast, in juice samples V and VI no content of reducing sugar was found. Like reducing sugar (%), non-reducing sugar (%)

b) Sulfur Dioxide (SO\textsubscript{2}) residue determination (g/Kg)

Sulfur dioxide concentration of juice samples (I to VI) were 0.01±0.02, 0.10±0.00, 0.01±0.01, 0.05±0.00, 0.10±0.02 and 0.17±0.09. According to WHO standard, MRL (maximum Residual Limit) for SO\textsubscript{2} in juices is 0.03 g/Kg. Of all the selected juice samples, only samples I (multinational) and III (national) showed SO\textsubscript{2} residues concentration less than 0.03 g/Kg (i.e. 0.01±0.02 and 0.01±0.00 respectively) and were found suitable for human consumption. All other samples were proven toxic and need to neglect its consumption (Table 1). Consumption of SO\textsubscript{2} above standard limits...
(0.03g/Kg) damage vegetative cell, cause stomach upsetting and various types of allergies (FAO/WHO, 1999).

Table 1: Physico-chemical and SO$_2$ residue analysis of commercial juice samples available in the market of Peshawar City

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Sample I</th>
<th>Sample II</th>
<th>Sample III</th>
<th>Sample IV</th>
<th>Sample V</th>
<th>Sample VI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moisture %</td>
<td>84.2±1.13</td>
<td>86.01±2.01</td>
<td>82.67±1.71</td>
<td>83.91±2.17</td>
<td>86.12±2.20</td>
<td>88.25±1.88</td>
</tr>
<tr>
<td>TSS Brix°</td>
<td>12.23±0.27</td>
<td>8.86±0.06</td>
<td>13.1±0.82</td>
<td>10.03±0.20</td>
<td>2.26±0.05</td>
<td>1.17±0.15</td>
</tr>
<tr>
<td>pH 32.4 °C</td>
<td>3.32±0.08</td>
<td>3.08±0.01</td>
<td>3.22±0.11</td>
<td>3.31±0.10</td>
<td>3.30±0.05</td>
<td>3.39±0.05</td>
</tr>
<tr>
<td>Acidity %</td>
<td>0.83±0.05</td>
<td>0.24±0.07</td>
<td>0.68±0.05</td>
<td>0.23±0.03</td>
<td>0.14±0.01</td>
<td>0.11±0.03</td>
</tr>
<tr>
<td>Vit-C %</td>
<td>23.50±1.83</td>
<td>22.00±1.02</td>
<td>26.01±0.05</td>
<td>20.20±0.33</td>
<td>20.00±0.02</td>
<td>14.00±0.10</td>
</tr>
<tr>
<td>TDS ppt</td>
<td>0.84±0.03</td>
<td>0.23±0.01</td>
<td>0.67±0.11</td>
<td>0.48±0.08</td>
<td>0.56±0.10</td>
<td>0.48±0.22</td>
</tr>
<tr>
<td>Red.sugar%</td>
<td>21.45±0.93</td>
<td>8.46±0.55</td>
<td>20.20±0.51</td>
<td>18.3±0.43</td>
<td>0.00±0.00</td>
<td>0.00±0.00</td>
</tr>
<tr>
<td>Non-reducing sugar %</td>
<td>2.1±0.74</td>
<td>0.26±0.06</td>
<td>1.81±0.15</td>
<td>0.93±0.20</td>
<td>0.05±0.00</td>
<td>0.10±0.02</td>
</tr>
<tr>
<td>SO$_2$ (g/Kg)</td>
<td>0.01±0.02</td>
<td>0.10±0.00</td>
<td>0.01±0.01</td>
<td>0.05±0.00</td>
<td>0.10±0.02</td>
<td>0.17±0.09</td>
</tr>
</tbody>
</table>

c) Microbial Analysis

Total viable count (CFU/mL) concentration was 30, 21, 15, 6, 4 and 2 for sample VI, V, II, III, IV and I. Coliform bacteria population was less than 1.1 for all samples. No evidence of E.coli was found in all selected juice samples (Table 2). According to WHO standard of drinking water (total viable count = < 100, coliform bacteria < 1.1 and E.coli 0157:H7 = nil), commercial apple juices present in the local market of Peshawar City are suitable for human consumption, from microbial point of view.

Table 2: Microbial analysis of commercial juice samples available in the market of Peshawar City

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Sample I</th>
<th>Sample II</th>
<th>Sample III</th>
<th>Sample IV</th>
<th>Sample V</th>
<th>Sample VI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total viable count (cfu/mL)</td>
<td>2</td>
<td>15</td>
<td>6</td>
<td>14</td>
<td>21</td>
<td>30</td>
</tr>
<tr>
<td>Coliform bacteria (MPN/100mL)</td>
<td>&lt; 1.1</td>
<td>&lt; 1.1</td>
<td>&lt; 1.1</td>
<td>&lt; 1.1</td>
<td>&lt; 1.1</td>
<td>&lt; 1.1</td>
</tr>
<tr>
<td>E.coli</td>
<td>Nil</td>
<td>Nil</td>
<td>Nil</td>
<td>Nil</td>
<td>Nil</td>
<td>Nil</td>
</tr>
</tbody>
</table>

IV. Conclusion

From this study it was observed that sample III (national) followed by sample I (multinational) of the selected apple juices is more suitable for human consumption. In contrast, human usage of samples VI and V is not good physico-chemically. Similarly all samples were found acceptable for human’s consumption from microbial point of view and fall in the range of WHO standards.

References

Compliance to Prenatal Iron and Folic Acid Supplement and Associated Factors among Women during Pregnancy in South East Ethiopia: A Cross-Sectional Study

By Mekonnen Tegegne, Haile Woldie & Abera Biratu

Madda Walabu University

Abstract: Background: Nutritional anemia is one of the leading causes of morbidity and mortality among pregnant women in developing country. Several studies have shown that prenatal iron and folic acid supplement for three months and more during pregnancy plays a great role in preventing maternal morbidity and mortality. The aim of this study was to assess compliance of prenatal iron and folic acid supplement and its associated factors during Antenatal Care in Goba District South East Ethiopia.

Methods: A community based cross-sectional study was conducted from March to May, 2014 in Goba District. A total of 405 mothers who give birth in the last six months were selected using systematic random sampling technique. Data were collected using pretested questionnaire by interview and then entered and analyzed using SPSS version 20. Both Bivariate and multivariate logistic regression were carried out to see significant association. Variables with P-value less than 0.05 were considered as significant in the multivariate analysis. Results: The compliance rate to IFA supplement was found out to be 18%. Educational status of mother (AOR=0.24 (95% CI 0.63-0.97)), knowledge on anaemia (AOR =0.41 (95% CI 0.20-0.84)), knowledge on benefit of iron folic acid (AOR =0.38 (95% CI 0.20-0.77), receiving health education on Iron Folic acid supplement during prenatal visit (AOR= 4.03 (95% CI 1.4-11.5) were found to be factors associated with compliances to iron folic acid supplement.

Keywords: iron, folic acid, compliances to IFA, women, southeast Ethiopia.

GJMR-L Classification: NLMC Code: QU 145, QU 145.5

Strictly as per the compliance and regulations of:
Compliance to Prenatal Iron and Folic Acid Supplement and Associated Factors among Women during Pregnancy in South East Ethiopia: A Cross-Sectional Study

Mekonnen Tegegne a, Haile Woldie a & Abera Biratu a

Abstract - Background: Nutritional anemia is one of the leading causes of morbidity and mortality among pregnant women in developing country. Several studies have shown that prenatal iron and folic acid supplement for three months and more during pregnancy plays a great role in preventing maternal morbidity and mortality. The aim of this study was to assess compliance of prenatal iron and folic acid supplement and its associated factors during Antenatal Care in Goba District South East Ethiopia.

Methods: A community based cross-sectional study was conducted from March to May, 2014 in Goba District. A total of 405 mothers who give birth in the last six months were selected using systematic random sampling technique. Data were collected using pretested questionnaire by interview and then entered and analyzed using SPSS version 20. Both Bivariate and multivariate logistic regression were carried out to see significant association. Variables with P-value less than 0.05 were considered as significant in the multivariate analysis. Results: The compliance rate to IFA supplement was found out to be 18%. Educational status of mother (AOR=0.24 (95% CI 0.63-0.97)), knowledge on anaemia (AOR =0.41 (95% CI 0.20-0.84)), knowledge on benefit of iron folic acid (AOR =0.38 (95% CI 0.20-0.77), receiving health education on Iron Folic acid supplement during prenatal visit (AOR= 4.03 (95% CI 1.4-11.5) were found to be factors associated with compliances to iron folic acid supplement.

Conclusions: Compliance to IFA supplement was low among the study communities. Improving awareness of the community about IFA supplement during pregnancy and improving educational status of women are highly recommended.

Keywords: iron, folic acid, compliances to IFA, women, southeast Ethiopia.

1. Background

Anemia is a global public health problem affecting two billion people worldwide. Globally, 41.8% of pregnant women and 30.2% of non-pregnant women are anemic (1). At least half of this anemia burden is assumed to be due to iron deficiency (2). Many studies documented the adverse effects of maternal anemia, 12.8% and 3.7% of maternal mortality in Asia and Africa respectively is directly attributable to anemia (3). In Ethiopia, anemia is the severe problem affecting 62.7% of pregnant mothers and 52.3% non-pregnant women (4, 5). For women, the consequences of anemia include reduced energy and capacity for work poor pregnancy and birth outcomes including premature delivery, low birth weight, and increased prenatal mortality, and increased risk of death during delivery and postpartum. It is estimated that as many as 20% of maternal deaths are caused by anemia and that anemia may be an associated cause in as many as 50% of maternal deaths worldwide(6).

As a public health measure, iron/folic acid supplementation has been the recommended strategy for alleviating anemia in pregnant women. WHO recommended daily dose of 30–60 mg of elemental iron and 400 μg (0.4 mg) Folic acid on daily bases throughout pregnancy(7).

To combat Iron deficiency anaemia, many developing countries including Ethiopia have interventions and programme during pregnancy. Provision of IFA supplement to all pregnant women free of charge is among the key interventions. The recommended dose by the Ministry of Health in Ethiopia is 60 mg/day for 90 days for iron and 400μg of folic acid daily(8, 9). And, Although National Nutrition Strategy adopted key target of increasing the proportion of mothers who get IFA for more than 90 days during pregnancy and the post-partum period to 50% by 2015, there is discrepancy in the ANC coverage and the IFA intake level. The 2011 DHS documented IFA supplement of 17%. More importantly the IFA intake 90 or more tablets found to be 0.4% (18).

Gastrointestinal side effects, inadequate Supply of tablets, inadequate counselling, poor utilization of prenatal health-care services, lack of knowledge and patient fears about the tablets affect women’s perception regarding tablet use in many countries (11-14).
Compliance to Prenatal Iron and Folic Acid Supplement and Associated Factors among Women during Pregnancy in South East Ethiopia: A Cross-Sectional Study

Even though iron folic acid (IFA) supplementation during pregnancy is among the methods to reduce maternal mortality, in Ethiopia the coverage is very low, in addition there are limited studies conducted on this topic. Therefore, the findings of this study will give valuable information on compliances of IFA and its determinate factors for policy makers and service providers.

II. Materials and Methods

A community based cross-sectional study using quantitative methods of data collection was conducted in Goba District, South East Ethiopia from March to May 2014. Those postnatal mothers who give birth 6 months before the survey were included in the study. The sample size for this study was determined using a single population proportion formula estimation, with the assumptions of: an expected compliances to IFA 50%, a 95% confidence level, a 5% margin of error and a none response rate of 10%. The final calculated sample size was 422.

Goba district is divided into 2 urban and 24 rural kebeles (the smallest administrative unit in Ethiopia). From the district’s 24 rural kebeles 4 were selected randomly and from the 2 urban kebele 1 is selected randomly. In selected kebeles, preliminary survey was conducted to identify households with mothers who have child birth within 06 months prior to the study and sampling frame was developed. After the total sample size was allotted proportionally to the selected kebeles based on the total number of deliveries in the past 06 months, respondents were selected using systematic random sampling technique.

Data was collected using semi-structured, interviewer administered, pretested questionnaire after obtaining informed consent. The completed questionnaire were given codes, checked for completeness and consistencies then entered into EPI-info version 3.5.3 statistical software and then transferred to SPSS version 20 statistical package for further analysis. Data cleaning were performed to check for accuracy and consistencies, missed values and variables were also checked and corrected. The results were presented in the form of tables, figures, and text.

In this study, women were categorized as compliant to IFA supplement if she took 90 or more IFA tablets on daily base during her pregnancy (20).

Mothers Knowledge of anaemia was assessed using 20 questions. The questionnaire were composed of cause, health consequence, risk group and method of prevention in anaemia, Mothers who score mean value and above were considered as having good knowledge of anaemia.

To assess mother’s knowledge of IFA, 12 questions were employed, mothers who score mean value and above were considered as having good knowledge of IFA.

Both Bivariate and multivariate logistic regressions were used to identify factors associated with compliances to IFA. Odds ratio with 95% confidence interval was used to identify the presence and strength of association between variables.

Ethical clearance was obtained from the Institutional Ethical Review Board of Institute of Public Health, College of Medicine and Health Sciences, University of Gondar. Correspondingly written letters were offered from Bale Zone Health Department. Finally informed consent was obtained from each mother before the start of the interview.

III. Results

a) Socio-demographic Characteristics

A total of 405 PNC mothers who give birth 6 months before data collection were included in the study with a response rate of 95.9%. The mean age of the respondents was 26.3 (+±5.1) years. Around 35.6% of respondent were in age group of 21-25 years and about 28% were in age group of 36-40 years.

Majority of the women interviewed were married (98.1%) and rural dwellers (83.2%). About (32.1%) of the respondents were unable to read and write, (27.4%) can only read and write, (13%) had primary school level and (19.5%) had secondary school level. Regarding occupation majority of the respondents were house wives (72.6%) (Table1).

b) Pregnancy and Obstetric related characteristic of respondent

Around half of the respondents had less than three times ANC visit. Around eleven percent of the respondents had history of abortion and 3% had history of still birth. Among the respondents 21.7% started ANC while their pregnancy was less than 12 weeks of gestation, and 26.7% started after 24 weeks of gestation (Table2).

c) Respondent’s knowledge about anemia and benefit of IFA supplement

Two third (62.5%) of respondents had good knowledge on cause, consequence, risk group, and method of prevention in anaemia, while 60.7% of the respondents had good knowledge on benefits of IFA.

d) Service related characteristics

About 78.9% were provided with health education and 21.1% were not provided health education on iron/folic acid supplements during their IFA collection . Regarding dispensing of supplement; majority of the respondents (87%) collected 30 tablets whereas 12.8% were collected more than 30 tablets per visit (Table 4).
e) **Compliances to iron/ folic acid supplement**

It was found out that only 18% of the respondents were compliant to iron/folic acid supplement.

f) **Factors Associated with Adherence**

Bivariate analysis for compliances to IFA revealed that place of residence, educational status of mother, education level of the husband, mothers knowledge of anaemia, mothers knowledge on benefits of iron folic acid and receiving health education at the time of supplement collection have significant association with compliance to IFA at p value ≤ 0.02.

Multivariable logistic regression was done to control potential confounders and educational status of mother, knowledge on anaemia, knowledge on benefits of iron folic acid and receiving health education at the time of supplement collection have significant association with compliances to IFA at p value≤ 0.05 (Table 5).

### IV. Discussion

This study revealed that only 18% of the studied subjects were compliant to IFA supplement.

The compliance rate of this study is lower than a study conducted in Kenya (24.5% (15), study conducted in Cambodia (47%) (16) and study conducted in India (35.5%) (17). This could be due to differences in socioeconomic status of the study population. But the finding of this study is higher than EDHS 2011 which was 0.4%. This could be because of the present study has been conducted among ANC followers and the time gap between the present study and EDHS 20011 (18).

Educational status of mother was important socio demographic factor which showed significant association. The compliance rate of IFA supplement was significantly increases with educational status of mother. Mothers who can’t read and write were 91%, mothers who can read and write were 77% and mothers who had primary education were 76% less likely to adhere to IFA when compared with those who had above secondary education. This might be because, when women are educated, they might have accessible to information and advices from different sources about IFA and threats of anaemia.

Another important variable that showed a significant association is knowledge of cause, consequences, risk group and method of prevention in anaemia. The rate of compliance to IFA was 59% times less likely among women with poor knowledge.

This finding was similar with the study done in Nepal which identifies high proportion of compliances among pregnant mothers with good knowledge (19). This could be due to reason that knowledge of pregnant women about anaemia related to causes, consequence and method of prevention affect their compliance of IFA.

In addition good level of knowledge about anaemia was a factor which could promote individuals in preventing iron deficiency anaemia and following recommendation.

It was found out that there was a significant association between respondent’s knowledge on benefit of IFA and compliance to IFA. Women with poor knowledge on benefit of IFA were 62% times less likely to adhere than women’s with good knowledge on benefit of IFA. This could be due to the fact that good levels of knowledge promote mothers to take the supplements based on the recommendation.

Receiving health education during prenatal visit was also an important predictor of compliance to iron folic acid supplements. This study showed that mothers who were provided with health education at the time of receiving supplements have about 4.03 (AOR 4.03 (95% CI 1.4- 11.5) times more likely to adhere to IFA supplement than those who were not provided. This could be due to the fact that health education at the time of supplement provide important information of IFA supplement.

### V. Conclusions

Compliance to IFA supplements was low among pregnant women attending ANC in the study communities. Increase awareness of the community about anemia and IFA supplement during pregnancy, improving educational status of women, providing alternative community based delivery mechanisms and sustainable supply of IFA is highly recommended.

a) **Abbreviations**

ANC: Antenatal Care; EDHS: Ethiopian demographic and health Survey; IDA: Iron deficiency anaemia; IFA iron / folic acid; MMR: maternal mortality rate; NIE: nutritional initiative of Ethiopia; PNC: postnatal care; SPSS: statistical package for social science; WHO: world organization.

b) **Competing Interests**

The authors declare that they have no competing interests.

### Acknowledgements

We would like to thank University of Gondar for approval of ethical clearance and technical and financial support for this study. We also acknowledge all staff of Institute of Public Health for their help and courage.

We would also like to extend our appreciation to, Bale Zonal Health Department and Goba District Health Office for providing the necessary information and facilitating conditions while carrying out this study. Above all our heartfelt thanks go to study participants who spent their precious time in responding to our questionnaire. All data collectors and the supervisors are highly acknowledged for the utmost effort they put to the quality of this research.
References


15. Dinga LA. Factors Associated With Adherence To Iron/Folate Supplementation Among Pregnant Women Attending Antenatal Clinic At Thika District Hospital In Kiambu County, Kenya: University of Nairobi; 2013.


Table 1: Socio-demographic and economic characteristics of respondent of pregnant and PNC mothers, Goba woreda, South East Ethiopia, 2014 (n=405)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Category</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>16-20</td>
<td>51</td>
<td>12.6</td>
</tr>
<tr>
<td></td>
<td>21-25</td>
<td>144</td>
<td>35.6</td>
</tr>
<tr>
<td></td>
<td>26-30</td>
<td>132</td>
<td>32.6</td>
</tr>
<tr>
<td></td>
<td>31-35</td>
<td>50</td>
<td>12.3</td>
</tr>
<tr>
<td></td>
<td>36-40</td>
<td>28</td>
<td>6.9</td>
</tr>
<tr>
<td>Marital status</td>
<td>single</td>
<td>15</td>
<td>3.7</td>
</tr>
<tr>
<td></td>
<td>Married</td>
<td>370</td>
<td>91.3</td>
</tr>
<tr>
<td></td>
<td>Divorced</td>
<td>4</td>
<td>1.0</td>
</tr>
<tr>
<td></td>
<td>widowed</td>
<td>16</td>
<td>4.0</td>
</tr>
<tr>
<td>Religion</td>
<td>l Orthodox</td>
<td>174</td>
<td>43.0</td>
</tr>
<tr>
<td></td>
<td>catholic</td>
<td>6</td>
<td>1.5</td>
</tr>
<tr>
<td></td>
<td>Muslim</td>
<td>213</td>
<td>52.6</td>
</tr>
<tr>
<td></td>
<td>protestant</td>
<td>12</td>
<td>3.0</td>
</tr>
<tr>
<td>Residence</td>
<td>rural</td>
<td>337</td>
<td>83.2</td>
</tr>
<tr>
<td></td>
<td>Urban</td>
<td>68</td>
<td>16.8</td>
</tr>
<tr>
<td>Family size</td>
<td>&lt; 4 family</td>
<td>71</td>
<td>17.5</td>
</tr>
<tr>
<td></td>
<td>4-7 family</td>
<td>253</td>
<td>62.5</td>
</tr>
<tr>
<td></td>
<td>&gt; 7 Family</td>
<td>81</td>
<td>20.0</td>
</tr>
<tr>
<td>Educational level</td>
<td>Can t read and write</td>
<td>122</td>
<td>30.1</td>
</tr>
<tr>
<td></td>
<td>Can read and write</td>
<td>117</td>
<td>28.9</td>
</tr>
<tr>
<td></td>
<td>Primary</td>
<td>53</td>
<td>13.1</td>
</tr>
<tr>
<td></td>
<td>secondary</td>
<td>84</td>
<td>20.7</td>
</tr>
<tr>
<td></td>
<td>Above secondary</td>
<td>29</td>
<td>7.2</td>
</tr>
<tr>
<td>Occupation of mother</td>
<td>House wife</td>
<td>294</td>
<td>72.6</td>
</tr>
<tr>
<td></td>
<td>Governmental employee</td>
<td>41</td>
<td>10.1</td>
</tr>
<tr>
<td></td>
<td>Private employee</td>
<td>18</td>
<td>4.4</td>
</tr>
<tr>
<td></td>
<td>Daily laborer</td>
<td>11</td>
<td>2.7</td>
</tr>
<tr>
<td></td>
<td>Merchant</td>
<td>24</td>
<td>5.9</td>
</tr>
<tr>
<td></td>
<td>Farmer</td>
<td>17</td>
<td>4.2</td>
</tr>
</tbody>
</table>
**Educational level of husband**

<table>
<thead>
<tr>
<th>Level</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Can’t read and write</td>
<td>80</td>
<td>19.8</td>
</tr>
<tr>
<td>Can read and write</td>
<td>116</td>
<td>28.6</td>
</tr>
<tr>
<td>Primary</td>
<td>59</td>
<td>14.6</td>
</tr>
<tr>
<td>secondary</td>
<td>117</td>
<td>28.9</td>
</tr>
<tr>
<td>Above secondary</td>
<td>33</td>
<td>8.1</td>
</tr>
</tbody>
</table>

**Occupation of husband**

<table>
<thead>
<tr>
<th>Occupation</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Governmental employee</td>
<td>58</td>
<td>14.3</td>
</tr>
<tr>
<td>Private employee</td>
<td>47</td>
<td>11.6</td>
</tr>
<tr>
<td>Daily laborer</td>
<td>12</td>
<td>3.0</td>
</tr>
<tr>
<td>Merchant</td>
<td>27</td>
<td>6.7</td>
</tr>
<tr>
<td>Farmer</td>
<td>261</td>
<td>64.4</td>
</tr>
</tbody>
</table>

Table 2: Pregnancy and obstetric related characteristic of respondent Goba woreda, Oromia region, South East Ethiopia, 2014 (n=405)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gravidity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; 3</td>
<td>302</td>
<td>74.6</td>
</tr>
<tr>
<td>≥ 3</td>
<td>103</td>
<td>25.4</td>
</tr>
<tr>
<td>Still birth</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>12</td>
<td>3</td>
</tr>
<tr>
<td>No</td>
<td>393</td>
<td>97</td>
</tr>
<tr>
<td>Abortion</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>47</td>
<td>11.6</td>
</tr>
<tr>
<td>No</td>
<td>358</td>
<td>88.4</td>
</tr>
<tr>
<td>No of ANC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt; 3</td>
<td>199</td>
<td>49.1</td>
</tr>
<tr>
<td>≤ 3</td>
<td>206</td>
<td>50.9</td>
</tr>
<tr>
<td>Time of start of ANC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; 12 week</td>
<td>88</td>
<td>21.7</td>
</tr>
<tr>
<td>12-24wk</td>
<td>209</td>
<td>51.6</td>
</tr>
<tr>
<td>&gt; 24 wk</td>
<td>108</td>
<td>26.7</td>
</tr>
<tr>
<td>Health post</td>
<td>73</td>
<td>18</td>
</tr>
<tr>
<td>Place of ANC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Health Center</td>
<td>277</td>
<td>88.4</td>
</tr>
<tr>
<td>Hospital</td>
<td>55</td>
<td>11.6</td>
</tr>
</tbody>
</table>

Table 3: Respondents knowledge about anaemia and benefit of IFA supplement Goba District, South East Ethiopia, 2014 (n=405)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge on anaemia</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Good knowledge</td>
<td>253</td>
<td>62.5</td>
</tr>
<tr>
<td>Poor knowledge</td>
<td>152</td>
<td>37.5</td>
</tr>
<tr>
<td>Knowledge on benefits of IFA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Good knowledge</td>
<td>246</td>
<td>60.7</td>
</tr>
<tr>
<td>Poor knowledge</td>
<td>159</td>
<td>39.3</td>
</tr>
</tbody>
</table>

Table 4: Service related characteristics Goba District, South East Ethiopia, 2014 (n=405)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Category</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health education</td>
<td>Yes</td>
<td>319</td>
<td>78.8</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>86</td>
<td>21.2</td>
</tr>
<tr>
<td>Waiting time</td>
<td>&lt; 30 minute</td>
<td>354</td>
<td>87.4</td>
</tr>
<tr>
<td></td>
<td>&gt; 30 minute</td>
<td>51</td>
<td>12.6</td>
</tr>
<tr>
<td>Problem faced</td>
<td>Yes</td>
<td>93</td>
<td>23</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>312</td>
<td>77</td>
</tr>
<tr>
<td>Number of tab supplemented per visit</td>
<td>&lt; 30 tab</td>
<td>353</td>
<td>87.2</td>
</tr>
<tr>
<td></td>
<td>&gt; 30 tab</td>
<td>52</td>
<td>12.8</td>
</tr>
</tbody>
</table>
**Table 5:** Factor associated with compliance to IFA at Goba District, South East Ethiopia, 2014 (n=405)

<table>
<thead>
<tr>
<th>Factors</th>
<th>Category</th>
<th>Compliance status of respondent</th>
<th>COR (95% CI)</th>
<th>AOR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Place of residence</td>
<td>Rural</td>
<td>54</td>
<td>0.49 (0.26, 0.90)</td>
<td>0.69 (0.31, 1.5)</td>
</tr>
<tr>
<td></td>
<td>Urban</td>
<td>19</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Educational status of mother</td>
<td>Can’t read and write</td>
<td>9</td>
<td>0.20 (0.07, 0.60)</td>
<td>0.11 (0.026, 0.47)</td>
</tr>
<tr>
<td></td>
<td>Can read and write</td>
<td>20</td>
<td>0.54 (0.21, 1.39)</td>
<td>0.23 (0.064, 0.87)</td>
</tr>
<tr>
<td></td>
<td>Primary education</td>
<td>8</td>
<td>0.46 (0.15-1.4)</td>
<td>0.24 (0.63, 0.97)</td>
</tr>
<tr>
<td></td>
<td>Secondary education</td>
<td>28</td>
<td>1.31 (0.51, 3.33)</td>
<td>0.97 (0.32, 2.8)</td>
</tr>
<tr>
<td></td>
<td>Above secondary</td>
<td>8</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Educational status of husband</td>
<td>Can’t read and write</td>
<td>10</td>
<td>0.38 (0.13, 1.04)</td>
<td>1.31 (0.34, 4.9)</td>
</tr>
<tr>
<td></td>
<td>Can read and write</td>
<td>16</td>
<td>0.42 (0.16, 1.08)</td>
<td>1.39 (0.37, 4.4)</td>
</tr>
<tr>
<td></td>
<td>Primary education</td>
<td>13</td>
<td>0.75 (0.28, 2.75)</td>
<td>3.3 (0.90, 12.3)</td>
</tr>
<tr>
<td></td>
<td>Secondary education</td>
<td>25</td>
<td>0.72 (0.29, 1.75)</td>
<td>0.85 (0.30, 2.3)</td>
</tr>
<tr>
<td></td>
<td>Above secondary</td>
<td>9</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>History of abortion</td>
<td>Yes</td>
<td>15</td>
<td>2.41 (1.23, 4.7)</td>
<td>3.79 (1.68, 8.55)</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>58</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Knowledge on anemia</td>
<td>Good</td>
<td>58</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Poor</td>
<td>137</td>
<td>0.36 (0.20, 0.67)</td>
<td>0.41 (0.20, 0.84)</td>
</tr>
<tr>
<td>Knowledge on benefits of iron</td>
<td>Good</td>
<td>56</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>folic acid</td>
<td>Poor</td>
<td>17</td>
<td>0.40 (0.22, 0.72)</td>
<td>0.38 (0.20, 0.77)</td>
</tr>
<tr>
<td>Health education at the time</td>
<td>Yes</td>
<td>68</td>
<td>4.31 (1.71, 11.2)</td>
<td>4.03 (1.4, 11.5)</td>
</tr>
<tr>
<td>of supplement collection</td>
<td>No</td>
<td>5</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>
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 address with 100 GB of space e.g. johnhall@globaljournals.org. This will include Webmail, Spam Assassin, Email Forwarders, Auto-Responders, Email Delivery Route tracing, etc.

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

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

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

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

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

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

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

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

It is mandatory to read all terms and conditions carefully.
**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.

© Copyright by Global Journals Inc.(US) | Guidelines Handbook
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 3 yrs.
- 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.
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 straightforward. put together a neat summary.

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

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

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

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

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

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

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

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

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

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

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

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

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

INFORMAL GUIDELINES OF RESEARCH PAPER WRITING

Key points to remember:

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

Final Points:

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

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

© Copyright by Global Journals Inc.(US) | Guidelines Handbook
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).

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

© Copyright by Global Journals Inc.(US) | Guidelines Handbook
## INDEX

### A
- Agronomic · 18
- Arabidopsis · 5

### B
- Benishangul · 17
- Bioavailability · 29

### C
- Cholesterolraising · 29
- Colorectal · 1, 6

### E
- Epidemiology · 16
- Esophageal · 2, 6

### G
- Gastrointestinal · 1
- Giovinazzo · 2, 5

### H
- Hepatocellular · 6
- Hydrocolloid · 17

### I
- Incubated · 19
- Indophenols · 28

### M
- Methanolic · 18
- Multiethnic · 6

### N
- Nasopharynx · 1

### O
- Obstetric · 32
- Oropharynx · 1
- Osteoarthritis · 13

### P
- Pharyngeal · 1, 6
- Physiochemical · 27
- Phytoestrogens · 7

### S
- Saponins · 7
- Symposium · 16

### L
- Laryngopharynx · 1
- Legislation · 27