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Neurology & Nervous System

Taylor Cortical Dysplasia

Stroke among Young Adults

Highlights

Impact of Rheumatic Heart

Transcutaneous Electrical Nerve

Discovering Thoughts, Inventing Future

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Contents of the Issue

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Early Diagnosis and Nutritional Treatment Stabilizes Neuropsychiatric Disorders

By Ian James Martins
Edith Cowan University

Abstract- The reliable diagnostic identification of neuropsychiatric disorders such as schizophrenia, bipolar disease, and depression has been associated with some biological markers (genomics, proteomics, metabolomics) but to date, these markers do not have the sensitivity/specificity of a diagnostic test. Biomarker tests that are relevant to global chronic disease are now applicable to neuropsychiatric diseases to prevent autoimmune disease, endoplasmic reticulum stress associated mitophagy with relevance to neuron apoptosis. Metabolic abnormalities has been linked to neuropsychiatric disorder with the careful nutritional assessment of patients reported in many published studies. Early interventions with genomic medicine now assist in the prevention of autoimmune disease associated with global chronic disease and neuropsychiatric disorders.

Keywords: neuropsychiatric; schizophrenia; depression; bipolar disease; diagnosis; mitophagy; endoplasmic reticulum stress; amyloid beta; genomic medicine; sirtuin 1; global; chronic disease; neurodegeneration.

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Abstract- The reliable diagnostic identification of neuropsychiatric disorders such as schizophrenia, bipolar disease, and depression has been associated with some biological markers (genomics, proteomics, metabolomics) but to date, these markers do not have the sensitivity/specificity of a diagnostic test. Biomarker tests that are relevant to global chronic disease are now applicable to neuropsychiatric diseases to prevent autoimmune disease, endoplasmic reticulum stress associated mitophagy with relevance to neuron apoptosis. Metabolic abnormalities has been linked to neuropsychiatric disorder with the careful nutritional assessment of patients reported in many published studies. Early interventions with genomic medicine now assist in the prevention of autoimmune disease associated with global chronic disease and neuropsychiatric disorders. Functional foods that contain appropriate doses of activators will allow modulation of neuropsychiatric diseases at the nuclear receptor level with the maintenance of neuron endoplasmic reticulum stress and the prevention of mitophagy associated with accelerated neurodegeneration.

Keywords: neuropsychiatric; schizophrenia; depression; bipolar disease; diagnosis; mitophagy; endoplasmic reticulum stress; amyloid beta; genomic medicine; sirtuin 1; global; chronic disease; neurodegeneration.

Abbreviations: NAFLD, non alcoholic fatty liver disease, ER, endoplasmic reticulum, LPS, bacterial lipopolysaccharides, NO, nitric oxide, Sirt 1, Sirtuin 1.

I. Introduction

Neuroscience research has become crucial to understand the complexity of neuropsychiatry disorders and assist with the diagnosis and treatment of the various disorders [1]. Neuropsychiatric disorders such as schizophrenia, depression, bipolar disease, autism, attention deficit hyperactivity disorder and neurodegenerative diseases such as Parkinson's disease, Huntington's disease, and Alzheimer's disease have increased in various communities. The global chronic disease epidemic has indicated that nonalcoholic fatty liver disease (NAFLD) and diabetes (Figure 1) will reach epidemic levels with 30% of the population affected with complications such as cardiovascular disease, kidney disease and neurodegenerative diseases [2,3]. Neuropsychiatric disorders may now be connected to the global chronic disease epidemic [2] with early diagnosis essential to prevent accelerated neurodegeneration and to improve medical therapy in neuropsychiatric patients [4-6].

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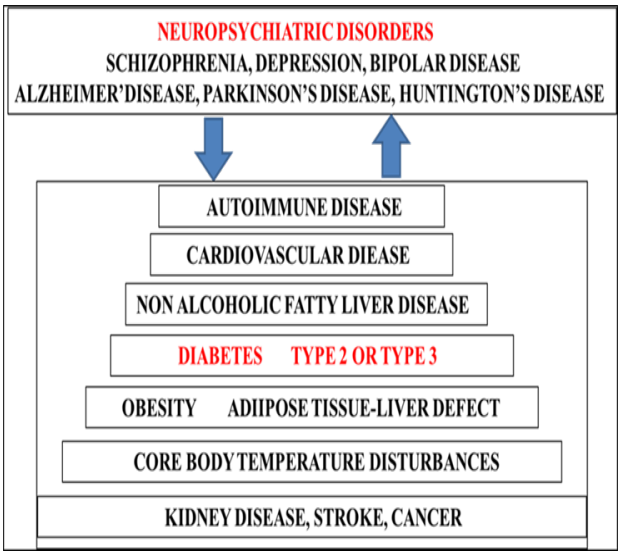

Figure 1: Connections between global chronic disease and neuropsychiatric disorders indicate insulin resistance and immune reactions interfere with the diagnosis and treatment of neuropsychiatric disturbances such as schizophrenia, depression, bipolar disorder, autism, and neurodegenerative diseases.

Insulin resistance in NAFLD, obesity, and diabetes involve autoimmune alterations in various tissues such as the adipose tissue, heart, liver and kidney that may determine accelerated brain aging and lifespan with relevance to neuropsychiatric disorders (Figure 1) [7-13]. The role of nutrition, lifestyle and environmental factors on increased oxidative stress, overactive immune system, and inactivation of anti-aging genes [14] has increased interest in the treatment, care, and diagnosis of neuropsychiatric disorders-early diagnosis with relevance to anti-aging genesis critical to prevent autoimmune reactions [3,7,14] associated withmajor subcellular alterations such as mitochondrial apoptosis and endoplasmic reticulum (ER) stress in neurons [15-21] that may lead to accelerated programmed cell death in neuropsychiatric conditions and global chronic disease.

a) Sirtuin 1 and Global chronic disease with relevance to ER stress and mitophagy in neuropsychiatric disorders

Specific genes and novel mutations were identified in neuropsychiatric conditions with gene variants involved in cognitive disorders in these patients [22-24]. These genes may not allow early diagnosis and

reversal of the complications of these neuropsychiatric disorders. In recent years the discovery of anti-aging genes and their inactivation [25, 26] may now be relevant to the epigenetics of neuropsychiatric disorders [27, 28]. The anti-aging gene Sirtuin 1 (Sirt 1) has become important to neuropsychiatric conditions with its connections to schizophrenia, depression, bipolar disease and autism [29-36]. Sirt 1 dysregulation is critical to the development of global chronic disease with Sirt 1 effects on chromatin alterations (modeling) that influence the DNA sequence, DNA repair, DNA methylation and histone modifications [25, 26]. Sirt 1 is a nicotinamide adenine dinucleotide dependent-class III histone deacetylase that targets transcription factors such as peroxisome proliferator-activated receptor gamma coactivator 1-alpha (PGC 1-<alpha>), mitochondrial biogenesis, p53, pregnane X receptor (PXR) to adapt gene expression to metabolic activity, insulin resistance and inflammation [25, 26]. Sirt 1 mediated deacetylation of the transcriptional factor FoxO3a represses Rho-associated protein kinase-1 gene expression was associated with the reduction of amyloid beta generation [14]. In mammalian cells, Sirt 1 is linked to autoimmune disease [3, 7] and the regulation of telomere maintenance and length [26]. Sirt 1 and its association with neuron senescence [37] was connected to Alzheimer's disease and other neurodegenerative diseases.

Inactivation of anti-aging genes such as Sirt 1 may supersede the genetic findings in neuropsychiatric disorders and the Sirt 1 gene now associated with cell abnormalities (Figure 2) in neuropsychiatric conditions. Mitochondrial alterations and ER stress in global chronic disease have become of principal concern to neuroinflammation in neuropsychiatric conditions and neurodegenerative diseases. The repression of Sirt 1 in global illness [2, 3] and ER stress-induced mitophagy (Figure 2) [38-42] may be relevant to the diagnosis and treatment of neuropsychiatric patients in various global communities. Sirt 1 in neurons is critical for the prevention of cholesterol dyshomeostasis with toxic amyloid beta formation (Figure 2) involved in ER stress-induced mitophagy and neuron survival [43]. The connections between Sirt 1 and neuropsychiatric conditions are relevant to Sirt 1's role in autoimmune disease and amyloid beta aggregation [3, 7, 43]. In the developing with increased plasma bacterial lipopolysaccharides (LPS), Sirt 1 may be repressed [44] with relevance to LPS in cell membranes that bind to cholesterol/sphingomyelin domain with an acceleration of toxic amyloid beta oligomerization in neuropsychiatric disorders [45-47].

In neuropsychiatric disorders [12, 13, 48, 49] alterations in neuron membranes have become of prime concern with relevance to defective phospholipid metabolism in these patients. Lipid membrane abnormalities may affect dopamine signaling in schizophrenia and phospholipase A2 abnormalities responsible for altered brain membranes. The defective neuron amyloid beta pathway (Figure 2) is now relevant to neuropsychiatric disorders such as schizophrenia, depression and bipolar disease and applicable to disturbed membrane cholesterol homeostasis and toxic amyloid beta oligomer formation in neurons (Figure 2). In chronic diseases such as NAFLD, obesity, and diabetes alterations in membrane phospholipids are connected to the defective amyloid beta clearance pathway [43, 47] with effects on neuron membranes with toxic amyloid beta oligomerization associated with neuron cell apoptosis (Figure 2). Phospholipid composition such as phosphatidylinositol lower membrane cholesterol (Figure 2) and amyloid beta with prevention of toxic amyloid beta aggregation [50].

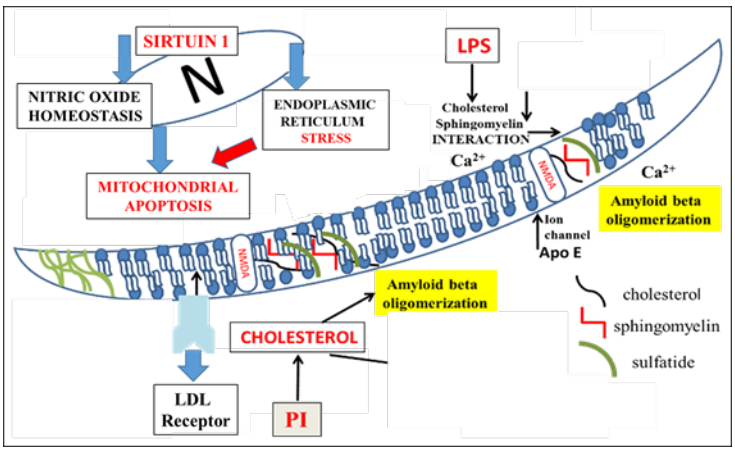

Figure 2: Inactivation of genes such as Sirtuin 1 (Sirt 1) is associated with ER stress and the induction of mitophagy in neuropsychiatric disorders. Cholesterol dysregulation and toxic amyloid beta formation are associated with Sirt 1 inactivation by LPS with relevance to neuropsychiatric diseases in the developing world. Phosphatidylinositol (PI) may reduce membrane cholesterol levels and amyloid beta oligomers to treat mitophagy and ER stress in liver and brain diseases (2). N- Nucleus.

Nitric oxide (NO) is now a crucial player in neuropsychiatric disease and associated with schizophrenia, bipolar disorder and major depression [51, 52]. NO as a lipophile acts as an intracellular and intercellular messenger that is critically regulated by cellular Sirt 1 [53, 54] with NO involved in cell communication between neuron cells in the brain. The connections between the immune system and neuropsychiatric diseases involve NO and implicate Sirt 1 regulation of NO in autoimmune disease [51]. The importance of Sirt 1 in neuropsychiatric disorders is relevant to NO homeostasis as the primary defect (Figure 2) with connections to secondary subcellular and membrane alterations in neuropsychiatric disturbances [51, 52].

b) *Diagnosis of mitophagy in neuropsychiatric patients with global chronic disease*

The criteria are allowing reliable diagnostic identification of schizophrenia, bipolar disease and depression are defined by subjective experiences (symptoms), loss of function (behavioral impairments) and variable patterns of the disease. Some biological markers (genomics, proteomics, metabolomics) were associated with the disorder, but to date, these markers do not have the sensitivity/specificity of a diagnostic test [55-60]. The early diagnosis of neuropsychiatric disorders now involves measurements of nuclear, cellular and plasma Sirt 1 levels (Figure 3) [43, 61]. Measurements of magnesium [62, 63] and zinc may be vital to prevent inactivation of brain Sirt 1 activity. Sirt 1 nuclear receptor control of ER-mitochondria interaction may need to assess plasma LPS levels to avoid complete repression of Sirt 1 and induction of mitophagy induced ER stress in neuropsychiatry diseases.

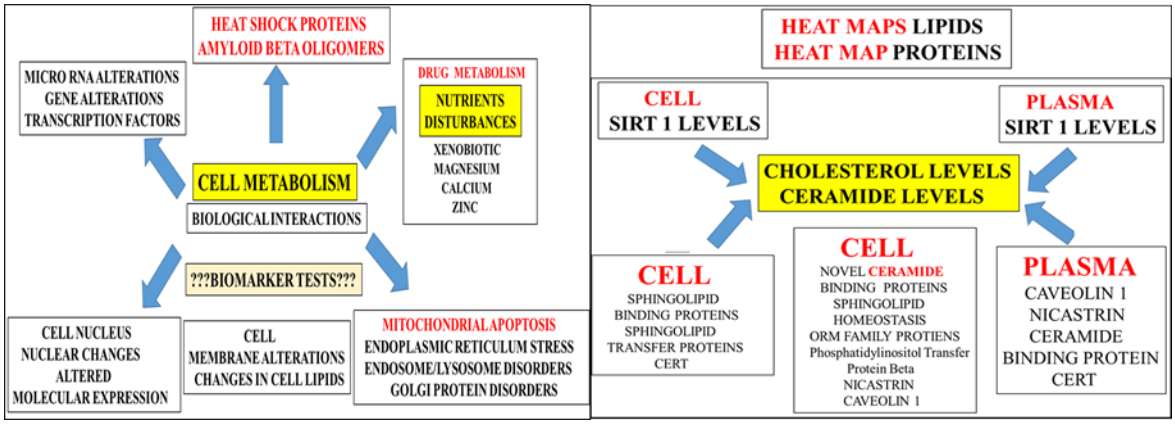

Figure 3: Biomarker tests for mitophagy and ER stress in neuropsychiatric disorders were required for reversal and stabilization of the disease. Genomic, proteomic and lipidomic experiments are critical to assess the induction of mitophagy with relevance Sirt 1 and lipid binding protein analysis in plasma and tissues. Plasma lipid measurements of cholesterol, ceramide, sphingolipids, and phospholipids (phosphatidylinositol) are essential to determine early mitophagy-ER stress disorders in neuropsychiatric disorders.

Lipidomic analysis [64] of plasma lipids (sphingolipids/ceramides) may reflect changes in the periphery and central nervous system and correlation with plasma Sirt 1, ceramide binding proteins and sphingolipid transfer proteins may be important in neuropsychiatric diseases. Measurements of micro RNA (mir-34a, mir-122, mir-132) may indicate repression of Sirt 1 [3] and relevant to the lipidomic analysis. The levels of plasma heat shock protein (Figure 3) may reflect inhibition of Sirt 1 activity and pertinent to activation of autoimmune disease [43]. These biomarker tests (Figure 3) that are relevant to global chronic illness [65,66] are now appropriate to the early diagnosis and treatment of neuropsychiatric disturbances.

c) *Nutritional Biotherapy and Management of neuropsychiatric114 patients*

In neuropsychiatric disorders such as schizophrenia, a healthy and low carbohydrate diet with careful nutritional assessment [67, 68] is required to prevent obesity, diabetes, and NAFLD and stabilize complications of the disease. A systematic review of the literature indicates that metabolic abnormalities were linked to schizophrenia [69]. In depression and mental illness a complete nutritional diet [70] is required to improve behavior, emotion, and cognition with consumption of low carbohydrates, proteins (amino acids/brain function, essential fatty acids (omega-3), vitamins (B, B12, folate) and minerals (calcium, chromium, iodine, iron, lithium, selenium, zinc). Diets that contain functional foods such as biologically active Sirt 1 activator are now essential to maintain patients with neuropsychiatric disorders [64].

Nutritional biotherapy is now critical to the maintenance of the calorie sensitive gene Sirt 1 with excessive glucose and fatty acid that is involved in Sirt 1 repression. Early interventions with the use of genomic

medicine [71, 72] and Sirt 1 activatorsare essential to the treatment of autoimmune disease and neurodegeneration. Appropriate doses of Sirt 1 activators such as pyruvic acid, resveratrol, leucine, rutin, and alpha lipoic acid will prevent mitophagy and ER stress by modulation at the cellular level of neuropsychiatric disease. Phosphatidylinositol (4gm/day) should be consumed [50] to halt neuron membrane cholesterol and amyloid beta disturbances. Appetite control (Figure 4) with cautious nutrient (glucose/fatty acid) intake will maintain the calorie sensitive Sirt 1 activity and stabilize schizophrenia, depression and bipolar disease. The contents of caffeine (Figure 4) in the diet in neuropsychiatric patients should be carefully controlled to prevent caffeine associated neuron disturbances in the brain [63]. In the developing world with elevated LPS levels [44-47] nutritional biotherapy is critical to maintaining Sirt 1 activity and rapid hepatic drug and xenobiotic metabolism [14]. The use of anti-depressants, antipsychotics and other drug therapy in neuropsychiatric patients require intact hepatic and brain Sirt 1 activity. Sirt 1 inhibitors [43, 63] may nullify drug therapy with drug-drug interactions (Figure 4) as complications of neuropsychiatric disorders. Prevention of stress and maintenance of core body temperature were required for the prevention of autoimmune disease [43, 54] in these patients.

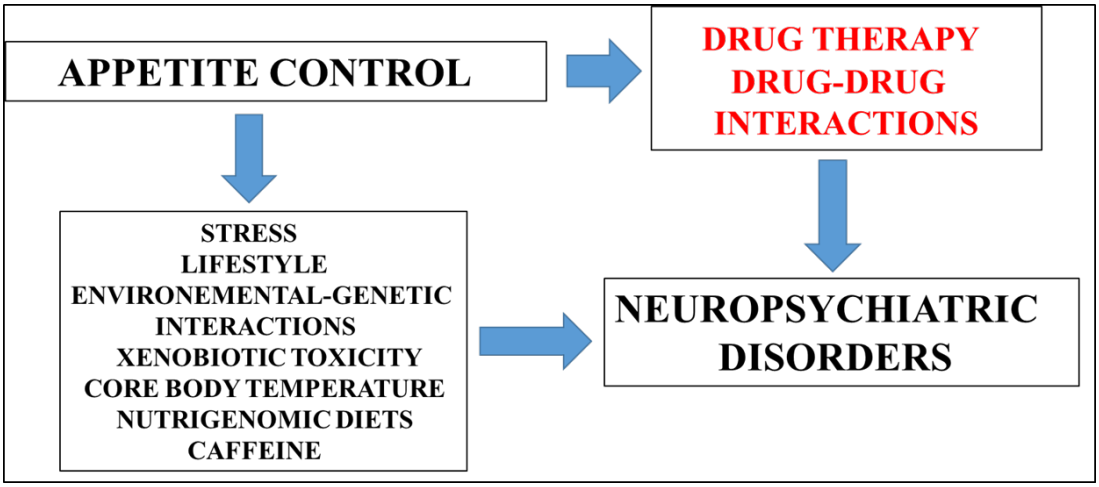

Figure 4: Appetite control is essential to maintain Sirt 1 activityand therapeutic drug metabolism with the prevention of drug-drug interactions in neuropsychiatric disorders. Nutrigenomic diets that contain Sirt 1 activators are vital for the treatment of neuropsychiatric disease and the prevention of mitophagy induced ER stress. Caffeine intake should be controlled to maintain therapeutic drug treatment. Excessive anxiety and pressure should be avoided to preserve nitric oxide homeostasis and immune reactions with relevance to autoimmune and neurodegenerative diseases.

II. Conclusion

Early diagnosis and the measurement of plasma/tissue Sirt 1 levels in neuropsychiatric disorders will allow treatment of schizophrenia, depression and bipolar disease. Plasma analysis of Sirt 1 with extensive lipidomic analysis may indicate the risk of mitophagy and ER stress with relevance to autoimmune disease in neuropsychiatric disorders. Nutritional biotherapy and genomic medicine that involves the activation of Sirt 1 at the nuclear receptor level may allow modulation/reversal of mitophagy and ER stress in psychiatric disorders and neurodegenerative diseases such as Alzheimer/s disease, Parkinson's disease, and Huntington's disease.

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Asymmetrical Fundus Autofluorescence Findings in Parkinson's

By N. Selcuk Cekmeceli & Umur Kayabasi

Introduction- Motor asymmetry is one of the criteria for the diagnosis of Parkinson's disease (PD) (1). A right-sided symptom onset is usually associated with a more favorable outcome in terms of cognitive impairment while a left-sided symptom onset appears to be associated with a better outcome in terms of motor progression. PD symptoms emerge more often on the dominant hand-side (2).

The mammalian retina contains dopaminergic neurons within the inner retinal layer. Visual alterations are associated with PD and seem to be caused by dysfunction of the intraretinal dopaminergic circuits (3).

Interocular asymmetry on spectral domain optical coherence tomography (SD-OCT) of the retina and possibly nerve fiber layer has also been documented (3). As the neurosensory retina is impacted in PD, it is plausible that the earliest changes are also asymmetrical and retina screening would thus be useful and be a good marker of disease presence and progression.

GJMR-A Classification: NLMC Code: WL 359

Strictly as per the compliance and regulations of:

Asymmetrical Fundus Autofluorescence Findings in Parkinson's

N. Selcuk Cekmeceli [α] & Umur Kayabasi [σ]

I. Introduction

Motor asymmetry is one of the criteria for the diagnosis of Parkinson's disease (PD) (1). A right-sided symptom onset is usually associated with a more favorable outcome in terms of cognitive impairment while a left-sided symptom onset appears to be associated with a better outcome in terms of motor progression. PD symptoms emerge more often on the dominant hand-side (2).

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Interocular asymmetry on spectral domain optical coherence tomography (SD-OCT) of the retina and possibly nerve fiber layer has also been documented (3). As the neurosensory retina is impacted in PD, it is plausible that the earliest changes are also asymmetrical and retina screening would thus be useful and be a good marker of disease presence and progression.

II. Methods

The files of 20 PD patients diagnosed at other neurology clinics were examined. Fundus autofluorescence (FAF) images of these patients were observed by two ophthalmologists in a masked fashion. Hyper or hypofluorescent lesions which suggested neurodegeneration were taken into consideration. The mean age of the patients was 69. 16 patients were right- handed while 4 were left- handed.

III. Results

In 15 patients hypo and hyperfluorescent lesions were on the nasal side of the retina. (Figures 1, 2) In 14 R- handed patients who had early PD, degenerative lesions were on the nasal side. 1 L- handed patient had changes in the temporal retina.(Figure 3) None of the R- handed patients had neurodegeneration on the temporal side. Diffuse degeneration on FAF was detected in the middle-late stages of the disease. 4 patients had this kind of distribution. The early asymmetric appearance was in parallel with the asymmetric findings in motor functions. The possibility to detect hemi-retinal neurodegeneration in patients with unilateral motor findings was statistically significant. (P: 0,001)

IV. Discussion

Since FAF detects lipofuscin in the retina, the images were consistent with retinal damage. Lipofuscin gives damage to the tissues by mechanically obstructing the flow into and out of the cells and slowing down the elimination of waste materials. Photoreceptor degeneration unmasks the autofluorescent signal of the underlying RPE and thus creates hyper-autofluorescent images. In contrast, hypo-autofluorescence arises from decreased lipofuscin or blockage by material anterior to the RPE and photoreceptors (4).

In the brain there is an important component of hemispheric lateralization over the course of PD. The motor asymmetry is associated with severe contralateral nigrostriatal degeneration (5). Some studies suggest increased "left hemisphere susceptibility," in that the left nigrostriatal pathway is more affected than the right (6). Some suggest this may be an effect of handedness, but handedness does not seem to account for this observation entirely. The etiology of this left hemisphere-predominant atrophy across the spectrum of neurodegenerative disease remains unclear, although there are several hypotheses involving genetics, lateralized vulnerability, and disease-specific factors (6).

Similar to the brain, the retina is also affected asymmetrically. FAF detected neurodegenerative changes seem to affect one side of the retina early in the disease. In our study, the nasal retina was more affected than the temporal part. The predilection of neurodegeneration for one side of the retina and the asymmetric appearance on FAF was not reported before, to the best of our knowledge. Studies with larger series may give important information about the early detection of PD by ophthalmological examination.

V. Conclusion

Our study suggests that imaging of the retina by FAF may reveal findings consistent with the asymmetric nature of PD.

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Figure Legends

Figure 1: Nasal retinal degeneration on FAF.

Figure 2: Nasal neurodegeneration on FAF.

Figure 3: Temporal changes on FAF.

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Effectiveness of Transcutaneous Electrical Nerve Stimulation in the Treatment of Temporomandibular Disorders - A Clinical Study

By Dr. Vishesh Yadav, Dr. Sankireddy Shailaja & Dr. Vinod VC

Abstract- *Objective:* The aim of this study is to analyze the effect of transcutaneous electric nerve stimulation in the symptomatic relief of pain in temporomandibular disorders.

Materials & Methods: Twenty patients received TENS therapy and VAS was used to measure changes in pain during and after therapy. Also changes in mouth opening were recorded and analyzed.

Results: A significant improvement was observed regarding orofacial pain, muscles and TMJs tenderness and interincisal distance.

Conclusion: Transcutaneous electric nerve stimulation is superior in complete elimination of pain as well as in reduction of severity in temporomandibular joint dysfunction syndrome.

Keywords: *transcutaneous, electric nerve stimulation, temporomandibular, joint dysfunction, syndrome.*

GJMR-A Classification: *NLMC Code: WE 346*

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Effectiveness of Transcutaneous Electrical Nerve Stimulation in the Treatment of Temporomandibular Disorders - A Clinical Study

Dr. Vishesh Yadav [α], Dr. Sankireddy Shailaja [σ] & Dr. Vinod VC [ρ]

Abstract- ***Objective:*** **The aim of this study is to analyze the effect of transcutaneous electric nerve stimulation in the symptomatic relief of pain in temporomandibular disorders.**

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Conclusion: **Transcutaneous electric nerve stimulation is superior in complete elimination of pain as well as in reduction of severity in temporomandibular joint dysfunction syndrome.**

Keywords: transcutaneous, electric nerve stimulation, temporomandibular, joint dysfunction, syndrome.

I. Introduction

Temporomandibular disorders (TMDs) are recognized as the most common chronic orofacial pain conditions confronting dentists and other health care providers.[1] TMDs refers to a cluster of disorders characterized by pain in the pre auricular area, the Temporomandibular joint (TMJ) or in the muscles of mastication, limitations or deviation in mandibular range of motion and noises in the TMJ during mandibular function.[2,3] Various treatment modalities have been tested over time e.g analgesic and anti inflammatory medications, muscle relaxants, massage therapy, occlusal splints, and cognitive behavioural therapies mainly aimed towards symptomatic relief of pain and discomfort. Transcutaneous electrical nervous stimulation (TENS) has been suggested as a treatment strategy in the therapy of TMD. TENS is a safe, non-invasive, reversible and effective therapy which has no potential adverse reactions. It is a method of applying low-voltage electrical current of varying frequency, intensity and pulse duration through the skin at various placement sites using surface electrodes for pain relief.[4,5] It's a safe, non invasive, effective and swift method of analgesia.

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TENS is regularly employed in patients with TMD, in view of its analgesic and muscle relaxing effect, with positive results. . The literature demonstrates the importance of physical therapy in the treatment of Temporomandibular Disorders. Therefore, the aim of this study was to evaluate the effectiveness of Transcutaneous electric nerve stimulation (TENS) in patients with TMD.

II. Material and Methods

This study was conducted in the department of Oral medicine & Radiology during a period from May 2013 to June 2014. Twenty patients with temporomandibular disorders irrespective of gender were recruited in this study. Pain assessment was done before and after intervention by using visual analogue scale and Maximum mouth opening (i.e. maximum interincisal distance) without pain (in mm). The scoring was recorded in such a way that a score of 1-3 was designated as mild pain, 4-6 as moderate pain and 7-10 as severe pain. Patients received Transcutaneous electric nerve stimulation quarterly during a period of 15 days for about 15-20 minutes per session. TENS therapy was given along with Visual analog scale of pain as well as mouth opening was noted at each visit i.e. 1st visit (Day 1), 2nd visit (Day 5), 3rd visit (Day 10) and 4th visit (Day 15). A standard Transcutaneous electric nerve stimulation unit (TENSSTIM Manufactured by Diabetik foot care India, Chennai.) was used. Patients were asked to inform the operator in case of any discomfort. Patients were asked to report after 15 days. Information so collected was analyzed using SPSS version 20.

III. Results

There were 9 males and 11 females in our study.

a) Evaluation of the Visual Analogue Scale (VAS)

Table 1 a: Comparison of pain intensity (VAS)

Group A n = 20	Day 1 M+SD	Day 5 M+SD	Day 10 M+SD	Day 15 M+SD	Pain Change	p Value
	3.8+1.2	2.75+0.72	1.75+0.72	0.8+0.83	3 (78.94%)	<0.001

n = No.of total patients M + SD = Mean + Standard deviation

The mean pain score for 20 patients in was 3.8+1.2 at day 1, 2.75 + 0.72 at day 5, 1.75 + 0.72 at day 10 and at the end of 15 days, the mean pain score reduced gradually to 0.8 + 0.83. The overall reduction in intensity of pain was 78.94%. The results were highly significant statistically (p<0.001).

b) Active range of motion (AROM)

Table 1 b: Comparison of improvement in mouth opening

Group A n = 20	Day 1 M+SD	Day 5 M+SD	Day 10 M+SD	Day 15 M+SD	Change In MO	p Value
	40.05+5.61	40.50+4.79	40.75+4.29	40.95+4.03	0.9 (2.25%)	0.086

MO = Mouth opening

The mean mouth opening score for 20 patients was 40.05 + 5.61 at day 1, 40.5 + 4.79 at day 5, 40.75 + 4.29 at day 10 and at the end of 15 days, the mean mouth opening was improved to 40.95 + 4.03. The overall improvement in mouth opening was 2.25%. The results were not significant statistically (p>0.05). However, out of 20 patients only 4 patients had reduced mouth opening (i.e. <38mm) and when only these 4 patients were analyzed, there was 14.87% improvement in mouth opening.

IV. Discussion

TMD is a collective term that includes a number of clinical complaints involving the muscles of mastication, the Temporomandibular joint (TMJ), or associated orofacial structures. TMDs are a major cause of nondental pain in the orofacial region and are considered a sub classification of musculoskeletal disorders. In many TMD patients the most common complaint originates from the muscles of mastication rather than from the TMJ. Therefore, the terms TMJ dysfunction or TMJ disorder are inappropriate for many complaints arising from the masticatory structures. It is for this reason that the American Dental Association adopted the term "Temporomandibular disorder".[6]

Several factors may influence TMD evolution, such as muscle hyperactivity, trauma, emotional stress and malocclusion, together with several predisposing factors which may trigger or perpetuate the disorder.[7] Pain, muscle tenderness, or alterations of the mandibular movements are the cardinal symptoms of TMJ pain dysfunction. For the treatment of such TMJ pain dysfunctions, a wide variety of therapeutic modalities have been offered, but there is still scarcity of randomized controlled clinical studies, to suggest appropriate management of TMDs. Various therapies appear to result in similar improvements in pain and dysfunction and caution is urged with regard to use of invasive and other irreversible treatments, particularly in the initial management of TMD subjects.[8]

A variety of therapeutic modalities offered to the individuals with TMDs include Counseling and self care therapy, behavioral/relaxation techniques, psychological like placebo, intraoral appliances, physical therapy like moist heat, ultrasound, microwave laser, exercise & TENS therapy and pharmacotherapy like analgesics, muscle relaxants and antidepressants method. An alternative mode of management is Transcutaneous Electrical Nerve Stimulation (TENS), which is a non-invasive analgesic technique that is used to relieve nociceptive, neuropathic & musculoskeletal pain. TENS delivers electricity across the intact surface of the skin to activate underlying nerve.[7] The use of TENS is based on several interrelated theories on the mechanisms of pain transmission and blocking of those mechanisms. The first one being gate control theory. Second theory is related to endogenous release of morphine-like substances (endorphin) after electrical stimulation. A third way of action of TENS is related to automatic and involuntary contraction of muscles.[9] It is widely used to relieve acute and chronic pain in various conditions like back pain, neck pain, phantom limb pain, extremity pain etc.[8] TENS used in dentistry aims at controlling chronic pain in selected cases & relaxing masticatory muscle. According to some authors it has been observed that at rest muscular TMD patients have higher myoelectric activity and TENS application has promoted pain relief with simultaneous decrease in myoelectric activity.

In present study, the intensity of pain for patients was reduced gradually over 15 days of therapy and overall reduction in intensity of pain was 78.94%. The results were highly significant ($p<0.001$) statistically as shown in Table 1a. The efficacy of TENS therapy in reducing TMD pain observed in present study is similar to the observations made by Wessberg GA et al[10], Moger G et al[1] , Tosato JDP et al[11] and Kato MT et al[4] . So, TENS has good success rate immediately after treatment, effective in reducing pain sensitivity in TMD patients and it was found that TENS was effective for decreasing the symptoms of TMD patients.

The maximum mouth opening without pain for patients in group A was improved marginally after therapy and overall improvement in mouth opening was 2.25%. The results were not significant ($p>0.05$) statistically as shown in Table 1 b. However, in this group; out of 20 patients only 4 patients had reduced mouth opening before treatment (i.e.<38mm) and when only these 4 patients were analyzed, there was 14.87% improvement in mouth opening. The efficacy of TENS therapy in improving mouth opening observed in present study is similar to the observations made by Mehta et al[12] and Moger G et al[1].

Thus, results from our study justify the use of TENS therapy in the management of TMD patients. TENS played a significant role in reducing pain as well as improvement in mouth opening.

Hence, oral health care professionals whenever encountering management of TMDs, it is preferred that, Aggressive, non reversible therapy for TMD should be avoided and the main emphasis should be on reversible therapy that facilitates the musculoskeletal system's natural healing capacity and patient-centred treatment.
Thus, the results of the present study are encouraging; as use of TENS has shown favourable results in pain management as well as in mouth opening.

V. Conclusions

TENS therapy provided a relief in the intensity of pain as well as improvement in the mouth opening. As an Oral physician our role is not only to give symptomatic treatment to the patient but also ensure that the patient leads a pain free and restorability of normal function for better quality of life which can be achieved only when improvement of both signs and symptoms pertaining to TMDs are managed by proper analysis, treatment planning, management and patient cooperation. Thus, we conclude that TENS is a promising therapeutic regimen for the management of TMDs. However, further studies with variation and the larger sample size are suggested to validate the same.

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Meningoangiomatosis associated with Taylor Cortical Dysplasia, Type IIIc: Report on a Case in Bogotá, Colombia

By Fernando Velandia, Camilo Moreno, Cesar Buitrago, Daniela Villegas, Yuliana Cuellar & Jorge Aponte
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Abstract- Cerebral meningioangiomatosis (MA) is a rare pathology, described as a proliferation of meningothelial cells that are wrapped around small cortical blood vessels in young people who suffer from refractory epilepsy as a principal clinical manifestation. Few cases of MA reported in the literature are associated with cortical dysplasia classified as type IIIc by the International League against Epilepsy (ILAE). In the following report we describe the first documented diagnosis of MA in Colombia, of a nine-year-old boy with medically refractory epilepsy who responded positively to surgical treatment.

Keywords: meningioangiomatosis, focal cortical dysplasia, refractory epilepsy, epilepsy surgery.

GJMR-A Classification: NLMC Code: WL 348

Meningoangiomatosis associated with Taylor Cortical Dysplasia, Type IIIc: Report on a Case in Bogotá, Colombia

Fernando Velandia [α], Camilo Moreno [σ], Cesar Buitrago [ρ], Daniela Villegas [ω], Yuliana Cuellar [¥] & Jorge Aponte [§]

Abstract- **Cerebral meningioangiomatosis (MA) is a rare pathology, described as a proliferation of meningothelial cells that are wrapped around small cortical blood vessels in young people who suffer from refractory epilepsy as a principal clinical manifestation. Few cases of MA reported in the literature are associated with cortical dysplasia classified as type IIIc by the International League against Epilepsy (ILAE). In the following report we describe the first documented diagnosis of MA in Colombia, of a nine-year-old boy with medically refractory epilepsy who responded positively to surgical treatment.**

Keywords: meningioangiomatosis, focal cortical dysplasia, refractory epilepsy, epilepsy surgery.

I. Introduction

Meningioangiomatosisis a rare disease of the central nervous system. It is non-neoplastic and may or may not be associated with meningiomas. It is a generally spontaneous (not associated with neurofibromatosis) hamartoma type, most frequently affecting the frontal and parietal lobes as a single lesion among young people with convulsive syndromes that are refractory to medical treatment. Few cases are associated with cortical dysplasia.

The variability of meningioangiomatosis is recognized in images and spectroscopic studies. The fundamental method of treatment is surgery for the control of convulsive syndrome and the histo-pathological diagnosis.

II. Case Presentation

A nine-year-old boy without history of neurofibromatosis whose symptoms began with episodes of unstable gait associated with dizziness that lasted a few seconds at a time. These episodes became more frequent with the passing of the weeks and took on the characteristics of convulsive crises consisting of tonic extension with pronation of the upper limbs, rightward head and eye deviation, clonic facial movements, loss of consciousness associated with cyanosis, and sialorrhea without relaxation of sphincters.

Telemetric video and magnetic resonance show epilepsy initiating in the left hemisphere with parietal epileptogenic zone in relation to hypo-intense media lesion in T1 (Figure 1 a), hyper-intense in T2 (Figure 1 b), hypo-intense in FLAIR (Fluid attenuation inversion recovery) (Figure 1 c) with an anomaly in the configuration of cerebral tissue, without signs of bleeding, enhanced by the administration of contrast (Figure 1 d) leading to a consideration of low grade glial lesion as a possible diagnosis, for which reason magnetic resonance spectroscopy is used to complement the study, evidencing diminished N-acetylaspartate peak, increased myoinositol with inverted lactate peak (Figure 1 e, f) suggesting meningioangiomatosis associated with cortical dysplasia as opposed to oligodendroglioma.

Due to refractory response to anticonvulsant treatment consisting of oxcarbazepine every 12 hours oral (37 mg / kg / día), levetiracetam every 12 hours oral (57 mg / kg / día) and topiramate every eight hours oral (8 mg / kg / día), a sterotaxically-guided resection of left parietal cortical-sub-cortical lesion was considered.

The histo-pathological study showed loss of formation of the laminae of the neuronal population with numerous vascular channels (arterial) throughout the sample of cerebral cortex. A proliferation of arachnoid cells with ill-defined cytoplasmic borders that showed whorling around the vascular channels and numerous psammoma bodies was apparent at the cortical-sub - cortical boundary. The study with EMA (epithelial membrane antigen) y progesterone was negative with a Ki-67 (MK167) cellular proliferation index of under 1%, for which reason it was concluded that this was a case of cortical meningioangiomatosis associated with focal cortical dysplasia classified by the ILAE as Taylor type IIIc.

The patient was crisis-free in postoperative follow-up, with adequate school performance, without signs of neurological focalization upon electroencephalographic study, without paroxysmal

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discharges or significant asymmetries, for which reason pediatric neurology considers the progressive reduction of anticonvulsant dosages.

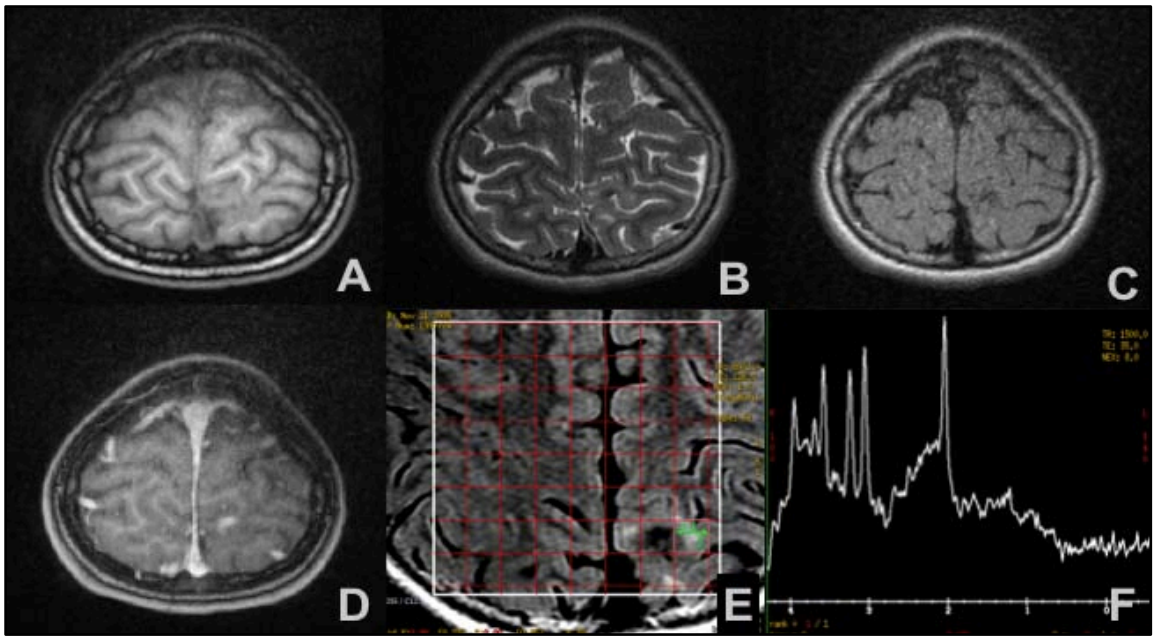

Figure 1: Cerebral image produced by magnetic resonance in which is observed, in the left parietal cortex, a hypo-intense lesion in T1, FLAIR *(a, c)*, hyper-intense in T2 *(b)* enhanced by the administration of contrast *(d)*. In a spectroscopic study of multiple voxel sequences *(e)* one can see heightened choline peak with a slight reduction of N-acetylaspartate and inverted lactate peak: in the single voxel sequence *(f)* is seen reduced N-acetylaspartate peak with increased myoinositol peak.

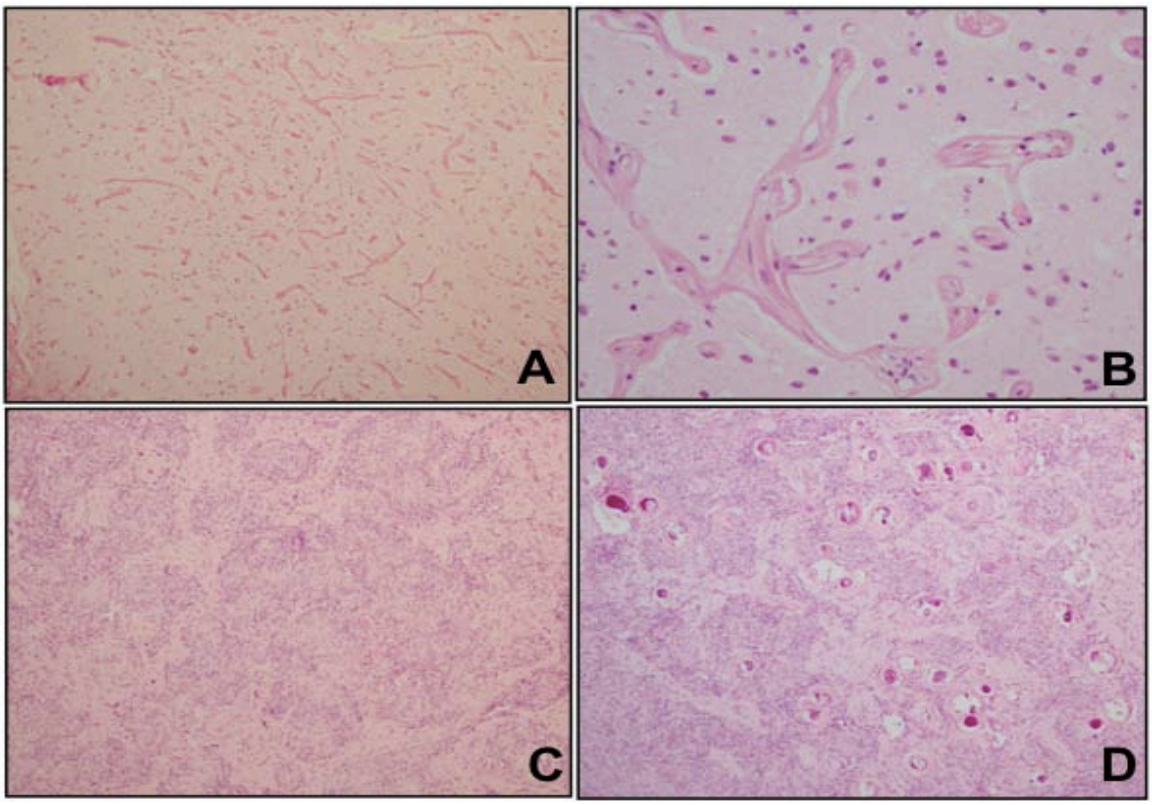

Figure 2: Microphotographs corresponding to histo-pathological study of surgical specimen of the left parietal cortex / sub-cortex stained with hematoxylin and eosin (H & E), demonstrating the loss of the laminae of the neuronal population with numerous vascular channels (a X 10, b X 40), proliferation of arachnoid cells with ill-defined cyto-plasmic borders that formed swirls (c X 10) and abundant psammoma bodies (d X 10).

III. Discussion

At this time there are few descriptions of cases of spontaneous meningioangiomatosis with cortical dysplasia entailing epilepsy that is difficult to manage and refractory to medical treatment among persons between 3 and 30 years of age (1-4). Findings of imaging studies show single lesions mostly located in the frontal or parietal lobe, shown by histo-pathological study to display a proliferation meningothelial cells and vascular channels in the cortical / sub-cortical region associated with enlarged neurones disorganized in their dispersion: changes compatible with focal cortical dysplasia classified by the ILAE as Taylor type IIIc (International League against Epilepsy) (1-3).

Since its description in 1915 as an incidental finding in the autopsy of a patient with type 2 neurofibromatosis (4), spontaneous meningioangiomatosis has been described as a benign hamartomatous pathology that may or may not be associated with meningiomas (9, 10), an uncommon finding that affects the leptomeninges, the cerebral cortex, and less commonly the thalamus or the brainstem, principally manifesting with untreatable epilepsies in more than 80% of cases (4, 8, 10). Despite not clearly understanding the epileptogenic mechanism, the perilesional or extra lesional cortex are understood to be ictal onset zones as documented in intra-operative electro-corticographic studies that facilitate planning for surgical treatment (1).

Although findings from imaging studies are variable, single lesions with calcification are commonly observed in tomography studies, as are signal alterations in magnetic resonance that are consistent with hypo-intensity in T1, hyper-intensity in T2 and the FLAIR, and enhancements with the administration of contrast in T1 (5, 6): despite the high resolution images, it is difficult at this time to identify the presence of focal cortical dysplasia type IIIc associated with MA in preoperative studies (1). Magnetic resonance spectroscopy in the analysis of the spectrum of metabolites describes increased elevation of choline peak (cho) with a reduction of N-acetylaspartate peak (NAA), which is related to a cellular proliferation presumed to derive from meningothelial cells and/or fibroblasts around blood vessels in the cortex, which are associated with studies by positron emission tomography (PET) documenting focal hypermetabolism which may be suggested as a differential diagnosis MA (7). The principle differential diagnoses are low grade gliomas, arteriovenous malformations, and invasive malignant meningioma (4).

Despite its low frequency, the impact on the patient's quality of life due to resistance to anticonvulsant treatment makes surgical treatment key to controlling convulsive syndrome and the histo-pathological diagnosis, recognizing the importance of intra-operative electro-corticography for identifying the ictal onset zones for successful treatment of this disease (1), given that according to the literature only in 43% of cases do convulsions disappear in the long term (4, 8).

Conflicts of Interest

All authors declare that they have no conflict of interest.

Informed Consent

The publication of this article is subject to authorization by the parents of the patient.

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Ischemic Stroke among Young Adults Visiting a Referral Hospital in Ethiopia: The Impact of Rheumatic Heart Disease

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Abstract- *Background:* The burden of stroke in young adults appears to have increased significantly over the past few decades. The causes of ischemic stroke are long-standing hypertension, smoking, physical inactivity and poor dietary habit. But, the burden of stroke from rheumatic heart disease in young adults in Ethiopia is not well studied.

Methods: A retrospective chart review of all ischemic stroke patients presented to Tikur Anbessa specialized hospital from December 2011 to December 2015. Their demographic data and clinical characteristics were analyzed using descriptive statistics.

Result: A total of 161 patients with ischemic stroke were eligible for chart review, of which75 patients (46.6%) were female and 86 patients (53.4%) were male. The median age of patients was 60 years.

Keywords: *stroke, rheumatic heart disease, atrial fibrillation, young adults.*

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Menbeu Mohammed [α], Aklilu Azazh [σ] & Hossein Kalantari [ρ]

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Result: A total of 161 patients with ischemic stroke were eligible for chart review, of which75 patients (46.6%) were female and 86 patients (53.4%) were male. The median age of patients was 60 years. Among these patients 29 had valvular heart disease, 22 patients (13.7%) had rheumatic heart disease of which 16 patients (73%) were younger than 40 years and 18 patients (82%) had documented a trial fibrillation. Of the RHD patients, there was no risk factor identified other than their cardiac condition for there stroke syptoms.

Conclusion: More than a quarter of ischemic stroke patients were young adults. In the absence of other cardiovascular risk factors, the history of RF/RHD and its sequel appear to have caused their stroke symptoms. Appropriate early prevention methods should be strengthened to decrease the mortality, disability and morbidity from a stroke.

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I. Introduction

Stroke is the leading cause of death and disability world-wide. It is responsible for 10.8% of total deaths and 3.1% of the burden of disease in the world. And nearly 15% of stroke patients were young adults[1,2]. In Ethiopia, with the demographic and epidemiologic shift now occurring, none communicable diseases like stroke are increasing. The well known risk factors for stroke like MD, HTN, smoking and dislipidemia are not its major cause in young adults of Ethiopia. It is also reported their is double burden of disease in Ethiopia with still unresolved communicable disease and the increasing none communicable disease.[3]

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One of the communicable diseases cause for stroke is acute rheumatic fever (ARF) with its sequel, rheumatic heart disease (RHD) and its thromboembolic complications.

ARF, RHD was affecting the young population, reduced through preventative measures in the developed world, but it is still highly prevalent in developing countries due to lack of awareness, inadequate early diagnosis and treatment[4-9]. The prevalence of RHD in Ethiopia is estimated to be up to 60 per 1000 population in ages between16-20[10]. Valvular heart disease (VHD) and atrial fibrillation (AF) are the sequel of RHD and remain important risk factors for ischemic stroke[11-13]. Group A streptococcal throat infection is a well-known cause of bacterial pharyngitis that can lead to Acute Rheumatic Fever (ARF) with cardiac, brain, joint and kidney complications. The cardiac involvement can affect the heart valves, predisposing the patient of an increased risk of vegetations and subsequent damage to the leaflets. Complications such as RHD and nephritis are more common in children in the first ten years after infection[14,15]. These complications remain the causes of mortality to a single organism[16,17].

Approximately 20% of patients with RHD will suffer thromboembolic complications. A pooled analysis from different studies stated that in 39% of cases of RHD, embolization to the brain occurred[13]. Studies have estimated the overall mortality rate from emboli secondary to RHD to be 11-16%[18]. Recent reports show increasing trend in ischemic stroke among young adults[19]. But the associated factors were not well studied in Ethiopia. Given the risk of RHD as a cause of stroke in young, Identifying the burden and appropriate early intervention targeting the prevention and treatment of ARF would be the best approach. So studying the specifically the associated factor for stroke in young adults is important to improve the prevention effort for stroke. Hence this study aimed to descriptively quantify the occurrences of RHD in young stroke patients in the study hospital.

The Objective of the study was to describe the occurrence of stroke risk factors in young adults visiting Tikur Ambessa Specialized hospital emphasizing the impact of RHD.

II. Materials and Methods

a) Study Design and Setting

We conducted a cross-sectional retrospective chart review of all stroke patients who presented to Tikur Anbessa specialized hospital from December 2011 to December 2015. Tikur Anbassa specialized hospital is located in the capital city Addis Ababa. It is the largest tertiary care teaching hospital in Ethiopia. It has more than 800 admission beds and more than 5 million population coverage. The hospital provides both inpatient and outpatient services to patients referred from different small hospitals of the country. It is currently the hospital where advanced neurology and neurosurgical investigations and intervention are practiced. The hospital also houses the Ethiopian pediatric cardiac Center.

b) Data Collection

A standard questionnaire was prepared which have a variable including patient demography, stroke type, presence of associated factors, and characteristics of patients with RHD. All charts of the patients during study time ware reviewed. Patients were selected from the patient register. Once their charts were identified we screened the charts for completeness. The data collectors were emergency medicine year two residents. Data quality was maintained throughout the collection to a cleaning process by the investigators. Patients charts with no brain imaging results and those with hemorrhagic stroke were excluded from the study.

c) Data Analysis

Data were cleaned and transferred to SPSS version 20 for further analysis. The analysis was done using descriptive statistics. The definition for young age varies from 35 to 45, the age range between 13 to 40 years was arbitrarily chosen by the authors as young adult.

d) Ethical Consideration

The study protocol was reviewed, and written support was obtained from Addis Ababa University, school of medicine department of emergency medicine. Patient identification was not collected, and confidentiality of patients was maintained during data collection through the dissemination of the results.

III. Results

a) Demography and Clinical Data of Ischemic Stroke Patients

A total of 304 confirmed stroke patients were seen at the hospital between the years 2011-2015. Of which 161(53%), patients had ischemic stroke and their charts were complete for chart review. From the ischemic stroke patiens a total of 75 patients (46.6%) were female and 86 patients (53.4%) were male. The mean age of patients was 60 years minimum being 13 and maximum being 90 years. Over all 42 (26%) ischemic stroke patients were young adults. Twenty nine patients (16%) had echo-cardiographically documented VHD. The median age for patients with VHD was 35 years. Twenty two patients (75.8 %%) had echo-cardiographically documented rheumatic valvular heart disease. The rest was documented as either degenerative valvular lesion or non specific vavular lesion. At presentation 17(63%) of young ischemic stroke patients was in heart failure (CHF), 13 (15.6%) had hypertension and none of them were smokers. Mitral valve was the commonest isolated valve affected accounting 8 (27.6%) of the patients with abnormal valve. But majority of patients with valvular lesion 14 (48.8%) had multi-valvular involvement. See table one below.

Table 1: Age Stratified Demographics and Clinical Data of Ischemic Stroke Patients seen at TASH 2011-2015

Characteristics		13 - 40 Years	%	> 40 Years	%	Total
Sex	Male	21	24.4	65	75.6	86
	Female	21	28	54	72	75
Clinical Character	RHD	16	72.7	6	27.3	22
	VHD	16	55.2	13	44.8	29
	CHF	17	63	10	27	27
	HTN	13	15.6	71	84.5	84
	DM	5	19.2	21	80.8	26
	Smoker	0	0	3	100	3
	Atrial Fibrillation	17	43.6	22	56.4	39
Valve Involved	Mitral	3	37.5	5	62.5	8
	Aortic	1	14.3	6	85.7	7
	Multi-Valve Lesion	12	85.7	2	14.3	14

b) Characteristics of Ischemic Stroke Patients with Rheumatic Heart Disease

Of the 22 patients with RHD and ischemic stroke 16 patients (73%) were young adults. Of the patients who had VHD, 20 patients (69%) were younger than 40. Eighteen (82%) patients with VHD had both RHD as well as AF of which 14 patients (77.8%) were younger than 40 years. In terms of valve involved on the echocardiogram, 7 (24%) patients had isolated aortic valve involvement, 8 (27.6%) patients had isolated mitral

valve involvement and 14 (48.3%) patients had multiple valve involvement.

Regarding the possible risk factors for stroke in young adults with RHD patients, none of the patients had Diabetes mellitus, hypertension or lipid profile derangement and none of them were smokers. But all had valvular involvement. For detailed clinical data see Tables 2 and Figure 1 below.

Table 2: Associated Sequel of Rheumatic Heart Disease in Patients with Ischemic Stroke, TASH 2011-2015

Sequel of RHD	< 40 Years	%	> 40 Years	%	Total (100 %)
RHD and VHD	16	73	6	27	22
RHD and Afib	14	77.8	4	22.2	18
RHD and CHF	15	88.2	2	11.2	17
RHD, AFib and VHD	12	75	4	25	16
RHD, AFib and VHD, CHF	12	85.7	2	14.3	14

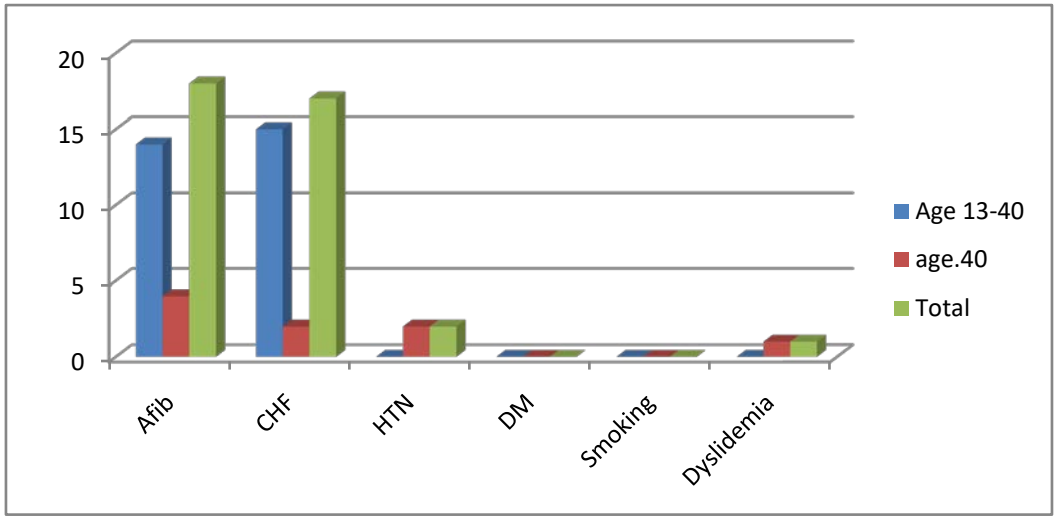

Fig. 1: Risk Factors Profile of Ischemic Stroke Patients with RHD, TASH, 2011-2015

IV. Discussion

This study has shown a slightly higher proportion of ischemic stroke occurrence in the study hospital. But, it is lower than the developed nations report (20). It has affected female more than male patients, 1:1.2. Twenty six percent of the patients were younger adults. This is higher than the 5% reports from the developed nation (21). The prevalence of valvular lesion in ischemic stroke patients was 16%, and more than a 75% of this valvular heart disease and stroke patients had rheumatic valvular damage. Our study also had showed 73% of the patients that had RHD and ischemic stroke were younger than 40 years. It appears, the only known risk factor for stroke in young adults with Rheumatic heart disease was their cardiac condition. This stroke with disabilities occurring at younger age leads not only to long-term care, but also reduces the number of young people entering the work force.

This study also shown the commonly involved isolated valves were mitral and aortic with Atrial fibrillation as a common rhythm problem detected. Similar to our study in a research in Estoniya atrial fibrillation was found in 48% of cardioembolic stroke patients. Researchers have shown nearly 100% of cases of pure Mitral stenosis (MS) are caused by RHD (22) and up to 80% of patients with systemic emboli with MS have atrial fibrillation. The relative risk of stroke is 15 times higher than in those with only one of MS and AF, but only six times higher for those with AF only, compared with the general population (23). Also thrombombolic complications from MS even in the absence of AF has been reported and is estimated to near 12% (24, 25).

The course on VHD in developing countries differs from that of the developed world similar to our study; a study from Asia had shown RHD is believed to be the cause of stroke in 23 % of the cases. But it was only 2.0 % in Europe and Northern America (26). In study in developed worled hypertention, dyslipidemia, and smoking were the most frequent risk factors for the stroke in youngs. In addition, in a population study in UK dissection of extra cranial arteries, premature atherosclerosis, migraine, and vasculitis were mentioned as causes for stroke in young, which were not found in our study patients (27). This discrepancy can be caused by the preventive effort made in the developed nation.

Given the high morbidity and mortality from RHD and its complications, efforts should be geared towards preventive measures in fighting the inciting

infective cause. Penicillin remains an effective medical treatment. It works as Primary prevention directed towards group. A streptococcal infection and secondary prevention of recurrence (28, 29). Tertiary management addresses the clinical consequences of established RHD and involves surgical management. Anticoagulation is also strongly recommended for patients with AF as well as those with MS with normal sinus rhythm (30, 31). Small studies have suggested that primary prevention of rheumatic fever is a cost- effective way of dealing with RHD. Of all the recommendations primary prevention appears to be the best approach in combating RHD and its squeal like stroke especially in the developing world, including Ethiopia.

V. Limitation

Not all patients had available and complete charts leading to a small sample size. Study was limited to data from one hospital only. Selection bias is another limiting factor as we only evaluated patients that presented to one hospital. These patients may not reflect the total stroke patients in other hospitals or in the country. No mortality outcome evaluated in this study.

VI. Conclusion

In the absence of other cardiovascular risk factors, the history of RF/RHD and its sequel appear to have caused the stroke symptoms in our patient cohort. RHD and its sequels serve as a significant risk factor for stroke in young adults and early effective preventive measures are needed to combat the problem.

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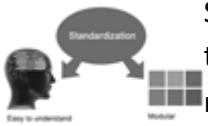

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Once you are designated as MARSM, you may send us a scanned copy of all of your credentials. OARS will verify, grade and certify them. This will be based on your academic records, quality of research papers published by you, and some more criteria.

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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).

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

The Institute will be entitled to following benefits:

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

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

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

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

The Board can also play vital role by exploring and giving valuable suggestions regarding the Standards of "Open Association of Research Society, U.S.A (OARS)" so that proper amendment can take place for the benefit of entire research community. We shall provide details of particular standard only on receipt of request from the Board.

The board members can also join us as Individual Fellow with 40% discount on total fees applicable to Individual Fellow. They will be entitled to avail all the benefits as declared. Please visit Individual Fellow-sub menu of GlobalJournals.org to have more relevant details.

We shall provide you intimation regarding launching of e-version of journal of your stream time to time. This may be utilized in your library for the enrichment of knowledge of your students as well as it can also be helpful for the concerned faculty members.

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

The following entitlements are applicable to individual Fellows:

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

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

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

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

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

- The professional accredited with Fellow honor, is entitled to various benefits viz. name, fame, honor, regular flow of income, secured bright future, social status etc.

- In addition to above, if one is single author, then entitled to 40% discount on publishing research paper and can get 10%discount if one is co-author or main author among group of authors.
- The Fellow can organize symposium/seminar/conference on behalf of Global Journals Incorporation (USA) and he/she can also attend the same organized by other institutes on behalf of Global Journals.
- The Fellow can become member of Editorial Board Member after completing 3yrs.
- The Fellow can earn 60% of sales proceeds from the sale of reference/review books/literature/publishing of research paper.
- Fellow can also join as paid peer reviewer and earn 15% remuneration of author charges and can also get an opportunity to join as member of the Editorial Board of Global Journals Incorporation (USA)
- • This individual has learned the basic methods of applying those concepts and techniques to common challenging situations. This individual has further demonstrated an in–depth understanding of the application of suitable techniques to a particular area of research practice.

Note :

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- 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.

"

Preferred Author Guidelines

We accept the manuscript submissions in any standard (generic) format.

We typeset manuscripts using advanced typesetting tools like Adobe In Design, CorelDraw, TeXnicCenter, and TeXStudio. We usually recommend authors submit their research using any standard format they are comfortable with, and let Global Journals do the rest.

Alternatively, you can download our basic template from https://globaljournals.org/Template

Authors should submit their complete paper/article, including text illustrations, graphics, conclusions, artwork, and tables. Authors who are not able to submit manuscript using the form above can email the manuscript department at submit@globaljournals.org or get in touch with chiefeditor@globaljournals.org if they wish to send the abstract before submission.

Before and during Submission

Authors must ensure the information provided during the submission of a paper is authentic. Please go through the following checklist before submitting:

1. Authors must go through the complete author guideline and understand and *agree to Global Journals' ethics and code of conduct,* along with author responsibilities.
2. Authors must accept the privacy policy, terms, and conditions of Global Journals.
3. Ensure corresponding author's email address and postal address are accurate and reachable.
4. Manuscript to be submitted must include keywords, an abstract, a paper title, co-author(s') names and details (email address, name, phone number, and institution), figures and illustrations in vector format including appropriate captions, tables, including titles and footnotes, a conclusion, results, acknowledgments and references.
5. Authors should submit paper in a ZIP archive if any supplementary files are required along with the paper.
6. Proper permissions must be acquired for the use of any copyrighted material.
7. Manuscript submitted *must not have been submitted or published elsewhere* and all authors must be aware of the submission.

Declaration of Conflicts of Interest

It is required for authors to declare all financial, institutional, and personal relationships with other individuals and organizations that could influence (bias) their research.

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Plagiarized content will not be considered for publication. We reserve the right to inform authors' institutions about plagiarism detected either before or after publication. If plagiarism is identified, we will follow COPE guidelines:

Authors are solely responsible for all the plagiarism that is found. The author must not fabricate, falsify or plagiarize existing research data. The following, if copied, will be considered plagiarism:

- Words (language)
- Ideas
- Findings
- Writings
- Diagrams
- Graphs
- Illustrations
- Lectures

- Printed material
- Graphic representations
- Computer programs
- Electronic material
- Any other original work

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2. Drafting the paper and revising it critically regarding important academic content.
3. Final approval of the version of the paper to be published.

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The corresponding author should mention the name and complete details of all co-authors during submission and in manuscript. We support addition, rearrangement, manipulation, and deletions in authors list till the early view publication of the journal. We expect that corresponding author will notify all co-authors of submission. We follow COPE guidelines for changes in authorship.

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Appealing Decisions

Unless specified in the notification, the Editorial Board's decision on publication of the paper is final and cannot be appealed before making the major change in the manuscript.

Acknowledgments

Contributors to the research other than authors credited should be mentioned in Acknowledgments. The source of funding for the research can be included. Suppliers of resources may be mentioned along with their addresses.

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Preparing your Manuscript

Authors can submit papers and articles in an acceptable file format: MS Word (doc, docx), LaTeX (.tex, .zip or .rar including all of your files), Adobe PDF (.pdf), rich text format (.rtf), simple text document (.txt), Open Document Text (.odt), and Apple Pages (.pages). Our professional layout editors will format the entire paper according to our official guidelines. This is one of the highlights of publishing with Global Journals—authors should not be concerned about the formatting of their paper. Global Journals accepts articles and manuscripts in every major language, be it Spanish, Chinese, Japanese, Portuguese, Russian, French, German, Dutch, Italian, Greek, or any other national language, but the title, subtitle, and abstract should be in English. This will facilitate indexing and the pre-peer review process.

The following is the official style and template developed for publication of a research paper. Authors are not required to follow this style during the submission of the paper. It is just for reference purposes.

Manuscript Style Instruction (Optional)

- Microsoft Word Document Setting Instructions.
- Font type of all text should be Swis721 Lt BT.
- Page size: 8.27" x 11'", left margin: 0.65, right margin: 0.65, bottom margin: 0.75.
- Paper title should be in one column of font size 24.
- Author name in font size of 11 in one column.
- Abstract: font size 9 with the word "Abstract" in bold italics.
- Main text: font size 10 with two justified columns.
- Two columns with equal column width of 3.38 and spacing of 0.2.
- First character must be three lines drop-capped.
- The paragraph before spacing of 1 pt and after of 0 pt.
- Line spacing of 1 pt.
- Large images must be in one column.
- The names of first main headings (Heading 1) must be in Roman font, capital letters, and font size of 10.
- The names of second main headings (Heading 2) must not include numbers and must be in italics with a font size of 10.

Structure and Format of Manuscript

The recommended size of an original research paper is under 15,000 words and review papers under 7,000 words. Research articles should be less than 10,000 words. Research papers are usually longer than review papers. Review papers are reports of significant research (typically less than 7,000 words, including tables, figures, and references)

A research paper must include:

a) A title which should be relevant to the theme of the paper.
b) A summary, known as an abstract (less than 150 words), containing the major results and conclusions.
c) Up to 10 keywords that precisely identify the paper's subject, purpose, and focus.
d) An introduction, giving fundamental background objectives.
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.
f) Results which should be presented concisely by well-designed tables and figures.
g) Suitable statistical data should also be given.
h) All data must have been gathered with attention to numerical detail in the planning stage.

Design has been recognized to be essential to experiments for a considerable time, and the editor has decided that any paper that appears not to have adequate numerical treatments of the data will be returned unrefereed.

i) Discussion should cover implications and consequences and not just recapitulate the results; conclusions should also be summarized.
j) There should be brief acknowledgments.
k) There ought to be references in the conventional format. Global Journals recommends APA format.

Authors should carefully consider the preparation of papers to ensure that they communicate effectively. Papers are much more likely to be accepted if they are carefully designed and laid out, contain few or no errors, are summarizing, and follow instructions. They will also be published with much fewer delays than those that require much technical and editorial correction.

The Editorial Board reserves the right to make literary corrections and suggestions to improve brevity.

Format Structure

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

All manuscripts submitted to Global Journals should include:

Title

The title page must carry an informative 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) where the work was carried out.

Author details

The full postal address of any related author(s) must be specified.

Abstract

The abstract is the foundation of the research paper. It should be clear and concise and must contain the objective of the paper and inferences drawn. It is advised to not include big mathematical equations or complicated jargon.

Many researchers searching for information online will use search engines such as Google, Yahoo or others. By optimizing your paper for search engines, you will amplify the chance of someone finding it. In turn, this will make it more likely to be viewed and cited in further works. Global Journals has compiled these guidelines to facilitate you to maximize the web-friendliness of the most public part of your paper.

Keywords

A major lynchpin of research work for the writing of research papers is the keyword search, which one will employ to find both library and internet resources. Up to eleven keywords or very brief phrases have to be given to help data retrieval, mining, and indexing.

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

Choice of the main keywords is the first tool of writing a research paper. Research paper writing is an art. Keyword search should be as strategic as possible.

One should start brainstorming lists of potential keywords before even beginning 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 a research paper?” Then consider synonyms for the important words.

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

Numerical Methods

Numerical methods used should be transparent and, where appropriate, supported by references.

Abbreviations

Authors must list all the abbreviations used in the paper at the end of the paper or in a separate table before using them.

Formulas and equations

Authors are advised to submit any mathematical equation using either MathJax, KaTeX, or LaTeX, or in a very high-quality image.

Tables, Figures, and Figure Legends

Tables: Tables should be 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. Authors must submit tables in an editable format and not as images. References to these tables (if any) must be mentioned accurately.

Figures

Figures are supposed to be submitted as separate files. Always include a citation in the text for each figure using Arabic numbers, e.g., Fig. 4. Artwork must be submitted online in vector electronic form or by emailing it.

Preparation of Eletronic Figures for Publication

Although low-quality images are sufficient for review purposes, print publication requires high-quality images to prevent the final product being blurred or fuzzy. Submit (possibly by e-mail) EPS (line art) or TIFF (halftone/ photographs) files only. MS PowerPoint and Word Graphics are unsuitable for printed pictures. Avoid using pixel-oriented software. Scans (TIFF only) should have a resolution of at least 350 dpi (halftone) or 700 to 1100 dpi (line drawings). 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.

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Tips for writing a good quality Medical Research Paper

1. Choosing the topic: In most cases, the topic is selected by the interests of the author, but it can also be suggested by the guides. You can have several topics, and then judge which you are most comfortable with. This may be done by asking several questions of yourself, like "Will I be able to carry out a search in this area? Will I find all necessary resources to accomplish the search? Will I be able to find all information in this field area?" If the answer to this type of question is "yes," then you ought to choose that topic. In most cases, you may have to conduct surveys and visit several places. Also, you might have to do a lot of work to find all the rises and falls of the various data on that subject. Sometimes, detailed information plays a vital role, instead of short information. Evaluators are human: The first thing to remember is that evaluators are also human beings. They are not only meant for rejecting a paper. They are here to evaluate your paper. So present your best aspect.

2. Think like evaluators: If you are in confusion or getting demotivated because your paper may not be accepted by the evaluators, then think, and try to evaluate your paper like an evaluator. Try to understand what an evaluator wants in your research paper, and you will automatically have your answer. 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.

3. Ask your guides: If you are having any difficulty with your research, then do not hesitate to share your difficulty with your guide (if you have one). They will surely help you out and resolve your doubts. If you can't clarify what exactly you require for your work, then ask your supervisor to help you with an alternative. He or she might also provide you with a list of essential readings.

4. Use of computer is recommended: As you are doing research in the field of medical research then this point is quite obvious. Use right software: Always use good quality software packages. If you are not capable of judging good software, then you can lose the quality of your paper unknowingly. There are various programs available to help you which you can get through the internet.

5. Use the internet for help: An excellent start for your paper is using Google. It is a wondrous search engine, where you can have your doubts resolved. You may also read some answers for the frequent question of how to write your research paper or find a model research paper. You can download books from the internet. If you have all the required books, place importance on reading, selecting, and analyzing the specified information. Then sketch out your research paper. Use big pictures: You may use encyclopedias like Wikipedia to get pictures with the best resolution. At Global Journals, you should strictly follow here.

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

7. Revise what you wrote: When you write anything, always read it, summarize it, and then finalize it.

8. Make every effort: Make every effort to mention what you are going to write in your paper. That means always have a good start. Try to mention everything in the introduction—what is the need for a particular research paper. Polish your work with good writing skills and always give an evaluator what he wants. Make backups: When you are going to do any important thing like making a research paper, you should always have backup copies of it either on your computer or on paper. This protects you from losing any portion of your important data.

9. Produce good diagrams of your own: Always try to include good charts or diagrams in your paper to improve quality. Using several unnecessary diagrams will degrade the quality of your paper by creating a hodgepodge. So always try to include diagrams which were made by you to improve the readability of your paper. Use of direct quotes: When you do research relevant to literature, history, or current affairs, then use of quotes becomes essential, but if the study is relevant to science, use of quotes is not preferable.

10. Use proper verb tense: Use proper verb tenses in your paper. Use past tense to present those events that have happened. Use present tense to indicate events that are going on. Use future tense to indicate events that will happen in the future. Use of wrong tenses will confuse the evaluator. Avoid sentences that are incomplete.

11. Pick a good study spot: Always try to pick a spot for your research which is quiet. Not every spot is good for studying.

12. Know what you know: Always try to know what you know by making objectives, otherwise you will be confused and unable to achieve your target.

13. Use good grammar: Always use good grammar and words that will have a positive impact on the evaluator; use of good vocabulary does not mean using tough words which the evaluator has to find in a dictionary. Do not fragment sentences. Eliminate one-word sentences. Do not ever use a big word when a smaller one would suffice.

Verbs have to be in agreement with their subjects. In a research paper, do not start sentences with conjunctions or finish them with prepositions. When writing formally, it is advisable to never split an infinitive because someone will (wrongly) complain. Avoid clichés like a disease. Always shun irritating alliteration. Use language which is simple and straightforward. Put together a neat summary.

14. 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 for your topic. You may also maintain your arguments with records.

15. Never start at the last minute: Always allow enough time for research work. Leaving everything to the last minute will degrade your paper and spoil your work.

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

17. Never copy others' work: Never copy others' work and give it your name because if the evaluator has seen it anywhere, you will be in trouble. Take proper rest and food: No matter how many hours you spend on your research activity, if you are not taking care of your health, then all your efforts will have been in vain. For quality research, take proper rest and food.

18. Go to seminars: Attend seminars if the topic is relevant to your research area. Utilize all your resources.

19. Refresh your mind after intervals: Try to give your mind a rest by listening to soft music or sleeping in intervals. This will also improve your memory. Acquire colleagues: Always try to acquire colleagues. No matter how sharp you are, if you acquire colleagues, they can give you ideas which will be helpful to your research.

20. Think technically: Always think technically. If anything happens, search for its reasons, benefits, and demerits. Think and then print: When you go to print your paper, check that tables are not split, headings are not detached from their descriptions, and page sequence is maintained.

21. Adding unnecessary information: Do not add unnecessary information like "I have used MS Excel to draw graphs." Irrelevant and inappropriate material is superfluous. Foreign terminology and phrases are not apropos. One should never take a broad view. Analogy is like feathers on a snake. Use words properly, regardless of how others use them. Remove quotations. Puns are for kids, not grunt readers. Never oversimplify: When adding material to your research paper, never go for oversimplification; this will definitely irritate the evaluator. Be specific. Never use rhythmic redundancies. Contractions shouldn't be used in a research paper. Comparisons are as terrible as clichés. Give up ampersands, abbreviations, and so on. Remove commas that are not necessary. Parenthetical words should be between brackets or commas. Understatement is always the best way to put forward earth-shaking thoughts. Give a detailed literary review.

22. Report concluded results: Use concluded results. From raw data, filter the results, and then conclude your studies based on measurements and observations taken. An appropriate number of decimal places should be used. Parenthetical remarks are prohibited here. Proofread carefully at the final stage. At the end, give an outline to your arguments. Spot perspectives of further study of the subject. Justify your conclusion at the bottom sufficiently, which will probably include examples.

23. Upon 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 for 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 of 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 criteria peer reviewers will use for grading the final paper.

Final points:

One purpose of organizing a research paper is to let people interpret your efforts selectively. The journal requires the following sections, submitted in the order listed, with each section starting on a new page:

The introduction: This will be compiled from reference matter and reflect the design processes or outline of basis that directed you to make a study. As you carry out the process of study, the method and process section will be constructed like that. The results segment will show related statistics in nearly sequential order and direct reviewers to similar intellectual paths throughout the data that you gathered to carry out your study.

The discussion section:

This will provide understanding of the data and projections as to the implications of the results. The use of good quality references throughout the paper will give the effort trustworthiness by representing an alertness to 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 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 avoid:

- Insertion of a title at the foot of a page with subsequent text on the next page.
- Separating a table, chart, or figure—confine each to a single page.
- Submitting a manuscript with pages out of sequence.
- In every section of your document, use standard writing style, including articles ("a" and "the").
- Keep paying attention to the topic of the paper.
- Use paragraphs to split each significant point (excluding the abstract).
- Align the primary line of each section.
- Present your points in sound order.
- Use present tense to report well-accepted matters.
- Use past tense to describe specific results.
- Do not use familiar wording; don't address the reviewer directly. Don't use slang or superlatives.
- Avoid use of extra pictures—include only those figures essential to presenting results.

Title page:

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

Abstract: This summary should be two hundred words or less. It should clearly and briefly explain the key findings reported in the manuscript and must have precise statistics. It should not have acronyms or abbreviations. It should be logical in itself. Do not cite 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 approaches 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. Use comprehensive sentences, and do not sacrifice readability for brevity; you can maintain it succinctly by phrasing sentences so that they provide more than a 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 limit the initial two items to no more than one line each.

Reason for writing the article—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 for this; results of any numerical analysis should be reported. Significant conclusions or questions that emerge from the research.

Approach:

- Single section and succinct.
- An outline of the job done is always written in past tense.
- Concentrate on shortening results—limit background information to a verdict or two.
- Exact spelling, clarity 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 of comprehending and calculating the purpose of your study without having to refer to other works. The basis for the study should be offered. Give the most important references, but avoid making a comprehensive appraisal of the topic. Describe the problem visibly. If the problem is not acknowledged in a logical, reasonable way, the reviewer will give no attention to your results. Speak in common terms about techniques used to explain the problem, if needed, but do not present any particulars about the protocols here.

The following approach can create a valuable beginning:

- Explain the value (significance) of the study.
- Defend the model—why did you employ this particular system or method? What is its compensation? Remark upon its appropriateness from an abstract point of view as well as pointing out sensible reasons for using it.
- Present a justification. State your particular theory(-ies) or aim(s), and describe the logic that led you to choose them.
- Briefly explain the study's tentative purpose and how it meets 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 for every section. If you make the four points listed above, you will need at least four paragraphs. Present surrounding information only when it is necessary to support a situation. The reviewer does not desire to read everything you know about a topic. Shape the theory 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 soundly written procedures segment allows a capable scientist to replicate 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 to give the least amount of information that would permit another capable scientist to replicate 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 section, mention the specific item describing the way, but draw the basic principle while stating the situation. The purpose is to show 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:

Materials may be reported in part of a section or else they may be recognized along with your measures.

Methods:

- Report the method and not the 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—detail how procedures were completed, not how they were performed on a particular day.
- If well-known procedures were used, account for the procedure by name, possibly with a reference, and that's all.

Approach:

It is embarrassing to use vigorous voice when documenting methods without using first person, which would focus the reviewer's interest on the researcher rather than the job. As a result, when writing up the methods, most authors use third person passive voice.

Use standard style in this and 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 as 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. Use statistics and tables, if suitable, to present consequences most efficiently.

You must clearly differentiate material which would usually be incorporated in a study editorial from any unprocessed data or additional appendix matter that would not be available. In fact, such matters should not be submitted at all except if requested by the instructor.

Content:

- Sum up your conclusions in text and demonstrate them, if suitable, with figures and tables.
- In the manuscript, explain each of your consequences, and point the reader to remarks that are most appropriate.
- Present a background, such as by describing the question that was addressed by creation of an exacting study.
- Explain results of control experiments and give 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 manuscript.

What to stay away from:

- Do not discuss or infer your outcome, report surrounding information, or try to explain anything.
- Do not include raw data or intermediate calculations in a research manuscript.
- Do not present similar data more than once.
- A manuscript should complement any figures or tables, not duplicate information.
- Never confuse figures with tables—there is a difference.

Approach:

As always, use past tense when you submit 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 section.

Figures and tables:

If you put figures and tables at the end of some details, make certain that they are visibly distinguished from any attached appendix materials, such as raw facts. Whatever the position, each table must be titled, numbered one after the other, and include a heading. All figures and tables must be divided from the text.

Discussion:

The discussion is expected to be the trickiest segment to write. A lot of papers submitted to the journal are discarded based on problems with the discussion. There is no rule for how long an 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 implications of the study. The purpose here is to offer an understanding of your results and support all of your conclusions, using facts from your research and generally accepted information, if suitable. The implication of results should be fully 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 the prospect, and let it drop at that. Make a decision as to whether each premise is supported or 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 an experiment might be personalized to accomplish a new idea.
- Give details of all of your remarks as much as possible, focusing on mechanisms.
- Make a decision as to whether the tentative design sufficiently addressed the theory and whether or not it was correctly restricted. Try to present substitute explanations if they are sensible alternatives.
- One piece of 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 other available information. Present work done by specific persons (including you) in past tense.

Describe generally acknowledged facts and main beliefs in present tense.

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

INDEX

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