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Preface

We would like to present, with great pleasure, the inaugural volume-8, Issue-3, March 2022, of a scholarly journal, *International Multispeciality Journal of Health*. This journal is part of the AD Publications series *in the field of Medical, Health and Pharmaceutical Research Development*, and is devoted to the gamut of Medical, Health and Pharmaceutical issues, from theoretical aspects to application-dependent studies and the validation of emerging technologies.

This journal was envisioned and founded to represent the growing needs of Medical, Health and Pharmaceutical as an emerging and increasingly vital field, now widely recognized as an integral part of scientific and technical statistics investigations. Its mission is to become a voice of the Medical, Health and Pharmaceutical community, addressing researchers and practitioners in below areas

Clinical Specialty and Super-specialty Medical Science:

It includes articles related to General Medicine, General Surgery, Gynecology & Obstetrics, Pediatrics, Anesthesia, Ophthalmology, Orthopedics, Otorhinolaryngology (ENT), Physical Medicine & Rehabilitation, Dermatology & Venereology, Psychiatry, Radio Diagnosis, Cardiology Medicine, Cardiothoracic Surgery, Neurology Medicine, Neurosurgery, Pediatric Surgery, Plastic Surgery, Gastroentrology, Gastrointestinal Surgery, Pulmonary Medicine, Immunology & Immunogenetics, Transfusion Medicine (Blood Bank), Hematology, Biomedical Engineering, Biophysics, Biostatistics, Biotechnology, Health Administration, Health Planning and Management, Hospital Management, Nephrology, Urology, Endocrinology, Reproductive Biology, Radiotherapy, Oncology and Geriatric Medicine.

Para-clinical Medical Science:

It includes articles related to Pathology, Microbiology, Forensic Medicine and Toxicology, Community Medicine and Pharmacology.

Basic Medical Science:

It includes articles related to Anatomy, Physiology and Biochemistry.

Spiritual Health Science:

It includes articles related to Yoga, Meditation, Pranayam and Chakra-healing.

Each article in this issue provides an example of a concrete industrial application or a case study of the presented methodology to amplify the impact of the contribution. We are very thankful to everybody within

that community who supported the idea of creating a new Research with *IMJ Health*. We are certain that this issue will be followed by many others, reporting new developments in the Medical, Health and Pharmaceutical Research Science field. This issue would not have been possible without the great support of the Reviewer, Editorial Board members and also with our Advisory Board Members, and we would like to express our sincere thanks to all of them. We would also like to express our gratitude to the editorial staff of AD Publications, who supported us at every stage of the project. It is our hope that this fine collection of articles will be a valuable resource for *IMJ Health* readers and will stimulate further research into the vibrant area of Medical, Health and Pharmaceutical Research.

Dr. Kusum Gaur
(Chief Editor)

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Dr. Kusum Gaur working as professor Community Medicine and member of Research Review Board of Sawai Man Singh Medical College, Jaipur (Raj) India.

She has awarded with WHO Fellowship for IEC at Bangkok. She has done management course from NIHFW. She has published and present many research paper in India as well as abroad in the field of community medicine and medical education. She has developed Socio-economic Status Scale (Gaur's SES) and Spiritual Health Assessment Scale (SHAS). She is 1st author of a book entitled " Community Medicine: Practical Guide and Logbook.

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Research Area: His area of Interest are Epidemiology, Biostatistics and Spiritual Health.

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Research Area: Brachytherapy, Total Skin Electron Irradiation, Palliative Radiotherapy, Stereotactic & Conformal radiotherapy, Radiation Cell Biology, Cancer Genetics.

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Research Area: Pediatric Surgery & Laparoscopy.

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He is recipient of WHO Fellowship award on Poison Patient Management at Vietnam. He is resource faculty for Experimental Toxicology and Basic Course for Medical Education. He is presented and published a lot of research articles at national and international level.

Research Area: PHARMACOLOGY.

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He has about 50 international and national publications to his credit. He has held various positions in the Association of Minimal Access Surgeons of India (AMASI) from time to time. He has also acted as instructor of various AMASI skill courses held at different places in India. He has established Surgical Technique learning centre at GMCH Chandigarh for imparting training to the budding surgeons in the field of minimal access surgery. He is also the reviewer in the subject in various journals.

Research Area: Minimal Access Surgery.

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She is Presently working as assistant professor in the department of Anatomy, GMCH, Chandigarh. She has many publications in various national and international journals. She is executive member of Anatomical Society of India (ASI) and North Chapter of ASI. She is also a member of editorial board of Journal of Medical College Chandigarh.

Research Area: Congenital Malformation, Developmental Anatomy.

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Dr. Mahesh Sharma is a Principle specialist General Surgery in Rajasthan State Government, India. He has been PMO of district hospitals for more than 15 years. He has gone abroad as observer of many of training related to his speciality. He has published and present many research paper in India as well as abroad.
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Research Area: General Surgery, Health and Hospital management and Spiritual Health.

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Dr. Praveen Mathur

Dr. Praveen Mathur is working as Professor- Pediatric Surgery and is recipient of Commonwealth Fellowship in Pediatric Laparoscopy from Uk and fellowship award in minimal access Surgery (FMAS). He has done Clinical observer ship in the Department of Pediatric Surgery, Johns Hopkins University, Baltimore, USA. (2008). He has presented and published a number of research articles at national and international level. He is reviewer of prestigious Journal of Pediatric Surgery (JPS) and World Journal of Gastroenterology, Journal of neonatal Surgery (JNS).

Research Area: Pediatric Surgery & Laparoscopy.

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Validity of IMPACT-S for Assessing Activities and Participation in patients with Carpal Tunnel Syndrome

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Abstract—

Objective of the study:

The study aims to establish whether IMPACT-S is an apt measure for assessing activities and participation in Carpal Tunnel Syndromepatients.

Significance of the study:

Carpal Tunnel Syndrome is one of the commonest entrapment neuropathies leading to marked activity and participation limitations. IMPACT-S is based on the ICF framework for assessing the functional involvement of the subject in terms of activities and participation. The current study focuses on establishing its validity of measuring activities and participation in patients with Carpal Tunnel Syndrome which will help clinicians and researchers use IMPACT-S for CTS patients.

Hypothesis:

Null Hypothesis: *There is no validity of IMPACT-S for functional evaluation of Carpal Tunnel Syndrome patients.*

Alternate Hypothesis: *IMPACT-S is a valid tool for functional evaluation in Carpal Tunnel Syndrome patients.*

Operational Definitions:

Validity: *The psychometric property of a tool to measure what it is intended to (Singh et al, 2014).*

ICF: *WHO recommends the International Classification of Functioning (ICF) as a comprehensive measure for assessing and rehabilitating patients (2007).*

IMPACT-S: *ICF Measure of Participation and Activities – Screener (IMPACT-S) is a self- measure tool for assessing functioning and disability in pateients (Post et.al, 2008).*

BCTQ: *The Boston Carpal Tunnel Questionnaire is a standardised a scale for assessment of CTS severity and functional ability (Fischer et.al 2014).*

Keywords: IMPACT-S tool, Carpal Tunnel Syndromepatients, ICF framework, CTS patients.

I. INTRODUCTION

The upper extremity terminates at the hand which serves as a linkage between the body and the surroundings and any restrictions in its functioning results in ADL (Activities of Daily Living) limitations [21]. Nerve damage occurring at stenotic anatomical structures is known as Entrapment neuropathy. Entrapments neuropathies are a common diagnosis in a clinical setting [13] and are often a cause for stress having physical, psychological and financial ramifications for the patients [6]. Carpal tunnel Syndrome frequently known as CTS is one of the most commonly encountered neuropathy of the upper-limb resulting in pain and disability of the hand. CTS usually results from compression of the carpal tunnel underneath the flexor retinaculum impinging the median nerve between the carpal bones and the flexor retinaculum, i.e. Carpal tunnel [6]. CTS is frequently associated with a specific set of signs and symptoms like numbness of the hand, burning pain in the palm and the

thumb, index and middle fingers, along with reduced grip strength[15]. The pain and disability experienced by the patients oftentimes is continuous with swelling, loss of motor control and weak grip due to thenar muscle atrophy in chronic disease stage [26]. Patients with CTS were found to have an association with age, female gender and high BMI [6].

CTS represent a large burden on occupational health with both social as well as economic ramifications [19]. A literature analysis through bibliometric investigation of articles on carpal tunnel syndrome (CTS) was carried out for a period of 35 years and shows CTS cases are increasing day by day, as more people are working on flat surfaced boards like keyboards of computers or musical instruments [18]. Other reasons for CTS include diabetes, thyroid dysfunction and autoimmune disease etc [12]. Profoundly more literature is attributed to female patients than their male counterparts [18].

Boston questionnaire or commonly called the Carpal Tunnel (formerly Levine) questionnaire serves as a common tool during CTS patient evaluation that can be used to indicate patient disability and the functional performance [9]. The scale was formulated initially by Levine et al., in 1993 as a self-administered, self-report questionnaire, with validity for disease specific outcome score for CTS and has two subscales for symptoms and functions [9]. Thus the scale has been found to be helpful for effectively and objectively assessing the symptom severity and functional status of subjects with CTS [9]. The scale was reported to have good reproducibility, internal consistency and responsiveness to clinical change [9].

The World Health Organization (WHO) proposed the adoption a system that allows the description and comparison of health in various populations in the year 2001. There were two systems; the International Classification of Disease and the International Classification of Functioning, Disability and Health (ICF). The former is an etiologic based disease classification system while the latter (ICF) is based on disability and functioning [23].With the approval by WHO in 2001, the ICIDH was revised and the International Classification of Functioning Disability and Health (ICF) was established [16]. Stier-Jarmer, 2009 described the role of ICF as a useful tool for assessment of severity and prognosis of musculoskeletal conditions; and as indicators for health, economy [24], along with education, insurance, labour health, disability policy and others [25] and as disease outcome measures [24].

IMPACT-S is the ICF Measure of Participation and Activities- Screener. The scale was developed according to the ICF (International Classification of Functioning, Disability and Health) [17]. ICF describes the interaction between disease/ conditions and the contextual factors as Dynamic in nature. ICF can be used to evaluate the functioning and disability of an individual [32]. IMPACT-S is an ICF based self-administered measure for assessing functioning and disability [17]. IMPACT-S has wide applications and can be used for assessment of healthcare needs as well as outcome measurement for healthcare [17]. IMPACT-S has shown to have good reliability and validity for measuring the constraints in activity and participation of daily life as per the ICF framework [17]. IMPACT-S scoring between 29% and 83% indicates 'no limitation/ restriction', between 13% to 45% indicates 'some limitation/ restriction' and between 3% to 34% indicates 'serious limitation/ restriction'[17].

Validity of a criterion describes the extent to which a tool measures what it is supposed to. Validity can be of three types: Content, Criterion –related and Construct Validity. Content validity is the degree to which the tool is adequate for the respective usage. Criterion-related validity indicates the prediction probability of an outcome or a condition. Construct validity indicates the level to which the predicted correlations match the theoretical hypothesis [3].

The IMPACT-S scale is based on ICF format and can be helpful to use new outcome measures for CTS patients. The validity of IMPAC-S has not been estimated for CTS patients. The current study is aimed at to evaluating the validity of IMPACT-S as a valid tool for patients with CTS by comparing with standardized BCTQ scale specifically among patients with diagnosed Carpal Tunnel Syndrome to assess CTS patients. This study will be in agreement with the suggestion given by Post et.al, 2008 recommending that validity be established for IMPACT-S for other clinical conditions.

II. LITERATURE REVIEW

- **Melissa Airem Cazares-Manríquez, Claudia Camargo Wilson, Ricardo Vardasca, Jorge Luis García-Alcaraz, Jesús Everardo Olguín-Tiznado, Juan Andrés López-Barreras and Blanca Rosa García-Rivera (2020)** conducted a literature review for better understanding the association between risk factors and CTS. These risk factors can age, gender, BMI, hand dominance, abdomen size and vitals to better understand the risk factors most commonly associated with CTS. Of the 72 articles studied, it was concluded that CTS has high associations with age, female sex and high BMI.
- **S.Ram (2019)** conducted a retrospective study to assess the recent developments in the literature based on those published on CTS during 1983 to 2017. It was concluded that middle aged population is more prone to the CTS and the

female gender has higher incidence than Males. The study suggested that CTS appears to be an occupational disease, a large population around the globe working on computer or keyboards have been reported to be have CTS.

- **Jochen Fischer, Neville W. Thompson, John W. K. Harrison (2014)**in their study checked the validity of a scale for the disease severity rating and ability of Carpal Tunnel Syndrome patients. Out of the 38 patients that underwent surgery, only 26 patients reported any positive recovery after 3 months of the surgery. The study concluded that the scale has good reproducibility, consistency and clinical responsiveness. The scale can be used as a standardised tool for outcome measurement for CTS.
- **Marcel WMPost, Luc P. de Witte, Enid Reichrath, Manon M. Verdonschot, Gert Jan Wijlhuizen, and Rom JM Perenboom (2008)** conducted a research work to understand the psychometric properties of the scale IMPACT-S in road accident survivors. The study centred on the consented 275 participants, of which 197 participants stayed till the end. The dropout rate was 28.4%. The results of the study are indicative of IMPACT-S having good psychometric properties for functional assessment of patients according to the ICF framework.
- **Yves Roquelaure, Catherine Ha, Natacha Fouquet, Alexis Descatha, Annette Leclerc, Marcel Goldberg and Ellen Imbernon** (**2009)** conducted a study to assess the work-related population-attributable fraction of CTS in industries and occupations with high risk for CTS in overall populace. The study included 1644 CTS patients over a 3 year period. The results of the research work indicate that 5-50% of CTS cases are preventable with specific strategies in these areas.
- **Sampada Swapneel Karne and Nilima Sudhakar Bhalerao(2016)** conducted a cross-sectional study of CTS in patients with primary hypothyroidism. A total of 36 participants were included. Results show that geater values of BMI correspond to more risk of CTS in subjects with hypothyroidism.
- **Shirin Mohammadi, Mohammad Mohsen Roostayi, Sedigheh Sadat Naimi, Alireza Akbarzadeh Baghban(2019)**conducted a randomized clinical trial aimed at evaluation of cupping on the outcomes of patients with Carpal tunnel Syndrome. The variables used were: 'Symptom Severity Scale, Functional Status Scale, Distal Sensory and Motor Latency'. They concluded that cupping therapy can be used as a complementary therapy in treatment of CTS.
- **Dimitios Kostopoulos (2004)** conducted a review detailing the treatment of CTS of non- surgical approaches with emphasis in neural mobilization. Entrapment of median nerve frequently causes disability especially amongst working populations. It was concluded that neurodynamic testing and neuro-mobilization of median nerve as assessment and treatment of choice approach to rehabilitating patients with CTS.
- **Ivan Urits, Kyle Gress, Karina Charipova, Vwaire Orhurhu, Alan D. Kaye & Omar Viswanath (2019)** conducted a comprehensive review on the literature update in understanding the intervention strategies of CTS. They concluded that the condition typically presents with primary symptoms, but may be also associated with weak grip strength due to thenar muscle atrophy leading to clumsiness and poor motor skills.
- **Carlijn H. van der Zee, Marcel W. Post, Martin W. Brinkhof, Robert C. Wagenaar (2014)** conducted a study to check the validate Utrecht Scale for Evaluation of Rehabilitation-Participation (USER-Participation) in subjects having injured spinal cord. The study used two scales; 'the ICF Measure of Activity and Participation Screener (IMPACT-S) and the WHO Disability Assessment Schedule (WHODAS II)'. The study included 157 subjects from the Netherlands, keeping in mind that the subjets needed to be long-term patients with SCI. The study concluded that IMPACT-S has better psychometric properties as compared to WHODAS II.
- **Carlijn H. van der Zee, Annique R. Priesterbach, Luikje van der Dussen, Albert Kap, Vera PM Schepers, Johanna Visser-Meily, and Marcel WM Post (2010)** conducted a studyof total 104 candidate-participants with physical disabilities were selected from Netherlands. The study focussed on the reproducibility of three scales based on ICF format. The scales used in the current study were: 'the IMPACT-S, the USER-P and the Participation scale'. Test re-test reliability statistics indicated that all three scales were equally reproducible and acceptable for clinical use.
- **Carlijn H. van der Zee,Albert Kap, Radha Rambaran Mishre, Evert J. Schouten, and Marcel WM Post (2011)** conducted a study to evaluate the responsiveness of four scales at three different time points. The study included 509 subjects from the Netherlands. The study compared four scales: the FAI, IMPACT-SP, Participation scale and the USER-P. The results of the study depict USER-P to be an effective tool for diagnosis with good clinical responsiveness.

- **Ayhan Aşkın, Emel Atar, Aliye Tosun, Ümit Demirdal, and Özlem Koca. (2020)** conducted a research work to formulate the Turkish version of the International Classification of Functioning, Disability and Health 'ICF Measure of Participation and Activities screener (IMPACT-S)'. The study evaluated the reliability and validity of the screener in Turkish subjects suffering from stroke. Eighty-six stroke patients both male and female participated in the research. The study used IMPACT-S and WHODAS II. Test re-test reliability and intra-class correlation coefficient were calculated. Negative correlations were reported for all the sub-scores between the two scales except "life activities/communication" and "life activities/ knowledge". It was reported that the scales produced excellent concurrent validity.
- **Sean D. Rundell, Todd E. Davenport, and Tracey Wagner (2009)**conducted a research on management strategies for subjects with pain the lower back. The study focussed on management of pain based on the 'International Classification of Functioning, Disability and Health'. During the study the subjects reported significant improvements in pain, disability and psychosocial factors. The data was recorded at 3 weeks and then later at 10 weeks following the rehabilitation. The results of the research are indicative of the clinical application and feasibility of the ICF format for individual disability experience and helps to select better treatment strategies.
- **Raquel Cantero-Téllez, Nancy Naughton, Lori Algar, and Kristin Valdes (2019)**conducted a systematic review for concluding the outcome measures that can be used in clinical trials after CTR in terms of the ICF framework. The results of the study indicate that functional measures of activity and participation oftentimes lack representation along with other contextual factors.

III. METHODOLOGY

3.1. Sample:

The sample of diagnosed Carpal Tunnel Syndrome patients were selected from the Northern states of India.

3.1.1. Sample size:

The sample size as estimated by G Power software, keeping a 15% dropout rate was found to be 214.

3.1.2. Inclusion Criteria:

- Subjects clinically diagnosed with 'Carpal Tunnel Syndrome' taking treatment as well as untreated.
- Age 20-55.
- Both genders
- Subjects fluent in the English Language, both reading and writing.

3.1.3. Exclusion Criteria:

- Long-standing diabetes (> 6 months)
- Chronic endocrine conditions (> 6 months)
- Post-traumatic Carpal Tunnel Syndrome or double crush injury
- Any history of head injury, brain damage or neurological conditions.

3.2. Procedure:

3.2.1 Research Design

Prospective Cross-sectional Study

3.2.2 Dependent Variable:

Functional Status

3.2.3 Independent Variable:

ICF Measure of Participation and Activities Screener (IMPACT-S)

Boston Carpal Tunnel Severity Questionnaire (BCTSQ)

3.3. Instrumentation:

Weighing machine to measure weight.

Stadiometer to measure height.

ICF Measure of Participation and Activities Screener (IMPACT-S).

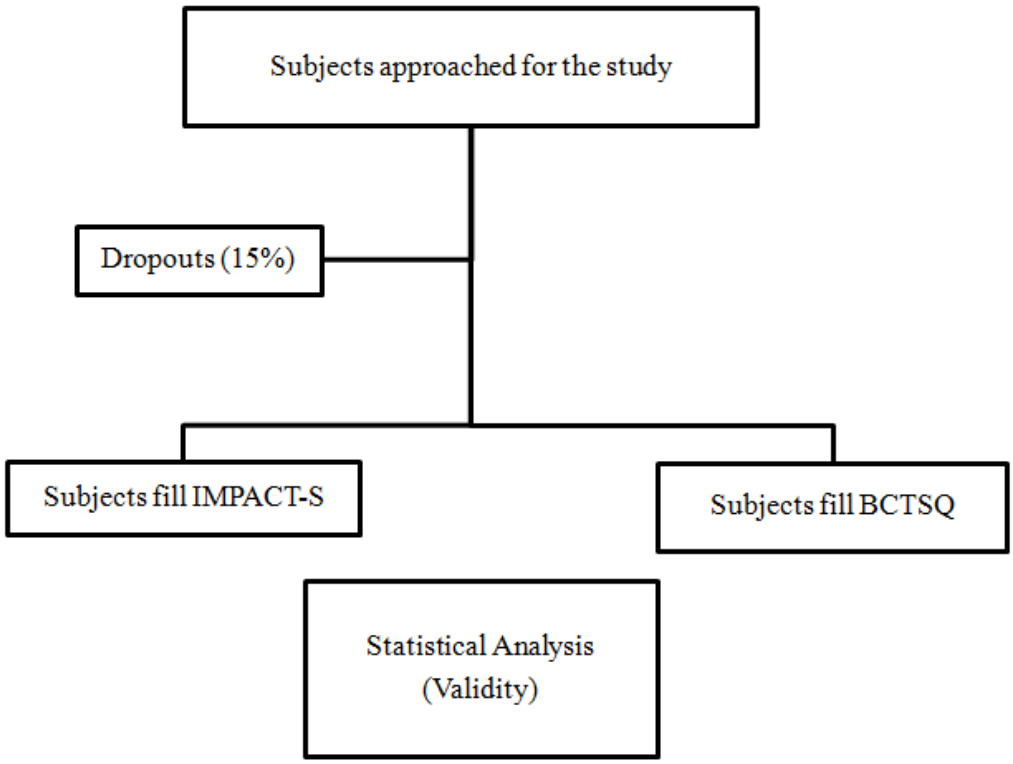
Boston Carpal Tunnel Severity Questionnaire (BCTSQ).

Computer/ Laptop.

3.4. Location of the study

Department of Physiotherapy, Teerthanker Mahaveer University.

3.5. Study Design



3.6. Protocol for Data Collection:

Patients with diagnosed Carpal Tunnel Syndrome were approached for the study. Participants were selected based on the Inclusion and Exclusion Criteria. Subjects will be explained the purpose and methodology of the study. An informed consent form was given to each of the subjects outlining their role and rights as study participants.

Once patient consent was achieved, the questionnaires were filled by the patient for calculating their total score and statistical analysis.

IV. DATA ANALYSIS

Statistical analyses of the data was done by using the SPSS software (version 26.0). Quantitative variables were described in terms of Mean and Standard deviations. To determine the normality of data Shapiro-Wilk test was employed. If data was found non-normal non-parametric test was applied. Tests with a $p< 0.05$ indicated statistical significance.

Concurrent validity was established by evaluating relationship between the scores of IMPACT-S and BCTSQ by using Spearman correlation coefficient. Depending on the value of correlation coefficient, the correlation was inferred as very weak (0.00-0.19), weak (0.20-0.39), moderate (0.40-0.59), strong (0.60-0.79), and very strong (0.8-1.0).

V. RESULT

TABLE 1
COMPARISON OF DEMOGRAPHIC DATA AT BASELINE

Variable	Mean (SD) n=374
Age (years)	46.04 (7.5)
Height (m)	1.55 (0.07)
Weight (kgs)	69.10 (4.54)
BMI (kg/m²)	28.53 (3.03)

**** Significant difference at <0.05; BMI: Body Mass Index***

TABLE 2
DESCRIPTIVE STATISTICS AND CORRELATION COEFFICIENTS FOR BCTSQ AND IMPACT-S.

Variables	Mean	SD	IMPACT-S	BCTSQ
IMPACT-S	25.14	6.89		r = 0. 508**
BCTSQ	47.33	13.26	r = 0.508**	

***** p<0.01 (2-tailed); n=374; IMPACT-S: ICF Measure of Participations and Activities Screener; BCTSQ: Boston Carpal Tunnel Syndrome Questionnaire***

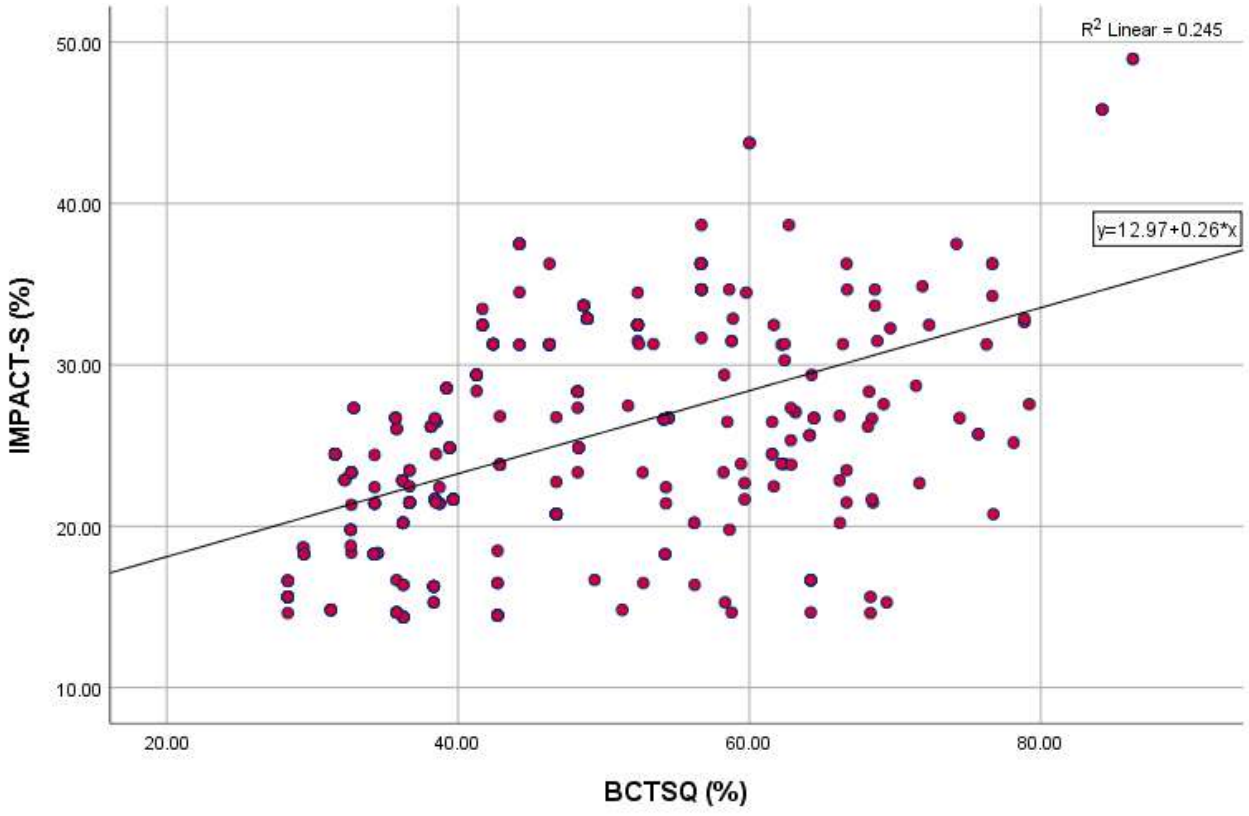


FIGURE 1: Scatter plot for Correlation Coefficients for BCTSQ and IMPACT-S.
IMPACT-S: ICF Measure of Participations and Activities Screener; BCTSQ: Boston Carpal Tunnel Syndrome Questionnaire

The Spearman's rank-order correlation was determined the relationship between IMPACT-S and BCTSQ scales. There was a moderate, positive correlation between IMPACT-S and BCTSQ scales, which was statistically significant [$r_s(374) = 0.508$, $p < 0.01$]

VI. DISCUSSION

The current research work was aimed at establishing the validity of IMPACT-S in subjects with Carpal Tunnel Syndrome. The results of this study indicate that ICF Measure of Participation and Activities- Screener (IMPACT-S) is a moderately valid tool to assess the disability resulting from Carpal tunnel syndrome [r_s (374) = 0.508, $p < 0.01$] when correlated with BCTQ: Boston Carpal Tunnel Questionnaire.

Woolf and Pfleger, 2003 concluded in their study that musculoskeletal disorders pose a health burden that can be evaluated by assessing pain, disability associated with disease processes of the joint or trauma. This global burden on the individual is explained in the Bone and Joint Decade 2000–2010 as well by the WHO and the United Nations.

The Chinese version of Boston Carpal Tunnel Questionnaire used in another study, was found to have satisfactory validity, reliability and responsiveness for patients with carpal tunnel syndrome [14].

Stucki et al., 2009defined a cross-cultural clinical measure of functioning integrating the various ICF framework based subsets. The results of the study indicated the applicability of the ICF format to clinical practice and the feasibility of its adoption into daily assessments.

A study by Rudolf et al., 2010 suggested the use of a comprehensive clinical framework for assessment of patients with various conditions of the hand according to the International ICF Consensus Conference for patients in acute care hospitals and rehabilitation centres.

A study by Franklin et al., 2005 indicated the need for proper diagnostic criteria for subjects with Carpal Tunnel Syndrome. This is suggested to improve the treatment strategies for early management and disability risk reduction. The overall effect of this holistic approach is to reduce the cost of intervention and thereby reduce the global burden.

The relation of Carpal tunnel Syndrome and other musculoskeletal injuries in manual labourers is depicted in a research work by Quandt et al., 2016. The study has concluded that the prevalence of Carpal Tunnel Syndrome is greater in patients with pre-existing Rotator Cuff injury. It was suggested that the cause-effect relationship between the two be further explored and the sequence be better defined. This is in similarity with use of the IMPACT-S being used for the assessment of various clinical conditions at once. Another systematic review by Van Rijn et al., 2009 indicated that carpal tunnel Syndrome was found to be related with the force exertion of hand on average and repetitive hand movements at work.

The responsiveness and test-retest reliability of 'Boston Carpal Tunnel Questionnaire' and 'Disability of Arm Shoulder and Hand (DASH)' were compared in a research work by Warwick et al., 2004. The results of the research work indicate that DASH has good clinical reliability and responsiveness for evaluation of disability experienced by patients with Carpal Tunnel Syndrome.

A case report by Akinson et al., 2011 explained the use of a clinical reasoning and reflection tool for the effective utilization of the ICF format. The study reported a patient oriented management model. It was suggested that this technique will be especially helpful for physical therapists to make informed decisions of patient care, professional and personal growth. The use of ICF framework ensures reflection stimulated dialog between therapists as well as patients.

Jelsma and Scott, 2011, in a retrospective study indicated that promotion of the use of ICF format among physical therapy students will improve clinical reasoning for problem solving in patient settings. A 'holistic approach' for identifying illnesses and for management strategies can be beneficial for patient outcomes.

VII. CONCLUSION

In summary, the present study showed that the use of the ICF Measure of Participation and Activities screener (IMPACT-S) and the Boston Carpal Tunnel Severity Questionnaire (BCTSQ) have moderate validity to assess the disability resulting from Carpal Tunnel Syndrome. It can be safely assumed that IMPACT-S can used in clinical practice for evaluation of Carpal Tunnel Syndrome as part of the WHO ICF core set assessment technique.

LIMITATIONS AND FUTURE RECOMMENDATIONS

The current study has established that IMPACT-S has moderate validity for Carpal Tunnel Syndrome patients. The current study was conducted during September 2020 and May 2021 and the data collection was hampered by the COVID-19 pandemic. Since the concurrent validity of the scale was assed, it is recommended that future researches evaluate construct and content validity as well as reliability of the scale.

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Influence of Human Activities on Fish Distribution, Composition and Abundance in Otamiri River, Imo State

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Abstract— *Otamiri River was carried out between July to October, 2018. The objective of the study was to identify those human activities that had been hindering the growth and survival of fish species in the river as well as ascertaining the species composition present in the river. The fish population were assessed using hooks and lines, gillnets, cast nets, traps etc as gears while one man dugout canoe as well as planked canoes were used as crafts. A total of 757 fish species which consist of 9 families, 10 genera and 15 species were described and identified. The family ranked highest as the most abundant fish species with 363 fishes, while Distichodontidae ranked the lowest with 5 fishes. The result of this study was further compared with other studies that had been carried out previously on the river where it was discovered that there had been a steady decline in number of fish species caught which were caused by most human activities such as sand and gravel mining, pollution, agricultural activities, deforestation etc.*

Keywords— Human, Fish distribution, Otamiri River.

I. INTRODUCTION

The fish farm fauna of the Ecozone has changed dramatically since the Europeans first arrived in the 16000's changes in the aquatic community structure have resulted from a variety of human activity including exploitation, habitat alteration, pollution, drains, canals, and introduction of non-native species. Often these factors act together to decimate native species and reduce the overall biodiversity of native aquatic ecosystems.

Unrelated or inadequately regulated commercial fishing quickly reduced populations of the lake sturgeon, and many species of native trout and whitefishes.

Species diversity is affected by habitat destruction which includes removal of ground water, land clearing and consequent sedimentation and water turbidity, more drastic variability of water levels, channelization, and removal of gravel and sand nutrient enrichment and addition of toxic contaminants. Populations of species which migrate up streams to spawn have been reduced or extirpated because dams have blocked access to spawning areas. In the 1800's dams were built usually to provide a head water to operate a mill. A secondary effect was the pollution caused by the organic waste material dumped into the water by the function of these mills. Species have been unintentionally introduced through man-made canals (e.g Wenand Canal, the Eric Barge Canal and the Trent Canal) or transported and introduced with blast water. Human interest in only a limited number of recreational species. Unauthorized introductions have come from bait buckets, aquariums, and fish markets that import live fishes for human food.

Recent examples of unintentional introductions include two members of the Goby family native to the black and Caspian seas in Europe which have been transported and inadvertently introduced – with discharged ballast water of international vessels. The tuberose goby, *proterorlinus marmoratus*, was the first to be discovered in April 1990 in ST. Clair River followed shortly by the round goby, *Neogobius melanostomus* discovered in June 1990. (Grossman and Holm, 1998). The effects of this population explosion on the total biodiversity is not fully understood yet, but it is becoming apparent that the round goby will cause a significant decline of the native mottled sculpin and possible log perch and other darters through competition for food, space, spawning areas, or by direct predation on these species. These two species are excellent examples of the unpredictable consequences of introductions.

One might have predicted from the rare occurrences of the introduced tuberose goby that the round goby would respond similarly and exert a negligible impact on native species.

II. MATERIALS AND METHODS

2.1 Study Area

The area chosen for this project was Otamiri River which lies on the eastern border of Imo state Polytechnic Umuagwo. It covers a length of about 4KM and width of 40cm, it has an estimated mean depth of 2.3M and sechi disc transparency of 2m (Akabuchi, 1986). In this part of the river are aquatic plants such as Lemna Polvrrhiza and Nymphae *spp.* Also on the water surface are floating Riiamentions plants. In the littoral zone are rooted aquatic plants easily identified amongst these are the Valiisheria *spp,* Scispus *spp* and Saggitharus *spp.*

Otamiri River lies between latitude 50^0: 01' and 5^0: 34' N and longitude 6^0: 55 and 7^0 : 07E. It has its sources at Egbu near Emekuku in Owerri North Local Government Area of Imo state in the south-East part of Nigeria.

This areas lies within the Equatorial rain forest zone of Nigeria cited in Nwadiora and Okereke (1993). The source of Otamiri River (Egbu) is at low relief region in the range of 61-122m above sea level. It starts as a first order stream flows West-ward for about 7km to receive another first order stream Nworie River in Owerri Local Government Area of Imo State. From that point if flows southward as a second order river for 28km and receives a major tributary river Oramiriukwa. From Oramiriukwa input, it continues southward for another 21km before it receives Ogochia River, its third tributary in Etche Local Government Area in River State. It finally continues for another 26km downstream to its south at near Owaza in Ikwere Local Government Area of River State, where it discharges into Elele River in Rivers State.

The source length of Otamiri River is approximately 82 kilometers. The width has a dry season maximum of 126-189 meters and a flood season equivalent of 145-208 meters, especially within the stretch studied within the stream of the Ogochia River confluence. Due to the shallowness of the river, it is not navigable (mean depth 2.5). Numerous obstructions occur along the main River channel. These include trees, logs, stumps, disused canoes and aquatic macrophytes like pistia, Azola, salvinia lemna and *typha* Nymphaea. Valisneria and ultlcularia. While the mareinal plants are sagitteria, and ipoma (Nwadiaro and Okereke, 1993). Otamiri River is an acidic water which has the temperature of 26.7^oC and pH range from 4.5 to 5.5 (Courant *et al* 1985). It indicates forested rivers within the lower Niger Delta (Nwadiaro *et al.*,1982). The total suspend solid was 2.5-mgl-l while the mean dissolve oxygen concentrationwas 4.8mgl-l. Otamiri River is under the influence of some mental disturbance due to human activities imputes into Otamiri from the main feeder stream, Nworie river through diverse sources such as sewage discharge from Owerri General Hospital, Alvan Ikoku College of Education. The river has greatly be affected by the human activities of the local communities (Mgbirichi and Umuagwo) aho are emerge in dredging the river for commercial sand and gravel (Nwadiaro and Okereke 1993).

2.2 Sampling:

Samplings was done using local fishermen; these samplings were done in the study area around Imo State Polytechnic Umuagwo (Otamiri River) and two other replicates. Replicates II was done at Otamiri River behind Mgbirichi while replicate III was done behind Umuagwo. The fish gears used for the sampling were hooks and line of size 18(grade), gillnets, cast net, and traps (Conical net). The mesh sizes of net used were 4.5cm, 3.5cm and 6cm.

2.3 Data Collection and Analysis:

Data (species composition and diversity) were collected from three sampling stations, designated as station 1, 11 and 111 change the course of Otamiri River, between Umuagwo and Mgbirichi.

Fishes collected were identified using keys, description and illustrations from freshwater fishes of Nigeria by Nigeria freshwater fishes by Olaosebikan and Raji (2013) and fish and fisheries of Nothern Nigeria by Reed *et al.,* (1967)

The passive gears were placed in the evening at about 4:30pm and checked in the morning by 6:00am. The duration of this sampling was from 12th July to 15th October 2018. The duration of this was sixteen weeks, this period falls into the raining season in the area of study, which is Southern-Eastern part of Nigeria; it was carried out twice a week.

III. RESULTS AND DISCUSSION

A total of 757 fishes were caught and identified during this investigation. This was made up of 15 species from 9 families as summarized in table 1.

TABLE 1
SPECIES COMPOSITION ON OTAMIRI RIVER FROM THREE SAMPLING STATION IN THE FIRST MONTH

Family	Species	RI	RII	RIII	Total	%
Cichilidae	*Tilapia Zilli*	21	22	23	66	65.9%
	T. Mariae	15	9	15	39	38.9%
	T. Guineensis	6	7	1	14	13.7%
	T. Melanopleura	0	1	4	5	4.2%
	T. Dageti	3	0	3	3	2.3%
	Hemichromis faciatus	1	2	1	4	3.1%
Channidea	*Parachanna obscura*	9	5	14	28	27.6%
Malaeruridae	*Malapterus electricus*	1	1	1	3	2.3%
Hepsetidae	*Hepsetus odoe*	-	1	2	3	2.3%
Notopteridae	*Papyrochranus a for*	14	5	3	22	21.0%
Mormyridae	*Mormyrops engystoma*	-	1	1	2	1.82%
Characidae	*Brycinus nurse*	1	-	1	2	1.82%
Mochokidae	*Synodontis omias*	3	1	7	11	10.6%
	Synodontis robbianus	-	-	1	1	0.98%
Distchodontidae	*Phago loricatus*	1	1	-	2	1.82%
Total					207	100%

Table 1 Summarizes the results, composition and diversity of fish in Otamiri River during the first month of sampling. The result in (table 1) showed that *Tilapia Zilli* comprised of 66% on the River as the most abundant species, while *Mormyrops engystoma*, *Phagoloricatus* and *Brycinus* which were least with 2 respectively.

TABLE 2
SPECIES COMPOSITION ON OTAMIRI RIVER FROM THREE SAMPLING STATIONS IN THE SECOND MONTH

Family	Species	RI	RII	RIII	Total	%
Cichilidae	*Tilapia Zilli*	14	7	6	27	26.4%
	T. Mariae	7	9		16	15.0%
	T. Guineensis	-	-	-		
	T. Melanopleura	1	1	5	7	6.5%
	T. Dageti	-	-	-	-	
	Hemichromis faciatus	2	3	-	5	4.2%
Channidea	*Parachanna obscura*	20	10	15	45	27.6%
Malaeruridae	*Malapterus electricus*	2	3	-	2	2.3%
Hepsetidae	*Hepsetus odoe*	-	1		1	2.3%
Notopteridae	*Papyrochranus a for*	12	11	4	27	26.4%
Mormyridae	*Mormyrops engystoma*	1			1	0.98%
Characidae	*Brycinus nurse*	-			-	1.82%
Mochokidae	*Synodontis omias*	10	4	7	21	20.6%
	Synodontis robbianus		1	1	2	1.82%
Distchodontidae	*Phago loricatus*	-				
Total					158	100%

TABLE 3
SPECIES COMPOSITION ON OTAMIRI RIVER FROM THREE SAMPLING STATIONS IN THE THIRD MONTH.

Family	Species	RI	RII	RIII	Total	%
Cichilidae	*Tilapia Zilli*	22	20	12	56	55.8%
	T. Mariae	12	10	4	26	25.3%
	T. Guineensis	1	3	1	5	4.2%
	T. Melanopleura	-	-	-	-	
	T. Dageti	-	-	-	-	
	Hemichromis faciatus	5	1	4	10	9.7%
Channidea	*Parachanna obscura*	10	7	11	28	27.6%
Malaeruridae	*Malapterus electricus*			1	1	0.98%
Hepsetidae	*Hepsetus odoe*	2	1	2	5	4.2%
Notopteridae	*Papyrochranus a for*	8	5	14	27	26.4%
Mormyridae	*Mormyrops engystoma*	1	1	3	5	4.72%
Characidae	*Brycinus nurse*	-			-	
Mochokidae	*Synodontis omias*	1	-	6	13	12.6%
	Synodontis robbianus			6	13	12.6%
Distchodontidae	*Phago loricatus*			1	1	0.98%
Total					183	100%

TABLE 4
SPECIES COMPOSITION ON OTAMIRI RIVER FROM THREE SAMPLING STATIONS IN THE FOURTH MONTH.

Family	Species	RI	RII	RIII	Total	%
Cichilidae	*Tilapia Zilli*	22	17	21	50	49.9%
	T. Mariae	12	8	16	36	35.6%
	T. Guineensis	4	4	2	10	9.7%
	T. Melanopleura			1	1	0.98%
	T. Dageti			1	1	0.98%
	Hemichromis faciatus					
Channidea	*Parachanna obscura*	10	9	9	28	27.6%
Malaeruridae	*Malapterus electricus*			1	1	0.98%
Hepsetidae	*Hepsetus odoe*					
Notopteridae	*Papyrochranus a for*	9	4	8	21	20.6%
Mormyridae	*Mormyrops engystoma*			1	1	0.98%
Characidae	*Brycinus nurse*		2	1	3	2.3%
Mochokidae	*Synodontis omias*	9	6	10	25	24.1%
	Synodontis robbianus		2	1	3	2.3%
Distchodontidae	*Phago loricatus*		1	1	2	1.82%
Total					209	100%
Notopteridae	*Papyrochranus after*	9	4	8	21	20.6%
Mormyridae	*Mormyrops enavstoma*			1	1	0.98%
Characidae	*Brycinus nurse*		2	1	3	2.3%
Mochokidae	*Synodontis omias*	9	6	10	25	24.1%
	Synodontis robbianus		2	1	3	2.3%
Distchodontidae	*Phago loricatus*		1	1	2	1.82%
					209	100%

Table I to VIII shows fish composition in the three sampling stations, it shows that Cichlidae was the family of fish with the greatest number of species (363 species abundance in the sample stations, Ri has the highest fish spread with 276 and followed by Riii (251), Rii(225).

IV. DISCUSSION

Comparing results obtained from this investation to previously done investigation by Nwadiaro and Okereke (1993). It showed that Otamiri River had a total of 46 species and 20 families. While Kasr and Schosser (1978) had 24 species from 14 families in their investigation, the composition of fishes in the river was 8 species from 7 families. The report show that there has been a steady decline in species ans fami;y composition of fish in Otamiri Rivers fishery. This may be attributed to some factors related to land water interaction.(Roth et al., 1996).

V. CONCLUSION

Degradation of lands adjacent to freshwater ecosystem can adversely affect biological communities through many mechanisms, for instance land use activities that eliminate vegetative covers, decrease infiltration rates or reduce moisture hold capacity of soil can adversely impact surface water quality. At Otamiri river dredging for sand and gravel have been going on for some years and this dredging helps in removing of some vegetative covering. Habitat destruction and degradation occurs when poorly managed agricultural lands, mineral extraction and construction of projects, in Otamiri, effluent from Fuason Alluminum Company, sewage from the college of Education, and soaking of cassava in the Otamiri River influence this factor.

During the dredging process, the spawning ground for some of the species must have been disrupted (causing them to migrate). Dredging also increase the depth while the width reduces some of fish families in earlier investigation. Another factor may be the season. Nwadiaro and Okereke (1993) did their investigation also during the rainy season and dry season periods, while this investigation was done during the dry season period. Some fish species might have migrate at this particular period may be in search of favorable weather condition or for breeding and or ecological reasons and this might be reasonable for the reduced catch in this study. Toxic substance in the cassava soaked in the river to be turbid which some fishes cannot tolerate. (Reeds et al., 1992) in Wiram Gulf discovered that there was evidence to suggest that over fishing with fine mesh net is partly to blame for the disappearance of haplochromis.

In conclusion, the declining rate of fish catch in Otamiri River need to be controlled in order to avoid losing most of the valuable fish species that are of great importance to fisheries. There might be need for legislation to check some of these obnoxious acts. Also some extension work should be done to educate people living along the river on the effect of what they do on the fish population and their long term to the aquatic ecosystem.

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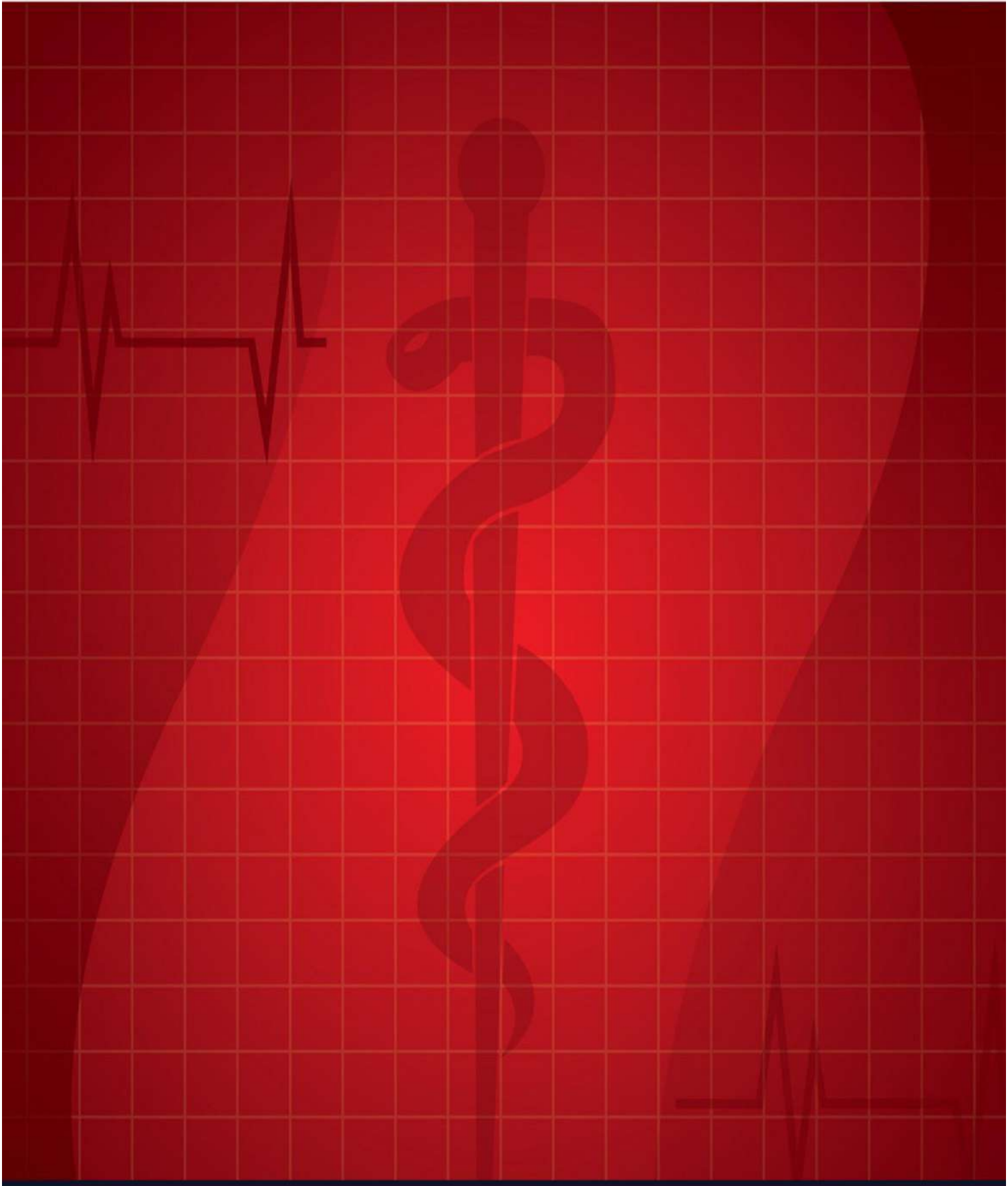

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