

IR – PERPUSTAKAAN UNIVERSITAS AIRLANGGA

THESIS

**ASSOCIATION OF NUTRITIONAL STATUS WITH THE SEVERITY OF
DISEASE, COMPLICATIONS, AND HOSPITALIZATION FREQUENCY IN
LIVER CIRRHOSIS PATIENTS**



Writer

Daffa Muhammad Cantona Guerin

NIM. 011911133299

MEDICAL STUDY PROGRAM

FACULTY OF MEDICINE UNIVERSITAS AIRLANGGA

SURABAYA

2022

THESIS

IR – PERPUSTAKAAN UNIVERSITAS AIRLANGGA

THESIS

**ASSOCIATION OF NUTRITIONAL STATUS WITH THE SEVERITY OF
DISEASE, COMPLICATIONS, AND HOSPITALIZATION FREQUENCY IN
LIVER CIRRHOSIS PATIENTS**



Writer

Daffa Muhammad Cantona Guerin

NIM. 011911133299

**MEDICAL STUDY PROGRAM
FACULTY OF MEDICINE UNIVERSITAS AIRLANGGA
SURABAYA
2022**

SKRIPSI

ASSOCIATION OF NUTRITIONAL....

DAFFA M. C. G.

IR – PERPUSTAKAAN UNIVERSITAS AIRLANGGA

THESIS

**ASSOCIATION OF NUTRITIONAL STATUS WITH THE SEVERITY OF
DISEASE, COMPLICATIONS, AND HOSPITALIZATION FREQUENCY IN
LIVER CIRRHOSIS PATIENTS**

This thesis is made to fulfill the requirement of the research module

Medical study program Faculty of Medicine Universitas Airlangga Surabaya

Author

Daffa Muhammad Cantona Guerin

011911133299

INTERNATIONAL CLASS OF MEDICAL PROGRAM

FACULTY OF MEDICINE

UNIVERSITAS AIRLANGGA SURABAYA

2022

ii

SKRIPSI

ASSOCIATION OF NUTRITIONAL....

DAFFA M. C. G.

FORM OF APPROVAL

This thesis has been approved to be examined:

21 November 2022

Primary Advisor



Prof. M. Miftahussurur, dr., M.Kes, Sp.PD, K-GEH, Ph.D, FINASIM
NIP. 19790929 200812 1 003

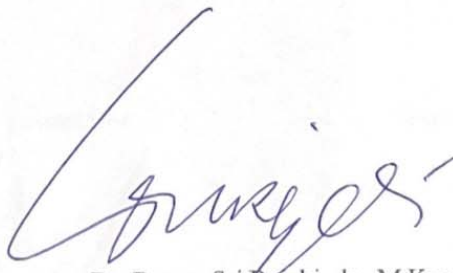
Secondary Advisor



Dr. Widati Fatmaningrum, dr, M.Kes, Sp.GK
NIP. 19660108 199702 2 001

Acknowledging,

Head of Medical Study Program



Dr. Purwo Sri Rejeki, dr., M.Kes.
NIP. 19750612 200501 2 003

EXAMINER DECISION FORM

ASSOCIATION OF NUTRITIONAL STATUS WITH THE SEVERITY OF
DISEASE, COMPLICATIONS, AND HOSPITALIZATION FREQUENCY IN
LIVER CIRRHOSIS PATIENTS

THESIS

Author:



Daffa Muhammad Cantona Guerin

NIM. 011911133299

Approved and accepted after being assessed by the Examiner Team of the
Medical Program, Faculty of Medicine, Universitas Airlangga
Surabaya, 12 December 2022

Approved by,
Chief Examiner



Amie Vidyani, dr., Sp.PD, K-GEH, FINASIM

NIP. 198001282012122002

First Supervisor



Prof. Muhammad Miftahussurur Sp.

PD-KGEH, Ph.D, FINASIM

NIP. 197909292008121003

Second Supervisor



Dr. Widati Fatmaningrum, dr. M.Kes,

Sp.GK

NIP. 196601081997022001

STATEMENT OF ORIGINALITY

The undersigned, I

Name : Daffa Muhammad Cantona Guerin

NIM : 011911133299

Study Program : Medical Program

Faculty : Medicine

Stage : Bachelor

Stating that I have not committed plagiarism in the writing of my thesis with a title of,

**ASSOCIATION OF NUTRITIONAL STATUS WITH THE SEVERITY OF
DISEASE, COMPLICATIONS, AND HOSPITALIZATION FREQUENCY IN
LIVER CIRRHOSIS PATIENTS**

If one day it is proven to have committed plagiarism, then I will receive the sanctions that have been set.

Thus this statement letter I made in real terms.



ACKNOWLEDGEMENT

First of all, the writer would like to express the deepest gratitude to the Almighty Allah SWT for all the guidance and abundant grace so that the writer could finally completed this research. The completion of this thesis would not have been possible without the help, support, and guidance from the participation of many people. Therefore, the writer would like to express her deepest gratitude to :

1. Prof. Dr. Budi Santoso, dr., Sp. OG(K), as the Dean of Faculty of Medicine Universitas Airlangga.
2. Dr. Purwo Sri Rejeki, dr., M.Kes., as the Head of Medical Study Program.
3. Dr. Pudji Lestari, dr., M.Kes., as the Coordinator of Research Module
4. Prof. M. Miftahussurur, dr., M.Kes, Sp.PD, K-GEH, Ph.D, FINASIM, as the first supervisor who had provided assistance, advices, input, and dedicated involvement in every step throughout the process of the making of this thesis.
5. Dr. Widati Fatmaningrum, dr., M.Kes, SpGK, as the secondary advisor who had given the writer guidance, advices, evaluation, and suggestions to finish this thesis.
6. Amie Vidyani, dr., SpPD - KGEH, as the thesis examiner who had given valuable time, advices, revision, and suggestions for this thesis.
7. All lecturers and staff of the Faculty of Medicine Universitas Airlangga who had provided facilities, knowledge, and expertise needed to finish this thesis.
8. The author's family: Husin Thamrin, dr., Sp.PD - KGEH as the author's father, Irine Ariyanti as the author's mother, and Hanna Ifita Guerin as the

author's sister for their patience, understanding, moral support, and motivation while completing this research.

9. The author's significant other: Nadira Zahra Maulidya Permana for constant support, for all the late nights and early mornings, being my muse, editor, proof-reader, and sounding board, who has stood by me through all my travails, my absences, my fits of pique and impatience.
10. The author's partner: Muhammad Muhibuddin Hilmy Asari, Hafidz Naufal Dhiyaulhaq, Hanif Ardiansyah Sulistya, and Pradityo Rafi Hardono, who always gave the author's support, assistance, knowledge, and motivation during the process of completing this research paper.
11. The author's colleagues: Ahmad Akmaluddin, Wildan Hartawan, Yoga Akbar, Daffa Arkan, Malik Adjie, Hafiza Amadhin, Kharis Khamdan, Almira Saskia, Alfi Syahrani, Nabilah Izzatunnisa who always gave the author support and encouragement during the process of completing this research.
12. The author's comrade: Nikolas, Pram, Abiyyu, Nando, Alvin, Aqilla, Hafid, Bima, Karanka, Daniel who always supported the author during the process of completing this research.
13. All parties who have helped during the process of completing this research which the author can't mention one by one

The author realized that this research paper is far from perfect. Therefore, the author still needs guidance and advice from the readers to improve this research paper. The author hopes this research paper can benefit all parties in need.

Surabaya, 17 November 2022

Daffa Muhammad Cantona Guerin

RINGKASAN

HUBUNGAN STATUS GIZI DENGAN DERAJAT KEPARAHAN PENYAKIT, KOMPLIKASI, DAN FREKUENSI RAWAT INAP PADA PASIEN SIROSIS HATI

Daffa Muhammad Cantona Guerin

Sirosis hati merupakan stadium akhir penyakit hati yang ditandai dengan fibrosis dan distorsi struktur hati dengan pembentukan nodul regeneratif (Lo dan Kim, 2017). Sirosis hati merupakan salah satu penyebab utama morbiditas dan mortalitas secara global, meskipun penyebab yang mendasari berbeda antara lokasi dan kelompok demografis. Di Indonesia, angka kematian akibat sirosis hati masih cukup tinggi; Menurut data World Health Organization (WHO), pada tahun 2018, kematian akibat penyakit liver di Indonesia mencapai 59.774, atau 3,51% dari total kematian. Hati berperan dalam mengatur metabolisme protein dan energi dalam tubuh, sehingga penderita penyakit hati stadium lanjut sering mengalami malnutrisi. Banyak faktor yang berkontribusi terhadap malnutrisi pada sirosis, termasuk asupan makanan yang tidak memadai, perubahan penyerapan nutrisi usus, dan perubahan metabolisme protein (Cheung et al., 2012).

Pada pasien sirosis hati perlu dilakukan pengkajian agar dukungan nutrisi dapat diberikan secara tepat dan cepat untuk menghindari efek samping dan mendukung keberhasilan pengobatan untuk mencegah komplikasi penyakit lebih lanjut, mengurangi biaya pengobatan, lama rawat inap, juga meningkatkan risiko rawat inap ulang di rumah sakit (Perumpail et al., 2017). Salah satu kendala dalam mengelola pasien sirosis hati adalah belum adanya pemeriksaan baku emas dalam menilai status gizi pasien sampai saat ini. Namun, beberapa metode seperti penilaian global subjektif (SGA), pengukuran antropometri, dan kekuatan genggam (HGS) dapat digunakan sebagai alat untuk mengidentifikasi status gizi pada pasien (Bharadwaj et al., 2016).

Penelitian ini bertujuan untuk mengetahui hubungan status gizi dengan derajat keparahan penyakit, komplikasi, dan frekuensi rawat inap pada pasien sirosis. Belum ada studi yang komprehensif tentang hal ini di Indonesia. Penelitian ini menggunakan penelitian observasional analitik dengan pendekatan cross sectional. Pasien rawat jalan direkrut secara konsekutif dari Desember 2021 hingga Juli 2022 dan dicatat jenis kelamin, usia, indeks massa tubuh (BMI), pekerjaan, tingkat keparahan penyakit menggunakan skor Child-Turcotte Pugh (CTP), komplikasi, dan frekuensi rawat inap. Penilaian gizi dilakukan dengan menggunakan Subjective Global Assessment (SGA) dan antropometri, yaitu Mid-arm Circumference (MAC), Triceps Skinfold (TSF), dan Handgrip Strength (HGS). Hasil pengumpulan data akan dianalisis menggunakan uji korelasi Spearman's Rank.

Hasil penelitian yang didapat dari 80 partisipan didominasi oleh partisipan laki-laki (72,5%), kategori umur 51-60 tahun (42,5%), sebagian besar partisipan overweight (45%), dan diantara partisipan tersebut lebih dari separuhnya menganggur. (52,5%).

Status gizi berdasarkan SGA paling banyak didominasi oleh SGA kelas A (66,25%), dan pengukuran antropometri meliputi MAC, TSF, dan HGS memiliki rerata 26,78 ($\pm 3,32$), 11,74 ($\pm 5,28$), masing-masing 24,35 ($\pm 9,58$). Sebagian besar pasien sirosis hati dalam penelitian ini tergolong pasien CTP kelas A (63,75%), tidak menunjukkan tanda-tanda komplikasi (35%), dan pernah dirawat di rumah sakit satu kali dalam satu tahun terakhir (43,75%). Status gizi yang dinilai dengan SGA menunjukkan hubungan yang signifikan, kuat, dan positif dengan tingkat keparahan penyakit, komplikasi, dan frekuensi rawat inap dalam setahun ($p = <0,001$, koefisien: 0,713; $p = <0,001$, koefisien: 0,629; $p = <0,001$, koefisien: 0,487). MAC menunjukkan korelasi yang signifikan dalam nilai negatif dengan keparahan penyakit, dan frekuensi rawat inap dalam setahun ($p = 0,008$, koefisien: -0,294; $p = 0,076$, koefisien: -0,199). TSF menunjukkan korelasi yang signifikan dalam nilai negatif dengan keparahan penyakit, dan komplikasi ($p = 0,008$, koefisien: -0,295; $p = 0,044$, koefisien: -0,226). HGS menunjukkan hubungan yang signifikan dan positif dengan tingkat keparahan penyakit, komplikasi, dan frekuensi rawat inap dalam setahun ($p = 0,001$, koefisien: -0,368; $p = 0,026$, koefisien: -0,248; $p = <0,001$, koefisien: -0,441).

Penelitian ini membuktikan adanya hubungan antara status gizi dengan tingkat keparahan penyakit, komplikasi, dan frekuensi rawat inap pada pasien sirosis hati. SGA dan HGS sebagai penilaian status gizi menunjukkan korelasi yang signifikan dengan tingkat keparahan penyakit, komplikasi, dan frekuensi rawat inap dalam setahun. Penilaian nutrisi harus dianggap wajib dalam perawatan rutin pasien sirosis hati.

ABSTRAK

HUBUNGAN STATUS GIZI DENGAN DERAJAT KEPARAHAN PENYAKIT, KOMPLIKASI, DAN FREKUENSI RAWAT INAP PADA PASIEN SIROSIS HATI

Daffa Muhammad Cantona Guerin

Latar Belakang: Status gizi merupakan salah satu faktor prognostik independen yang berhubungan dengan morbiditas, mortalitas, dan pengobatan pasien sirosis hati. Salah satu kendala dalam mengelola pasien sirosis hati adalah belum adanya pemeriksaan baku emas dalam menilai status gizi pasien sampai saat ini.

Tujuan: Mengetahui hubungan status gizi dengan derajat keparahan penyakit, komplikasi, dan frekuensi rawat inap pada pasien sirosis hati.

Metode: Penelitian ini menggunakan studi observasional analitik dengan pendekatan cross sectional. Pasien rawat jalan direkrut secara konsekutif dari Desember 2021 hingga Juli 2022 dan dicatat jenis kelamin, usia, *body mass index* (BMI), pekerjaan, tingkat keparahan penyakit menggunakan skor *Child-Turcotte Pugh* (CTP), komplikasi, dan frekuensi rawat inap. Penilaian gizi dilakukan dengan menggunakan *Subjective Global Assessment* (SGA) dan antropometri, yaitu *Mid-arm Circumference* (MAC), *Triceps Skinfold* (TSF), dan *Handgrip Strength* (HGS).

Hasil: Sebanyak 80 pasien sirosis hati (58 laki-laki) berusia 22-70 tahun (rata-rata 52 tahun) dilibatkan. Status gizi yang dinilai dengan SGA menunjukkan hubungan yang signifikan, kuat, dan bernilai positif dengan derajat keparahan penyakit, komplikasi, dan frekuensi rawat inap dalam setahun ($p = <0,001$, koefisien: 0,713; $p = <0,001$, koefisien: 0,629; $p = <0,001$, koefisien: 0,487). MAC menunjukkan korelasi yang signifikan bernilai negatif dengan derajat keparahan penyakit, dan frekuensi rawat inap dalam setahun ($p = 0,008$, koefisien: -0,294; $p = 0,076$, koefisien: -0,199). TSF menunjukkan korelasi yang signifikan bernilai negatif dengan derajat keparahan penyakit, dan komplikasi ($p = 0,008$, koefisien: -0,295; $p = 0,044$, koefisien: -0,226). HGS menunjukkan hubungan yang signifikan dan bernilai positif dengan tingkat keparahan penyakit, komplikasi, dan frekuensi rawat inap dalam setahun ($p = 0,001$, koefisien: -0,368; $p = 0,026$, koefisien: -0,248; $p = <0,001$, koefisien: -0,441).

Kesimpulan: Penelitian ini membuktikan bahwa ada hubungan antara status gizi dengan keparahan penyakit, komplikasi, dan frekuensi rawat inap pada pasien sirosis hati, dengan SGA dan HGS sebagai penilaian status gizi menunjukkan hubungan yang signifikan dengan tingkat keparahan penyakit, komplikasi, dan frekuensi rawat inap dalam setahun. Penilaian nutrisi sebaiknya diwajibkan dalam perawatan rutin pasien sirosis hati.

Kata kunci: Hati, Sirosis, Malnutrisi, Antropometri, CTP, Rawat Inap

ABSTRACT

ASSOCIATION OF NUTRITIONAL STATUS WITH THE SEVERITY OF DISEASE, COMPLICATIONS, AND HOSPITALIZATION FREQUENCY IN LIVER CIRRHOSIS PATIENTS

Daffa Muhammad Cantona Guerin

Background: Nutritional status is one of the independent prognostic factors related to morbidity, mortality, and treatment for patients with liver cirrhosis. One of the obstacles in managing patients with liver cirrhosis is that there is no gold standard examination in assessing the nutritional status of patients until now.

Aim: To determine the association of nutritional status with the severity of disease, complications, and hospitalization frequency in liver cirrhosis patients.

Methods: This research uses an analytical observational study with a cross-sectional approach. Consecutive ambulatory/outpatients were recruited from December 2021 to July 2022 and studied according to gender, age, body mass index (BMI), occupation, the severity of disease using Child-Turcotte Pugh (CTP) score, complications, and hospitalization frequency. Nutritional assessment was conducted using Subjective Global Assessment (SGA) and anthropometry, namely, Mid-arm Circumference (MAC), Triceps Skinfold (TSF), and Handgrip Strength (HGS).

Results: A total of 80 liver cirrhosis patients (58 men) aged 22-70 years (mean 52 years) were included. Nutritional status assessed by SGA showed a significant, strong, and positive correlation with severity of disease, complications, and hospitalization frequency in a year ($p = <0.001$, coefficient: 0,713; $p = <0.001$, coefficient: 0,629; $p = <0.001$, coefficient: 0,487). MAC showed significant correlation in negative value with severity of disease, and hospitalization frequency in a year ($p = 0.008$, coefficient: -0,294; $p = 0.076$, coefficient: -0,199). TSF showed significant correlation in negative value with severity of disease, and complications ($p = 0.008$, coefficient: -0,295; $p = 0.044$, coefficient: -0,226). HGS showed a significant, and positive correlation with severity of disease, complications, and hospitalization frequency in a year ($p = 0.001$, coefficient: -0,368; $p = 0.026$, coefficient: -0,248; $p = <0.001$, coefficient: -0,441).

Conclusion: This research proves that there is a relationship between nutritional status with the severity of disease, complications, and hospitalization frequency in liver cirrhosis patients, with SGA and HGS as nutritional status assessment showed a significant correlation with the severity of disease, complications, and hospitalization frequency in a year. Nutritional assessment should be considered mandatory in the routine care of liver cirrhosis patients.

Keywords: Liver, Cirrhosis, Malnutrition, Anthropometry, CTP, Hospitalization

TABLE OF CONTENTS

RINGKASAN.....	ix
ABSTRACT	xii
LIST OF TABLES.....	xvii
LIST OF ATTACHMENTS.....	xviii
LIST OF ABBREVIATIONS	xix
CHAPTER 1.....	1
PRELIMINARY	1
1.1 Background	1
1.2 Research Question	3
1.3 Research Purposes.....	3
1.3.1 General Purposes.....	3
1.3.2 Specific Purposes	3
1.4 Research Benefit.....	4
1.4.1 Theoretical Benefit.....	4
1.4.2 Practical Benefit	4
CHAPTER 2.....	5
LITERATURE REVIEW.....	5
2.1 Anatomy of Liver.....	5
2.2 Physiology of Liver.....	6
2.3 Histology of Liver.....	8
2.4 Liver Cirrhosis	9
2.4.1 Overview	9
2.4.2 Epidemiology.....	10
2.4.3 Etiology	11
2.4.4 Classification.....	11
2.4.5 Pathophysiology.....	12
2.4.6 Clinical Manifestations	14
2.4.7 Diagnosis	18
2.4.8 Complications.....	19
2.4.9 Severity of Disease	21
2.4.10 Management.....	22
2.4.11 Overview.....	24
2.4.12 Assessment.....	24
2.4.13 Malnutrition	28
2.4.14 Malnutrition in Liver Cirrhosis	29
2.5 The Effect of Malnutrition on Hospitalization Frequency & Outcome	30
CHAPTER 3.....	32
CONCEPTUAL FRAMEWORK & HYPOTHESIS	32
3.1 Conceptual Framework	32
3.2 Conceptual Framework Explanation	33

3.3	Research Hypothesis	34
CHAPTER 4		35
RESEARCH METHODS		35
4.1	Research Design.....	35
4.2	Population and Sample.....	35
4.2.1	Population.....	35
4.2.2	Sample	35
4.2.3	Sample Size.....	36
4.2.4	Sampling Technique	36
4.3	Variable and Operational Definition	36
4.3.1	Dependent Variable	36
4.3.2	Independent Variable	37
4.3.3	Moderator Variable.....	37
4.3.4	Operational Definition.....	37
4.4	Research Instrument.....	39
4.5	Time and Location.....	39
4.6	Research Protocol	40
4.7	Data Collection	40
4.8	Data Processing and Analysis.....	41
4.8.1	Data Processing.....	41
4.8.2	Data Analysis	41
4.9	Ethical Aspect.....	42
CHAPTER 5		44
RESULT		44
5.1.	Demographic Data.....	44
5.2.	Nutritional Status Data	45
5.3.	Severity of Disease	46
5.4.	Complications	46
5.5.	Hospitalization Frequency in a Year.....	46
5.6.	Relationship between nutritional status and severity of disease.....	47
5.7.	Relationship between nutritional status and complications	48
5.8.	Relationship between nutritional status and hospitalization frequency	
	49	
CHAPTER 6		51
DISCUSSION		51
6.1.	Demographic Data on Liver Cirrhosis Patient.....	51
6.2.	Nutritional Status Data on Liver Cirrhosis Patient	52
6.3.	Severity of Disease data on Liver Cirrhosis Patient.....	54
6.4.	Complications data on Liver Cirrhosis Patient.....	54

6.5.	Hospitalization Frequency in a Year Data on Liver Cirrhosis Patient.....	55
6.6.	Relationship Between Nutritional Status and Severity Of Disease.....	55
6.7.	Relationship Between Nutritional Status and Complications	56
6.8.	Relationship Between Nutritional Status and Hospitalization Frequency 57	
CHAPTER 7		59
CONCLUSION AND SUGGESTION.....		59
7.1.	Conclusion.....	59
7.2.	Suggestion.....	60
REFERENCES.....		62
ATTACHMENTS		70

LIST OF FIGURES

Figure 2. 1 Anatomy of Liver.....	5
Figure 2. 2 Histology of Liver.....	8
Figure 2. 3 Etiology of Malnutrition in Cirrhosis.....	29
Figure 3. 1 Conceptual Framework modified from	32
Figure 4. 1 Sample Size Formula.....	36
Figure 4. 2 Research Protocol	40

LIST OF TABLES

Table 2. 1 CTP Score Assessment (Peng et al., 2016)	22
Table 2. 2 Specific Treatment of Liver Cirrhosis by Etiology (Sherlock, 2011)	23
Table 4. 1 Dependent Variable.....	37
Table 4. 2 Independent Variable	38
Table 4. 3 Moderator Variable	38
Table 5. 1 Demographic Data on Liver Cirrhosis Patient (n=80).....	44
Table 5. 2 Nutritional Status on Liver Cirrhosis Patient Based on Subjective Global Assessment (n=80)	45
Table 5. 3 Nutritional Status on Liver Cirrhosis Patient Based on Mid Arm Circumference, Triceps Skinfold, and Handgrip Strength (n=80)	45
Table 5. 4 Severity of Disease Data on Liver Cirrhosis Patient (n=80).....	46
Table 5. 5 Complications Data on Liver Cirrhosis Patient (n=80).....	46
Table 5. 6 Hospitalization Frequency in a Year Data on Liver Cirrhosis Patient (n=80)	46
Table 5. 7 Spearman's Rank Correlation Test Between Nutritional Status and Severity of Disease	47
Table 5. 8 Spearman's Rank Correlation Test Between Nutritional Status and Complications.....	48
Table 5. 9 Spearman's Rank Correlation Test Between Nutritional Status and Hospitalization Frequency.....	49

LIST OF ATTACHMENTS

Attachment 1 Research Timeline	70
Attachment 2 Budget Plan.....	70
Attachment 3 Information for Consent.....	71
Attachment 4 Informed Consent	75
Attachment 5 Form Persetujuan Tindakan Medis	76
Attachment 6 Form Pengunduran Diri Sebagai Subjek Penelitian	77
Attachment 7 Subjective Global Assessment Questionnaire	78
Attachment 8 Ethical Clearance	79
Attachment 9 Research Instrument	80

LIST OF ABBREVIATIONS

ALP	: Alkaline Phosphatase
ALT	: Alanine Transaminase
AST	: Aspartate Aminotransferase
BMI	: Body Mass Index
CT	: Computerized Tomography
CTP	: Child-Turcotte Pugh
GGT	: Gamma Glutamyl Transpeptidase
HBV	: Hepatitis B Virus
HBeAg	: Hepatitis B e-Antigen
HCC	: Hepatocellular Carcinoma
HGS	: Handgrip Strength
ICC	: Indian childhood cirrhosis
INR	: International Normalized Ratio
MAC	: Mid Arm Circumference
MRI	: Magnetic Resonance Imaging
NAFLD	: Non-Alcoholic Fatty Liver Disease
NASH	: Non-Alcoholic Steatohepatitis
SGA	: Subjective Global Assessment
TSF	: Triceps Skinfold
USG	: Ultrasonography
WHO	: World Health Organization