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DIABETIC FOOT

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RELEVANCE. DIABETIC MELLITUS IS ONE OF THE WORLD'S COMMON CHRONIC DISEASES. ACCORDING TO THE WORLD HEALTH ORGANIZATION, IT IS ASSUMED THAT 60% OF THE PEOPLE FROM ASIAN COUNTRIES HAVE THIS DISEASE. DIABETIC FOOT IS AN ULCER THAT COULD DEVELOP IN PEOPLE WHO HAVE DIABETIC TYPE 1 AND TYPE 2. WHICH IS AN OPEN WOUND AND THE MOST COMMONLY AFFECTED PART OF THE BODY IS THE FOOT. IT WAS FOUND THAT 18.6 MILLION PEOPLE WORLDWIDE ARE CONSIDERED TO BE AFFECTED BY THE DIABETIC FOOT. ABOUT HALF OF THE PEOPLE ARE IDENTIFIED THAT THEY GOT THE DIABETIC FOOT DUE TO INFECTION AND THE 20% OF THEM WILL RESULT IN AMPUTATING THE FOOT, WHICH IS NECESSARY FOR PREVENTION OF SPREADING OF THE GANGRENE TO THE OTHER PARTS OF THE BODY. THIS COULD END UP IN A SERIOUS INFLUENCE ON THE DAILY LIFE OF THE PATIENTS AND IT IS NECESSARY TO EDUCATE EVERY INDIVIDUAL REGARDING THE DIABETIC FOOT COMPLICATION TO MAKE THEM AWARE OF METHODS OF TAKING CARE OF THE FOOT.

OBJECTIVE. AN ANALYSIS ABOUT THE DIABETIC FOOT: FACTORS THAT CONTRIBUTE TO THE DIABETIC FOOT, NON-SURGICAL AND SURGICAL TREATMENTS AND PREVENTION.

MATERIALS AND METHODS. THIS ARTICLE FOCUSES ON THE ANALYSIS AND MAKING REVIEWS ABOUT MEDICAL STATISTICS AND EVIDENCE FROM WORLD HEALTH ORGANIZATION'S WITHIN THE PAST 7 YEARS FROM 2017 TO 2024 OF BOTH COUNTRIES: SRI LANKA AND RUSSIAN FEDERATION.

RESULTS. THE DIABETIC MELLITUS LEADS TO DEVELOPMENT OF DISEASES THAT ARE RELATED TO NEUROPATHIC SENSORY LOSS AND PERIPHERAL ARTERIAL DISEASES (PAD) WHICH INTERN TRIGGERS THE DIABETIC FOOT FORMATION. THE NEUROPATHIC LEAD TO LOSS OF SENSATION AND PAD LEAD TO ISCHEMIA, THE SYSTEMATIC ANALYSIS SHOWED THAT 0.003-2.8% OF NEUROPATHIC CAUSED DIABETIC AND 0.01-0.4% PAD CAUSED DIABETIC. THE COMMON CLINICAL MANIFESTATION OF PAD IS NUMBNESS, TINGLING AND LOSS OF FEELING IN FOOT. DIABETES CAN ALSO BE ONE OF THE REASONS FOR THE FORMATION OF CHARCOT ARTHROPATHY, WHICH INCLUDES DIMINISHING OF BONES, JOINTS AND SOFT TISSUES. NEUROPATHY ALSO LEADS TO CONTINUOUS MICROTRAUMA, METABOLIC DISORDERS OF BONE, WHICH CAUSES INFLAMMATION, FRACTURES AND DEFORMITIES THAT HIGHLY CONTRIBUTES FOR THE INFECTIONS TO OCCUR.

CONCLUSION. DIABETIC FOOT IS ONE OF THE MOST COMMON REASONS FOR HOSPITALIZATION OF PATIENTS, WHICH LEADS TO AMPUTATION. THE GLOBAL WIDESPREAD PRESENCE HAS DRAMATICALLY PROGRESSED IN THE LAST THIRTY YEARS. IT IS EXPECTED TO FURTHER INCREASE IN THE FUTURE FROM 5.1% TO 7.7% IN 2030. KNOWING THE METHODS OF TAKING CARE OF THEIR OWN FOOT AND ATTENDING REGULAR BODY CHECKUPS, WITH A PROPER DIET AND LIFESTYLE MAINTENANCE CAN PREVENT THE DEVELOPMENT OF DIABETIC FOOT FORMATION.

KEYWORDS: DIABETIC MELLITUS, PERIPHERAL ARTERIAL DISEASES, DIABETIC FOOT.

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RELEVANCE

DIABETIC MELLITUS IS ONE OF THE WORLD'S COMMON CHRONIC DISEASES. ACCORDING TO THE WORLD HEALTH ORGANIZATION, IT IS ASSUMED THAT 60% OF THE PEOPLE FROM ASIAN COUNTRIES HAVE THIS DISEASE. DIABETIC FOOT IS AN ULCER THAT COULD DEVELOP IN PEOPLE WHO HAVE DIABETIC TYPE 1 AND TYPE 2. WHICH IS AN OPEN WOUND AND THE MOST COMMONLY AFFECTED PART OF THE BODY IS THE FOOT. IT WAS FOUND THAT 18.6 MILLION PEOPLE WORLDWIDE ARE CONSIDERED TO BE AFFECTED BY THE DIABETIC FOOT [1, 5-6]. ABOUT HALF OF THE PEOPLE ARE IDENTIFIED THAT THEY GOT THE DIABETIC FOOT DUE TO INFECTION AND THE 20% OF THEM WILL RESULT IN AMPUTATING THE FOOT, WHICH IS NECESSARY FOR PREVENTION OF SPREADING OF THE GANGRENE TO THE OTHER PARTS OF THE BODY. THIS COULD END UP IN A SERIOUS INFLUENCE ON THE DAILY LIFE OF THE PATIENTS AND IT IS NECESSARY TO EDUCATE EACH INDIVIDUAL REGARDING THE DIABETIC FOOT COMPLICATION AND MAKE THEM AWARE OF METHODS OF TAKING CARE OF THE FOOT [8, 10].

THE DIABETIC MELLITUS LEADS TO DEVELOPMENT OF DISEASES THAT ARE RELATED TO NEUROPATHIC SENSORY LOSS AND PERIPHERAL ARTERIAL DISEASES (PAD) WHICH INTURN TRIGGERS THE DIABETIC FOOT FORMATION. THE NEUROPATHIC LEAD TO LOSS OF SENSATION AND PAD LEAD TO ISCHEMIA, THE SYSTEMATIC ANALYSIS SHOWED THAT 0.003-2.8% OF NEUROPATHIC CAUSED DIABETIC AND 0.01-0.4% PAD CAUSED DIABETIC [6]. THE COMMON CLINICAL MANIFESTATION OF PAD IS NUMBENESS, TINGLING, AND LOSS OF FEELING IN FOOT. DIABETES CAN ALSO BE ONE OF THE REASONS FOR THE FORMATION OF CHARCOT ARTHROPATHY, WHICH INCLUDES DIMINISHING OF BONES, JOINTS AND SOFT TISSUES. NEUROPATHY ALSO LEADS TO CONTINUOUS MICRO TRAUMA, METABOLIC DISORDERS OF BONE, WHICH CAUSES INFLAMMATION, FRACTURES AND DEFORMITIES, WHICH HIGHLY CONTRIBUTES FOR THE INFECTIONS TO OCCUR [3-4, 18].

OBJECTIVE – AN ANALYSIS ABOUT THE DIABETIC FOOT: FACTORS THAT CONTRIBUTE TO THE DIABETIC FOOT, NON-SURGICAL AND SURGICAL TREATMENTS AND PREVENTION.

MATERIALS AND METHODS

THIS ARTICLE FOCUSES ON THE ANALYSIS AND MAKING REVIEWS ABOUT MEDICAL STATISTICS AND EVIDENCE FROM WORLD HEALTH ORGANI-

ZATION'S WITHIN THE PAST 7 YEARS FROM 2017 TO 2024 OF BOTH COUNTRIES: SRI LANKA AND RUSSIAN FEDERATION.

RESULTS AND DISCUSSION

DIABETIC FOOT IS A PATHOLOGICAL PROBLEM RELATED TO DIABETIC MELLITUS. WHEN CONSIDERING THE FACTORS THAT CONTRIBUTE TO THE FORMATION OF THE DIABETIC FOOT. THERE WAS A RECENT FINDING MENTIONING THAT GRAM NEGATIVE BACTERIA WAS A COMMON REASON FOR DIABETIC FOOT BUT WAS NOT CONCRETELY PROVIDED WITH EVIDENCE. ACCORDING TO THE PATHOLOGICAL PHYSIOLOGY, THE DISTURBANCE IN THE NEUROPATHY, IMMUNOPATHY, ARTERIOPATHY AND OTHER FACTORS PROMOTE THE INFECTION, ALSO THE TRAUMA THAT LEADS TO DISTURBANCE OF THE PROTECTIVE SKIN ENVELOPE. WHEN CONSIDERING THE MAIN FACTORS THAT HAVE AN IMPACT IN THE DEVELOPMENT OF DIABETIC FOOT ARE AGE, DURATION OF DIABETES, GENDER, GLYCEMIC CONTROL, DIABETIC RETINOPATHY, PERIPHERAL VASCULAR DISEASE AND NEPHROPATHY [2].

ACCORDING TO THE CROSS SECTIONAL STUDY IT WAS A RATIO OF 68 MALES AND 32 FEMALES WITH DIABETIC FOOT, WITH TYPE 2 DIABETES, ACCORDING TO DURATION OF DIABETES: LESS THAN 5 YEAR HAD 22%, FROM 5-10 YEARS HAD 24%, FROM 10 TO 15 YEAR HAD 17%, 15 TO 20 YEARS HAD 16 % AND MORE THAN 20 YEARS HAD 21%. IN THE RETROSPECTIVE STUDY THERE ARE 74.6% OF MEN AND 25.3% OF FEMALES ARE AFFECTED, WITH TYPE 2 DIABETES, LESS THAN 5 YEAR HAD 40%, 5 TO 10 YEARS HAD 34%, 10 TO 15 YEARS HAD 17%, 15 TO 20 YEARS HAD 7.3% AND >20 YEARS HAD 1.3%. ACCORDING TO THE COMPARISON OF BOTH THE STUDIES, IT CAN BE CONCLUDED THAT MALES ARE AFFECTED MORE THAN FEMALES WITH DIABETIC FOOT. MOST OF THE PATIENTS WERE FOUND WITH TYPE 2 DIABETIC [14, 17, 19]. WHEN THE DURATION OF DIABETES IS LESS THAN 5 YEARS OR FROM 5 TO 10 YEARS THE CHANCE OF DEVELOPING DIABETIC FOOT IS HIGH [2].

IN ANOTHER STUDY IT WAS MENTIONED THAT THE FIRST PRESENTING OF AN OUTPATIENT CHARACTERISTICS CONSIDERING SMOKING IT WAS IDENTIFIED THAT THE PATIENTS WHO ARE NON-SMOKERS: 49.7%, FORMER SMOKERS: 32.2%, CURRENT SMOKERS: 18%. THE EFFECT OF ALCOHOL INTAKE FOR NON-ALCOHOLIC PEOPLE: 72.8%, FORMER ALCOHOL INTAKE: 15%, CURRENT ALCOHOL INTAKE: 12%. PAST ULCER HAS 41.1%.

RETICULOPATHY HAS A CONTRIBUTION OF ABOUT 57.4% [4, 6, 11]. WHEN CONSIDERING THE PRESENTING DISEASES IN PATIENTS WITH DIABETIC FOOT: HYPERTENSION: 80.5%, ISCHEMIC HEART DISEASES: 39.3%, CEREBROVASCULAR DISEASE: 16.6%, SENSORY NEUROPATHY: 75.1%, ISCHEMIC LESION: 49.4%. IT WAS IDENTIFIED THAT THERE WERE A HIGH PERCENTAGE OF DIABETIC FOOT PATIENTS WHO WERE NONSMOKERS, NONALCOHOLIC, WITH A PAST ULCER. WHEN CONSIDERING THE OTHER PATHOLOGICAL DISEASES HYPERTENSION AND SENSORY NEUROPATHY HAS A HIGHEST AND OFTENLY FOUND IN A HIGH NUMBER OF DIABETIC PATIENTS [3, 11, 13].

WHEN THE PROPER CARE AND MANAGEMENT TO THE DIABETIC FOOT IS NOT MAINTAINED, IT MIGHT END UP IN A HIGH RISK FOR THE AMPUTATION TO OCCUR. THE COMMONEST CAUSE OF HYPERGLYCEMIA IS NEUROPATHY, WHICH CAUSES THE LOSS OF SENSATION, WHICH LEADS TO UNAWARE INJURIES OF THE LEG AND FOOT. THE PERIPHERAL ARTERY DISEASES REDUCE THE BLOOD FLOW AND MAKE IT IMPOSSIBLE TO HEAL THE WOUND. IT IS NECESSARY TO UNDERGO TREATMENT AS SOON AS POSSIBLE OR WHICH MAY LEAD TO SEVERE INFECTION AND AMPUTATION OF THE LEG MIGHT BE THE RESULT. AN EARLY DIAGNOSIS WOULD PREVENT WORSENING AND THE RISK OF AMPUTATION ALONG WITH AN EFFECTIVE TREATMENT. REGULAR EXAMINATION OF FOOT INCLUDING MONOFILAMENTS, ASSESSING THE VASCULARITY BY USING ANKLE BRACHIAL INDEX (ABI), TOE BRACHIAL INDEX (TBI), ARTERIAL COLOR DOPPLER SCAN. TREATMENTS SUCH AS USING NON REMOVABLE KNEE HIGH OFFLOADING DEVICE, WHICH CAN BE EITHER TOTAL CONTACT CAST (TCC) OR REMOVABLE WALKER RENDERED, ANKLE HIGH OFFLOADING DEVICE, AND FELTED FOAM CAN ALSO BE USED ALONG WITH THE PARTICULAR FOOTWEAR [7, 10].

REVASCULARIZATION IS AN IMPORTANT STEP IN THE TREATMENT OF DIABETIC FOOT IN WHICH WE TRY TO SECURE THE BLOOD SUPPLY FOR AT LEAST ONE OF THE FOOT ARTERIES, MOST OFTENLY THE ARTERY THAT SUPPLIES TO THE INJURED WOUND AREA SO THAT IT CAN UNDERGO THE HEALING PROCESS. THE TYPE OF VASCULARIZATION METHOD THAT WE ARE GOING TO USE SHOULD CONSIDER THE WAY OF PERIPHERAL ARTERY DISEASE DISTRIBUTION AND AUTOGENOUS VEIN [7, 18]. NON-SURGICAL TREATMENTS SUCH AS ADVANCED WOUND HEALING METHODS AND DEBRIDEMENT METHODS ARE INTRODUCED FOR EXAMPLE DRESSING WHICH DIRECTLY INTRODUCES THE THERAPEUTIC MEDICATIONS TO THE WOUND

SUCH AS GROWTH FACTORS, STEM CELLS, PEPTIDES, BIOLOGICALLY ACTIVE SUBSTANCES (COLLAGEN, HYALURONIC ACIDS, FIBRINS, CHITOSAN) AND MOST ABUNDANTLY USED HYDROGELS. THESE KINDS OF SUBSTANCES GREATLY REDUCE THE INFLAMMATORY CYTOKINES AND DEGRADATION OF MATRIX THEREBY REGULATING NEW COLLAGEN FORMATION AND TISSUE GRANULATIONS [2, 15, 16].

THERAPIES SUCH AS HYPERBARIC OXYGEN THERAPIES (HBOT) HAVE THE BACTERICIDAL EFFECT BY OXYGEN FREE RADICALS AND PROMOTES HEALING, NEGATIVE PRESSURE WOUND THERAPY (NPWT) HAS THE VERY HIGH EFFICIENCY OF REDUCING THE CHANCE OF AMPUTATION, ALSO PLATELET PLASMA TRANSFUSION, BIOTECHNOLOGICAL CELL THERAPIES [8].

WHEN CONSIDERING THE ASPECT OF SURGERY IN THE PATIENT WITH DIABETIC FOOT, FOR EXAMPLE IN CONDITIONS SUCH AS ROCKER BOTTOM DEFORMITY WHICH IS A MIDFOOT COLLAPSE WHICH IS CAUSED DUE TO OSSEOUS DESTRUCTIONS, IN SUCH CASES FUSION CAN BE PERFORMED BY MIDFOOT OSTEOTOMY. PROCEDURES SUCH AS METATARSOPHALANGEAL JOINT (MTPJ) ARTHROPLASTY, HALLUX INTERPHALANGEAL JOINT (HIPJ) ARTHROPLASTY, METATARSAL OSTEOTOMIES AND METATARSAL HEAD RESECTION (MHR) [9].

CONCLUSION

DIABETIC FOOT IS ONE OF THE MOST COMMON REASONS FOR HOSPITALIZATION OF PATIENTS, WHICH LEADS TO AMPUTATION. THE GLOBAL WIDESPREAD PRESENCE HAS DRAMATICALLY PROGRESSED IN THE LAST THIRTY YEARS. IT IS EXPECTED TO FURTHER INCREASE IN THE FUTURE FROM 5.1% TO 7.7% IN 2030. KNOWING THE METHODS OF TAKING CARE OF THEIR OWN FOOT AND ATTENDING REGULAR BODY CHECKUPS, WITH A PROPER DIET AND LIFESTYLE MAINTENANCE CAN PREVENT THE DEVELOPMENT OF DIABETIC FOOT FORMATION.

CONFLICT OF INTEREST

THE AUTHORS DECLARE THE ABSENCE OF OBVIOUS AND POTENTIAL CONFLICTS OF INTEREST RELATED TO THE PUBLICATION OF THIS ARTICLE.

AUTHORS CONTRIBUTION

KANTHIBAN S. – WRITING TEXT, PROCESSING MATERIALS;

GRIGORYAN A.Y. – SCIENTIFIC GUIDANCE, EDITING, DESIGN OF THE FINAL VERSION OF THE AR-

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REFERENCE

1. ALAVI A., SIBBALD R.G., MAYER D., GOODMAN L., BOTROS M., ARMSTRONG D.G. DIABETIC FOOT ULCERS. *JOURNAL OF THE AMERICAN ACADEMY OF DERMATOLOGY*. 2014;70(1):11-18.
2. BOTEZATU I., LAPTOIU D. MINIMALLY INVASIVE SURGERY OF DIABETIC FOOT – REVIEW OF CURRENT TECHNIQUES. *JOURNAL OF MEDICINE AND LIFE*. 2016;9(3):249-254.
3. GHOTASLOU R., MEMAR M.Y., ALIZADEH N. CLASSIFICATION, MICROBIOLOGY AND TREATMENT OF DIABETIC FOOT INFECTIONS. *JOURNAL OF WOUND CARE*. 2018;27(7):434–41.
4. GRENNAN D. DIABETIC FOOT ULCERS. *JAMA*. 2019;321(1):114.
5. HUANG J., YANG J., QI H., XU M., XU X., ZHU Y. PREDICTION MODELS FOR AMPUTATION AFTER DIABETIC FOOT: SYSTEMATIC REVIEW AND CRITICAL APPRAISAL. *DIABETOLOGY & METABOLIC SYNDROME*. 2024;16(1).
6. IGNATYEVA V., AVXENTYEVA M., GALSTYAN G.R., BREGOVSKIY V., UDOVICHENKO O. DIRECT COSTS OF DIABETIC FOOT ULCERS IN RUSSIA. *VALUE IN HEALTH*. 2014;17(7):A342.
7. JOSEPH W.S. DIABETIC FOOT INFECTION. *JOURNAL OF THE AMERICAN PODIATRIC MEDICAL ASSOCIATION*. 2013;103(1):1.
8. KARUPPIAH D., WEERAKKODY M., COORAY S., WEERASINGHE C. DIABETIC FOOT CARE IN SRI LANKA- A WAY FORWARD. *SRI LANKA JOURNAL OF DIABETES ENDOCRINOLOGY AND METABOLISM*. 2018;8(1):1.
9. KUMBHAR S., BHATIA M. ADVANCEMENTS AND BEST PRACTICES IN DIABETIC FOOT CARE: A COMPREHENSIVE REVIEW OF GLOBAL PROGRESS. *DIABETES RESEARCH AND CLINICAL PRACTICE*. 2024;217:1118-1145.
10. KILICOGLU O.I., DEMIREL M., AKTAS S. NEW TRENDS IN THE ORTHOPAEDIC MANAGEMENT OF DIABETIC FOOT. *EFORT OPEN REVIEWS*. 2018;3(5):269-277.
11. LAVERY L.A., WUNDERLICH R.P., TREDWELL J.L. DISEASE MANAGEMENT FOR THE DIABETIC FOOT: EFFECTIVENESS OF A DIABETIC FOOT PREVENTION PROGRAM TO REDUCE AMPUTATIONS AND HOSPITALIZATIONS. *DIABETES RESEARCH AND CLINICAL PRACTICE*. 2005;70(1):31-37.
12. MATOS M., MENDES R., SILVA A.B., SOUSA N. PHYSICAL ACTIVITY AND EXERCISE ON DIABETIC FOOT RELATED OUTCOMES: A SYSTEMATIC REVIEW. *DIABETES RESEARCH AND CLINICAL PRACTICE*. 2018;139:81-90.
13. PEREZ-PANERO A.J., RUIZ-MUNOZ M., CUESTA-VARGAS A.I., GONZALEZ-SANCHEZ M. PREVENTION, ASSESSMENT, DIAGNOSIS AND MANAGEMENT OF DIABETIC FOOT BASED ON CLINICAL PRACTICE GUIDELINES. *MEDICINE*. 2019;98(35):e16877.
14. RIEDEL U., SCHUBLER E., HARTEL D., KEILER A., NESTORIS S., STEGE H. WOUND TREATMENT IN DIABETES PATIENTS AND DIABETIC FOOT ULCERS. *DER HAUTARZT; ZEITSCHRIFT FUR DERMATOLOGIE, VENEROLOGIE, UND VERWANDTE GEBIETE*. 2020;71(11):835-842.
15. RUBIO J.A., JIMENEZ S., LAZARO-MARTINEZ J.L. MORTALITY IN PATIENTS WITH DIABETIC FOOT ULCERS: CAUSES, RISK FACTORS, AND THEIR ASSOCIATION WITH EVOLUTION AND SEVERITY OF ULCER. *JOURNAL OF CLINICAL MEDICINE*. 2020;9(9):3009.
16. SHIU A.Y., WONG R.M. DIABETES FOOT CARE KNOWLEDGE: A SURVEY OF REGISTERED NURSES. *JOURNAL OF CLINICAL NURSING*. 2011;20(15-16):2367-2370.
17. SONG K., CHAMBERS A.R. DIABETIC FOOT CARE. *TREASURE ISLAND (FL): STATPEARLS PUBLISHING*. 2023.
18. VIKULOVA O.K. TRENDS IN EPIDEMIOLOGY OF DIABETIC FOOT AND LOWER LIMB AMPUTATIONS IN RUSSIAN FEDERATION BY DIABETES REGISTER 2013–2017. *BIBLIOBOARD LIBRARY CATALOG (OPEN RESEARCH LIBRARY)*. 2019.
19. WANG Y., SHAO T., WANG J., HUANG X., DENG X., CAO Y. AN UPDATE ON POTENTIAL BIOMARKERS FOR DIAGNOSING DIABETIC FOOT ULCER AT EARLY STAGE. *BIOMEDICINE & PHARMACOTHERAPY*. 2021;133:1109-1191.
20. ZUBAIR M. PREVALENCE AND INTERRELATIONSHIPS OF FOOT ULCER, RISK-FACTORS AND ANTIBIOTIC RESISTANCE IN FOOT ULCERS IN DIABETIC POPULATIONS: A SYSTEMATIC REVIEW AND META-ANALYSIS. *WORLD JOURNAL OF DIABETES*. 2020;11(3):78-89.