I'm not a bot

Mdw blood test high

A high monocyte count, referred to as monocytosis, occurs when the body is subject to acute or chronic inflammation caused by things like infections, trauma, medications, autoimmune diseases, and certain cancers. Monocytes are white blood cells produced by the bone marrow that make up your frontline immune defense. There are no symptoms of high monocytes. Monocytosis is simply an indication of an illness or health condition which could be minor or serious. Monocytes are part of your innate (inborn) immune system. This is your body's first-line response to infections, trauma, disease, or other conditions that cause the body harm. As a part of innate immunity, monocytes do not rely on antibodies to target an immune assault. Instead, they patrol the body continuously to monitor for any foreign invaders and attack indiscriminately until the adaptive (antibody-based) immune system focuses the assault. Monocytosis occurs as the number of monocytes increases in response to acute (short and severe) or chronic (persistent or recurrent) infections or illnesses. High monocytes are detected with a complete blood count (CBC) which measures the number and proportion of blood cells in a sample of blood, including different white blood cells. High monocytes may be detected incidentally during a routine medical visit. Since monocytosis does not cause symptoms on its own, you may not even know there is a problem until lab results are returned. At other times, your monocytes may be checked if you have symptoms of an infection or illness. Testing may also be performed if you are recovering from an illness to see how you are doing. Monocytosis is diagnosed when your monocytes are above the normal range of values (meaning the high and low values between which levels are considered normal). These values are represented both as percentages of your total white blood cell count and the number of cells per cubic millimeter of blood (mm3). With most labs: A normal monocyte count is between 2% and 8% (or 200 to 800 mm3).A high monocyte count is generally above 10% (or 1,000 per mm3). Monocytosis is a general indication of an acute or chronic inflammatory condition. The cause may not be serious and will resolve on its own; in other cases, it may be the first sign of a serious illness, particularly if monocytosis is persistent and unexplained. The possible causes of monocytosis are many and include: Pregnancy Chronic stress Severe traumatic injury Bacterial infections, like tuberculosis, salmonella, syphilis, and bacterial endocarditis Viral infections, like mononucleosis, mumps, measles, and COVID-19 Fungal infections, like aspergillosis, cryptococcal meningitis, and systemic candidiasis Parasitic infections, like toxoplasmosis and malaria Autoimmune diseases, like lupus, rheumatoid arthritis, and inflammatory bowel disease Chronic inflammatory diseases, like sarcoidosis and Crohn's colitis Blood diseases, like sickle cell disease and hemolytic anemia Blood cancers, such as Hodgkin lymphoma, and chronic myelomonocytic leukemia (CMML) Medications, including the long-term use of corticosteroids, olanzapine, or allopurinol Splenectomy (removal of the spleen which serves as a reservoir for monocytes) Radiation therapy, particularly for bone marrow Heart attack, also known as myocardial infarction A high monocyte count on its own is not diagnostic of any medical condition. It simply indicates that the body is responding to a condition characterized by inflammation. When compared to other blood cells in the CBC, monocytes can offer clues to what is causing your illness. For instance, with chronic myelomonocytic leukemia (CMML), monocytes will characteristically be elevated while all other white blood cells, red blood cells, and platelets will be low. To help narrow the possible causes of your monocytosis, your healthcare provider will order additional tests, which may include: Blood smear (a sample of blood that is stained and examined under a microscope) Blood culture (used to grow and isolate disease-causing organisms in blood) Stool culture (used to grow and isolate disease-causing organisms in stool) C-reactive protein (a blood test used to detect generalized inflammation in the body) PCR tests (a type of blood test that can identify different infections based on their DNA) Rheumatoid factor test (a blood test used to check for signs of autoimmunity) STI panel (a panel of blood or urine tests to check for sexually transmitted infections) Bone marrow biopsy (the extraction of a sample of bone marrow to examine in the lab) The treatment of monocytosis depends on the cause. For example, antibiotics may be prescribed to treat a bacterial infection and certain parasitic infections, while antifungals can help clear serious fungal infections. People with leukemia, lymphoma, or CMML may be treated with chemotherapy, radiation therapy, or stem cell transplant. In some cases, medications like corticosteroids or immunosuppressants may be given to ease inflammation and decrease the monocyte count. This is a typical approach for certain autoimmune diseases or chronic inflammatory diseases like Crohn's colitis. During treatment, you may need to have your monocyte levels checked repeatedly. Testing at regular intervals helps to monitor the effectiveness of treatment. A high monocyte count (monocytosis) is a sign that your body is acting against infection or injury, or dealing with a chronic condition like an autoimmune disorder, inflammatory disease, or certain blood cancers. Monocytosis does not cause symptoms, although the underlying condition can. On its own, a high monocyte count cannot diagnose any conditions but may help narrow the causes when compared to other blood cells in a complete blood count (CBC). Monocytosis generally improves once the underlying cause is treated. A high monocyte count, referred to as monocytosis, occurs when the body is subject to acute or chronic inflammation caused by things like infections, trauma, medications, autoimmune diseases, and certain cancers. Monocytes are white blood cells produced by the bone marrow that make up your frontline immune defense. There are no symptoms of high monocytes. Monocytosis is simply an indication of an illness or health condition which could be minor or serious. Monocytes are part of your innate (inborn) immune system. This is your body's first-line response to infections, trauma, disease, or other conditions that cause the body harm. As a part of innate immunity, monocytes do not rely on antibodies to target an immune assault. 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On its own, a high monocyte count cannot diagnose any conditions but may help narrow the causes when compared to other blood cells in a complete blood count (CBC). Monocytosis generally improves once the underlying cause is treated. Understanding the value of monocyte distribution width (MDW) in acutely ill medical patients presenting to the emergency department: a prospective single center evaluation The monocyte distribution width (MDW) has emerged as a promising biomarker for accurate and early identification of patients with potentially life-threatening infections. Here we tested the diagnostic performance of MDW in adult patients requiring hospital admission for community-acquired infections and sepsis, evaluated sources of heterogeneity in the estimates of diagnostic accuracy, and assessed the meaning of MDW in a patient population presenting to the emergency department (ED) for acute non-infectious conditions. 1925 consecutive patients were categorized into three groups: non-infection (n = 1507), infection (n = 316), and sepsis/septic shock (n = 102). Diagnostic performance for infection or sepsis of MDW alone or in combination with components of SOFA was tested using AUC of ROC curves, sensitivity, and specificity. The relationship between MDW and different pathogens as well as the impact of non-infectious conditions on MDW values were explored. For the prediction of infection, the AUC/ROC of MDW (0.84) was nearly overlapping that of procalcitonin (0.83), and C-reactive protein (0.89). Statistical optimal cut-off value for MDW was 21 for predicting infection (sensitivity 73%, specificity 82%) and 22 for predicting sepsis (sensitivity 79%, specificity 83%). The best threshold to rule out infection was MDW ≤ 17 (NPV 96.9, 95% CI 88.3–100.0), and ≤ 18 (NPV 99.5, 95% CI 98.3–100.0) to rule out sepsis. The combination of MDW with markers of organ dysfunction (creatinine, bilirubin, platelets) substantially improved the AUC (0.96 (95% CI 0.94–0.97); specificity and sensitivity of 88% and 94%, respectively). In conclusion, MDW has a good diagnostic performance in diagnosing infection and sepsis in patients presenting in ED. Its use as an infection marker even increases when combined with other markers of organ dysfunction. Understanding the impact of interactions of non-infectious conditions and comorbidities on MDW and its diagnostic accuracy requires further elucidation. Article Open access 16 June 2021 Article Open access 13 December 2022 Article Open access 01 July 2022 Infections are one of the most common reasons for patients to seek medical care in the emergency department. The high burden of infections has been demonstrated in a large German study showing that more than one out of four patients admitted to the hospital were diagnosed with infection1. Despite major advances in medicine, early recognition of potentially life-threatening infections remains a fundamental challenge in clinical practice. The spectrum of symptoms is highly variable and non-specific. Early signs of sepsis are often vague or unusual and may be missed, misinterpreted or clouded by complex underlying disease conditions. Many serious non-infectious diseases may mimic sepsis. The failure to rule out an infection accurately can also lead to excessive and unnecessary use of antimicrobial therapy. Unfortunately, available laboratory tests for early and accurate diagnosis of serious infections have significant limitations2.Recently, there has been a resurging interest in studying the diagnostic utility of various components of the complete blood cell count, which represents a first-level test in all acutely ill patients. Indeed, complete blood count hides a rich collection of useful information related to each blood cell3. Emerging data suggest that monocyte distribution width (MDW), a quantitative measure of variability in the volume of circulating monocytes, might improve early screening and diagnosis of acute serious infections, thus navigating clinical decision-making in combination with clinical findings4,5,6,7,8,9,10,11,12,13,14. The performance of MDW coupled with white blood cell count (WBC) has been reported to be equivalent to or outperform the accuracy of C-reactive protein (CRP) and procalcitonin (PCT) for the diagnosis of sepsis15,16,17,18,19,20. Especially in a subgroup of patients with a low pre-test sepsis probability score, in which no CRP or PCT had been ordered routinely21. Recently published systematic reviews and meta-analyses demonstrated promising diagnostic performance of MDW both for bacterial and viral sepsis, including COVID-19 and it has been suggested that MDW, due to its high sensitivity, could serve as a “rule-out” screening tool for sepsis in adult patients22,23. In addition, the above-mentioned metanalyses suggested that the overall diagnostic performance of MDW was comparable with that of PCT and CRP. Although encouraging, original studies included in recent meta-analyses have been performed in a heterogeneous clinical context, with inconsistent thresholds for MDW and variable outcome definitions. Thus, further studies are required to understand the role of MDW in the early detection of serious infections. With this background, the primary research objective of the study was to test the diagnostic performance of MDW in adult patients requiring hospital admission for community-acquired infections, sepsis and/or septic shock and to investigate sources of heterogeneity in the estimates of diagnostic accuracy. We also sought to evaluate the meaning of MDW biomarker in a large and unselected patient population presenting to the emergency department for acute non-infectious conditions.We performed observational, exploratory, prospective, non-interventional cohort study in a high-volume academic center. The study was conducted between September 2019 and October 2020. The study was performed in accordance with Good Clinical Practice, as defined by the International Conference on Harmonization, the ethical principles underlying European Union Directive 2001/20/EC, and all applicable local requirements. The need for informed consent was waived given the non-interventional, no potential harm to subjects, and anonymous nature of the study. MDW results were unavailable to the physicians in charge and subjects were not managed based on the results of MDW.The study population included all consecutive adults presenting to the Emergency department and subsequently admitted to the Department of Internal Medicine (medical ward or intensive care unit). For the final analysis, patients were subsequently assigned into one of three pre-defined groups based on the electronic medical records: (1) patients without clinically, radiologically, microbiologically and/or laboratory (negative PCT levels) proven infections; (2) patients with definitive admission diagnosis of bacterial infection (positive bacterial culture result, and/or clinical, radiological and laboratory findings, (3) patients with definitive admission diagnosis of sepsis and/or septic shock (defined according to Sepsis-3 criteria)24. The assignment to the respective groups was performed by analyzing hospital electronic medical records after completion of the study. The hospital electronic medical records were reviewed by two experienced clinicians (MK, JM). All patients were assessed by both investigators. Discrepancies were resolved by consulting a third investigator (MM). All diagnoses were made after consensus and continuous data integrity checks by independent investigators.Data collectionAll clinical and paraclinical data were recorded in and extracted from a hospital electronic medical record (Medicalc4). Baseline demographic and clinical variables included age, sex, co-morbidities (cancer, diabetes, cirrhosis, chronic heart failure, coronary artery disease, chronic kidney disease, chronic obstructive pulmonary disease, immunosuppression), vital signs, qSOFA, SIRS, routine biochemistry and microbiological data, ward or intensive care admission, hospital length of stay and survival. Blood for the complete blood count with differential was obtained in a K3EDTA tube. The same blood sample was used for MDW measurement using UniCelDxH 900 analyzer (Beckman Coulter, Inc., Brea, CA). C-reactive protein (CRP) was determined in all patients (cobas c 702, Roche; Tina-quant, immunoturbidimetry, reference range 0–5 mg/l), while procalcitonin (PCT) was measured (cobas e 601, Roche; Elecsys BRAHMS, ECLIA, electrochemiluminescence) when clinically indicated.Study outcome and statistical analysisThe primary aim of this study was to evaluate the diagnostic utility of MDW value to detect an infection, sepsis and/or septic shock in the population of patients presenting to the emergency department and requiring admission to the hospital. We sought to determine the optimal cut-off, rule-in and rule-out value and then compare the MDW performance with other well established infection biomarkers. The secondary aim was to investigate the optimal statistical model combining MDW with other easily obtainable laboratory parameters such as infection biomarkers or SOFA score components.General descriptive statistics for the study population were calculated. Continuous variables are presented as a median with IQR (interquartile range). Categorical variables are presented as numbers with percentages. Statistical differences between continuous variables were evaluated by the non-parametrical Kruskal–Wallis test or Wilcoxon test. To determine the optimal cut-off, rule-in and rule-out value for MDW and to compared the MDW performance with other biomarkers we performed multiple receiver operating characteristic (ROC) analysis, including the calculation of sensitivity, specificity, likelihood ratio and the AUC (Area Under the Curve). The best thresholds were searched by the Youden method from ROC curve analysis. ORs (odds ratios) were calculated for the optimal cut-off values. Results presented along with their 95% confidence intervals (CIs). The results were considered significant for p value less than 0.05. For the non-infectious group we defined the 95th percentile for MDW and then compared MDW values between different groups using non parametrical one-way ANOVA on ranks. Spearman’s rank correlation was computed to assess the relationship between MDW and qSOFA score.A multivariate logistic regression analysis was used to detect statistically significant predictors of sepsis development. Those variables were then subjected to a final logistic regression model. The ROC analysis of this model, including sensitivity and specificity, was then compared to the best standard biomarker (CRP).We used SAS (SAS Institute Inc., Cary, NC, USA) and Statistica 12 (StatSoft®, TIBCO Software Inc., USA) for the statistical analysis.Ethics approvalThis study’s protocol was approved by the ethics committee of Faculty hospital Pilsen, Czech Republic (approval number: 393/2020).A total of 2049 adult patients presenting to the Emergency department and subsequently admitted to the hospital were assessed for eligibility during the reference timeframe. Of these patients, 124 patients were excluded due to inadequate sample collection (inaccurate MDW measurement), prior enrollment in the study, pregnancy, discharge from the ED or due to other relevant limitations (e.g. absence of other biomarkers such as CRP). Thus, 1925 patients were enrolled, of whom 418 were admitted with infection-related causes. The flowchart of the enrollment process is shown in Fig. 1.Figure 1Flowchart describing enrollment and exclusion of patients.All those patients had complete blood count differential including MDW, PCT, CRP, coagulation (aPTT–activated Partial Thromboplastin Time, PT–Prothrombin Time) and biochemistry needed for SOFA score calculation (creatinine, bilirubin, lactate) ordered upon presentation to the emergency department. Group 1 included patients without an infection (n = 1507; 78.3%); group 2 included patients that developed an infection but did not meet the criteria for sepsis (n = 316; 16.4%) and group 3 included patients with sepsis and/or septic shock, defined by a vasopressor requirement to maintain a mean arterial pressure of 65 mmHg or greater and serum lactate level greater than 2 mmol/L in the absence of hypovolemia (n = 102, 5.3%). Characteristics of patients at baseline and preexisting medical conditions likely to predispose for infection are provided in Table 1. Baseline blood count differential including MDW, CRP, PCT and biochemistry values are provided in Table 2. Table 1 Characteristics of the patients at baseline.Table 2 Laboratory results of monitored parameters and parameters of SOFA score.MDW for detection of infection and sepsisMDW was significantly higher in patients admitted with infection (without or with sepsis and/or septic shock) compared to those without infection [23(20–25) vs. 19(17–20), p 43 (PPV 66.7, 95% CI 20.47–100) and MDW ≤ 18 (NPV 99.5, 95% CI 98.3–100) to rule out sepsis. ROC curves for infection and sepsis detection are showed in Fig. 3.Figure 3ROC curves analysis comparison for MDW in prediction of sepsis and or septic shock (blue) or infection (orange) upon presentation to the emergency department.Non-infectious causes for MDW elevationThe distributions of non-infectious causes of MDW and CRP across various diagnostic groupings are shown in Fig. 4.Figure 4Comparison of MDW and CRP in non-infection, infection and sepsis/septic shock groups of patients. Medians with interquartile ranges. CAD coronary artery disease, CHF chronic heart failure, CKD chronic kidney disease, COPD chronic obstructive pulmonary disease, DM diabetes mellitus.In the non-infectious group diabetes mellitus and multimorbidity were associated with higher MDW values than that of patients without comorbidities. Multimorbidity was defined as at least two unrelated chronic conditions from other groups, with diabetes being the most common (69%). Other groups did not reach statistical significance, although both patient with cirrhosis and immune-suppression had higher or identical median values (Table 3). Table 3 Comparison of non-infective causes for MDW elevation.The median value of MDW in non-infectious group was 19 (17–20) with maximum of 40 and 95th percentile 23. Thus, we selected all patients above 95th percentile for MDW to evaluate the cause of the elevation. Total of 49 patients crossed the threshold, of which 30 had significant comorbidities. (Table S1, Supplementary Appendix) For the purpose of the risk factor analysis in a limited sample setting we counted each comorbidity separately in multimorbid patients. The median and mean values with IQR are provided in Table 4. Interestingly, 50% of the patients with comorbidities and high MDW without an infection had active cancer, which is a significant proportion considering only 10.8% of patients with comorbidities from the whole study population had cancer and the percentage was even lower in the non-infective group (8.4%). The most common type of cancer in this group were hematologic malignancies (n = 7; 46.7%) followed by adenocarcinoma of pancreas (n = 3; 20%). Moreso, four patients with significant MDW elevation without an infection or comorbidities had cancer diagnosed on admission. No significant difference in MDW values was found in-between patients grouped by comorbidities. Table 4 Non-infective causes of significant MDW elevation above 95th percentile (MDW value 23).MDW in combination with qSOFA and other biomarkers of infectionThere was a weak positive correlation between MDW and qSOFA in the non-infective group (r(1500) = 0.09, p