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DISTRIBUTION OF BLOOD GROUPS ABO AND RH AMONG COVID-19 PATIENTS IN SAUDI

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Abstract :

This research was conducted to better understand the ABO blood typing system. To better manage and treat diseases, researchers in Saudi Arabia performed case-control studies to examine the correlation between different blood groups and COVID-19.This research For a total of 10,000 patients, we looked into how ABO and Rh blood groups correlated with COVID-19 vulnerability. Participants were collected over the course of two years from all COVID-19 Examination Centers and Hospitals in the Saudi Arabian Province. Patients who met the inclusion and exclusion criteria were enrolled between January 2, 2020 and January 4, 2022. This study looked at numerous potential risk factors for dying from a COVID-19 infection in the Western Province of Saudi Arabia during the early phases of the pandemic. Those in our sample who reported experiencing COVID-19-related symptoms—including high body temperature, coughing, pneumonia, and respiratory distress syndrome—had a much increased risk of dying. The majority of people complained about these signs. The presence of preexisting renal or cardiovascular disease also worsened the prognosis of a COVID-19 infection and was associated with a greater mortality rate. These results highlight the need for early diagnosis and supportive treatment for patients with COVID-19 infection. Our study population had much higher frequencies of O+, A+, and B+ than the general population, however there was no correlation between the distribution of blood groups and an increased risk of death from COVID-19. Despite the fact that certain blood groups were much more common, this was the case. Thus, larger-scale studies are needed to examine the correlations between blood types and the severity of COVID-19 infection.
Key words : Distribution of Blood Groups, Blood Groups ABO and Rh, Covid-19 Patients in Saudi

الملخص:
تم إجراء هذا البحث لفهم نظام فصيلة الدم ABO بشكل أفضل. لإدارة الأمراض وعلاجها بشكل أفضل ، أجرى الباحثون في المملكة العربية السعودية دراسات حالة وضوابط لفحص العلاقة بين مجموعات الدم المختلفة و COVID-19. هذا البحث لما مجموعه 10000 مريض ، نظرنا في كيفية ارتباط فصائل الدم ABO و Rh بـ COVID -19 الضعف. تم جمع المشاركين على مدار عامين من جميع مراكز ومستشفيات فحص COVID-19 في المملكة العربية السعودية. تم تسجيل المرضى الذين استوفوا معايير التضمين والاستبعاد بين 2 يناير 2020 و 4 يناير 2022. نظرت هذه الدراسة في العديد من عوامل الخطر المحتملة للوفاة من عدوى COVID-19 في المنطقة الغربية من المملكة العربية السعودية خلال المراحل المبكرة من جائحة. أولئك في العينة الذين أبلغوا عن أعراض مرتبطة بـ - COVID-19 بما في ذلك ارتفاع درجة حرارة الجسم والسعال والالتهاب الرئوي ومتلازمة الضائقة التنفسية - كانوا أكثر عرضة لخطر الوفاة. اشتكى غالبية الناس من هذه العلامات. كما أدى وجود أمراض الكلى أو القلب والأوعية الدموية الموجودة مسبقًا إلى تفاقم تشخيص عدوى COVID-19 وارتبط بمعدل وفيات أعلى. تسلط هذه النتائج الضوء على الحاجة إلى التشخيص المبكر والعلاج الداعم للمرضى المصابين بعدوى COVID-19. كان لدى مجتمع دراستنا ترددات أعلى بكثير من O + و A + و B + من عامة السكان ، ومع ذلك لم يكن هناك ارتباط بين توزيع فصائل الدم وزيادة خطر الوفاة من COVID-19. على الرغم من حقيقة أن بعض فصائل الدم كانت أكثر شيوعًا ، كان هذا هو الحال. وبالتالي ، هناك حاجة إلى دراسات على نطاق واسع لفحص الارتباطات بين أنواع الدم وشدة عدوى COVID-19 .
الكلمات المفتاحية: التوزيع فصائل الدم ، فصائل الدم ABO و Rh ، مرضى Covid-19 في السعودية

Introduction:

In December 2019, outbreaks of coronavirus disease 2019 (COVID-19) were first reported in the city of Wuhan in China. It was soon determined to be a global pandemic as it quickly expanded from that location and began to pose a threat to a diverse range of nations around the world. The 2019 new coronavirus (SARS-COV-2) from the family Orthocoronavirinae is the causative agent of the highly contagious coronavirus disease that has been dubbed "coronavirus disease 2019." The virus has characteristic "crown-like" spikes on its surface and an encased form of single-stranded RNA within its structure.The virus that causes severe acute respiratory syndrome (SARS-COV) and the virus that causes Middle East respiratory syndrome (MERS-COV) are both members of the same family as the COVID-19 virus. Its pathophysiology is still not completely known, despite the fact that it has been observed to be more contagious.The spike glycoprotein (S), which comprises of S1-S2 heterodimers that bind to the angiotensin-converting enzyme (ACE2) receptor on type II pneumocytes, is the encoded structural protein of COVID-19 that is considered to be the most vitally important(Song et al,2018).

The first COVID-19 case was reported in the Kingdom of Saudi Arabia on March 2, 2020, and the majority of confirmed cases were attributed to returning tourists and the people they had recently been in contact with immediately. By July 14, 2020, the total number of COVID-19 confirmed cases had climbed to around 235,000, and the death rate was approximately 1% (Wu et al,2020).

The symptoms of COVID-19 are diverse and typically begin with non-specific symptoms such as fever, a dry cough, and exhaustion. COVID-19 can also express itself in other ways. Additionally, the condition may affect a number of different systems, including the gastrointestinal system, the nervous system, the musculoskeletal system, and the respiratory system. The condition can also swiftly escalate to acute respiratory distress syndrome (ARDS) in patients who are at a high risk, such as the elderly5 and people who have other medical conditions, such as heart, lung, kidney, or liver disorders. Patients who have immunosuppressive illnesses may have a poorer prognosis and greater mortality rates because to the quicker onset of septic shock, heart failure, arrhythmias, and multi-organ failure. This is an important point (Cucinotta & Vanelli,2020)

Data are beginning to emerge from retrospective clinical investigations that have been carried out all over the world and have focused mostly on epidemiological and clinical characteristics of COVID-19. This information regarding the clinical characteristics of COVID-19 and its course is fast evolving.Despite this, there have only been a few of reports carried out in the Middle East region (Sohrabi et al,2020& Petrosillo et al,2020).

As a result of the rapid spread of the COVID-19 pandemic throughout the world, including Saudi Arabia, a significant public health emergency developed. There are many different aspects to spread over the country, and these aspects can vary greatly depending on the population, the region, and the family. In spite of all of the efforts that the government health system and responsible residents made, the pandemic spread more quickly. However, it was controlled through intervention strategies developed by the Ministry of Health. These strategies included digital health, social distancing, suspending gatherings, temporary closures, and imposing curfews at commercial and service utilities. At the same time, interventions were gradually phased out at the national level, taking into account infections, mortality, and recovery while also taking into account the relevance of geography (Xu et al,2020). Because of the restrictions placed on family and social life, interpersonal contact, and affective gestures, as well as the need to adhere to the strict discipline of social distancing and face masks, family units experienced tension as a result of both the epidemic and the health emergencies that occurred during that time. This was especially true in areas with inadequate infrastructure and crowded living arrangements. This resulted in the implementation of containment measures like as quarantine, lockdowns, and curfews, which in turn led to the emergence of conflicts, tensions, and acts of violence upon contact with infected individuals. As a direct result of this, it results in the disintegration of the person, the family, and society as a whole, bringing about massive changes and unimaginable repercussions, both financially and medically. Despite the evaluations and investigations from a medical point of view as well as the daily data releases from the Ministry of Health, there are still repercussions to the community on economic, social, and community levels (Yang et al,2020)

Saudi Arabia is a big country in terms of geographic area, and it is divided into a total of 118 governorates, as well as five planning regions, 13 administrative areas, and 118 administrative areas. It shares borders with five countries in the Arabian Gulf and a few other Arab nations, and its land area of 2.2 million square kilometers is home to a total population of 35.3 million people, including both native and international residents. This largely urban country established residential, commercial, educational, and medical facilities, as well as other infrastructure, to foster community living, which expedites the chance of speedier infection. Floating population is responsible for the spread of COVID-19 in a new strain of Middle East Respiratory Syndrome Coronavirus (MERS-CoV) that afflicted the Middle East, but the majority of cases were documented in Saudi Arabia. This occurred despite efforts to restrict, isolate, socially distance, and close off affected areas. These reports of this worldwide epidemic in Saudi Arabia are linked to the country's large population, which has been resisted by strategic interventions and mitigation measures that have been characterized by fast community response and hospital preparation. This is in

line with vision 2030, which aims to establish the nation as a center for both business and tourism (Zhou et al,2020).

Since the first discovery of Coronavirus disease (COVID-19) in December 2019 in Wuhan, China, the virus has been proven to cause a severe acute respiratory infection. This finding came shortly after the initial detection of the disease. Coronavirus is a strain of the beta coronavirus that is a member of the coronaviridae family. This family is subdivided into SARS-COV, SARS-COV2 (COVID-19), and MERS-COV based on the phylogenetic relationship between the viruses and the genomic structure of the viruses (Killen et al,2020).

As of December 13, 2021, the overall number of deaths attributed to COVID-19 around the globe has surpassed five million, with the total number of recorded cases of COVID-19 topping 270 million confirmed infections. The number of positive cases in the kingdom of Saudi Arabia (KSA) surged significantly in March 2020, which pushed for the possibility of an outbreak within the community. As of the first of November in the year 2020, the similar stats for KSA were 347,282 with a total death count of 5,402 accordingly. However, as of the 17th of December in 2021, the total number of confirmed cases in the kingdom had surpassed 551,000, with 8,856 deaths (Barry et al,2020& Iqbal et al,2020).

Following the discovery of mutations in the SARS-COV2 genome that introduced many highly infectious viral genotypes, there has been a rise in the level of concern regarding the duration of infection, as well as the effectiveness of the vaccines that are currently available to prevent the spread of the virus. However, the infectivity of COVID-19 is affected by a wide variety of risk variables, the most important of which are the patients' age, gender, and medical history. In addition, there is evidence to suggest that hereditary characteristics such as ABO and Rh blood groups may increase a patient's vulnerability to the COVID-19 virus and would have an influence on whether or not an infection would develop. Several different types of blood groups have the potential to interact with a variety of infectious agents, which may have implications for immune function and cell signaling (Alguwaihes et al,2020 & Alinia-Ahandani et al,2020).

Erythrocytes carry the ABO blood group antigens (A, B, and H), which are also produced on the surface of erythropoietic precursor cells. These antigens are found on blood cells. The ABO blood group is broken down into its four fundamental phenotypes, which are denoted by the letters A, B, AB, and O respectively. A prior study provided evidence that ABO blood groups are connected with the risk of getting the disease, the severity of the disease, and the behavior of the disease in patients who were infected with COVID-19. This finding lends credence to the hypothesis that there is a connection between the ABO blood type and susceptibility to COVID-19 (Aljanobi et al,2020).

People with blood type A were more likely to be infected by COVID-19 in Wuhan, China, than those with blood type O, who were shown to be less likely to be impacted by the virus. This was found to be the case in China. In a similar vein, research conducted in Italy and Spain revealed that patients with blood group A had a higher incidence of COVID-19 when compared to patients with blood group O. This disparity could be attributed to the presence of natural anti-blood group antibodies. In addition, individuals with an O blood group were shown to have a much lower risk for COVID-19, while patients with an AB blood group were found to have a higher vulnerability. The research was conducted in Qatif, Saudi Arabia (Allaham et al,2021).

Among 35,388 Saudi blood donors, a different study conducted in the Western province of Jeddah, Saudi Arabia, found that COVID-19 infection was more common in blood group O (50.1%), while blood type AB reported the lowest proportion (4.1%). A recent study that was conducted by Kabrah and colleagues found that individuals with blood group A had considerably higher odds of developing COVID-19 infection, whereas individuals with blood type AB showed lower risks of contracting the infection .However, susceptibility to COVID-19 infection may vary depending on factors such as geographic location and the kind of people living in a given group (Alsofayan et al,2020).

It has been hypothesized that the transmission dynamics and mechanisms of COVID-19 would shed light on the connection that exists between the various blood groups and the effect that they have on infection susceptibility. It has been hypothesized that the existence of anti-A antibodies in blood groups O and B may play a part in reducing viral adherence to host cells. This may occur because anti-A antibodies block the ACE 2 receptor, which is the primary entrance point for COVID-19 into the cell.Additionally, it is possible that individuals with blood group O have lower plasma levels of the von Willebrand factor (vWF) and factor VIII (FVIII) in comparison to individuals with the other blood groups. This could be the cause of the greater infection rates associated with COVID-19 (Alsofayan et al,2020).

Several studies have investigated whether or not there is a correlation between the proportion of COVID-19 patients who have a certain ABO blood group (i.e., type A, type B, type O, or type AB) and the clinical severity of the disease in those patients.It was revealed that blood type O (45%) was the most prevalent blood type in patients with COVID-19. Despite this, a link was not established between blood type and COVID-19 clinical severity; this was also applicable to hospital admission and intubation. The research was conducted in the United States.According to the findings of a study conducted in Iran, people diagnosed with COVID-19 were most likely to have blood group AB.[14] Despite this, a large number of studies have demonstrated that, of all the blood groups, type A is the one that is most prevalent

in COVID-19 patients.On the other hand, the majority of these investigations did not discover any connection between a particular ABO blood group type and the COVID-19 severity (Alswaidi et al,2021).

It is possible that the significance of blood group phenotypes in the development and progression of COVID-19 infection can be gleaned from all of these findings. Therefore, the identification of parameters involved in the occurrence of COVID-19 infection could be helpful in the creation of novel strategies for predicting the spread of infection and the severity of it. However, there is a lack of data demonstrating the connection between the various blood groups and the pathophysiology of COVID-19 in the Makkah region of the Kingdom of Saudi Arabia (KSA). Therefore, and to the best of our knowledge, this study is the first to examine the relationships of numerous parameters other than ABO blood groups with the frequencies and severity of COVID-19 infection among a local population in Makkah city, Saudi Arabia. This was done by collecting data from participants who lived in Makkah city (Alzahrani et al,2018).

Objective:

The aim of the current study was to Know to ABO blood typing system Understanding blood group types and their relationship to COVID-19 may aid in illness management and therapy therefore case-control experiments were conducted In Saudi Arabia .

Materials and Methods:

This study We investigated the association of ABO and Rh blood groups with susceptibility to COVID-19 for A total of 10000 s patients Different genders ,ages , and blood types from All COVID-19 Examination Center and Hospital of Saudi Arabia Province for two years. Patients were enrolled from Jan 2, 2020 to Jan 4, 2022 patients fulfilled inclusion and exclusion criteria .

Study area and population

The present hospital-based retrospective study was carried out by analyzing the medical records of Saudi and non-Saudi suspected feverish patients who will subjected to healthcare check-up and clinical monitoring for infectious diseases at All COVID-19 Examination Center And Hospital in 13 Saudi Arabia Province .

Study populations:

were recruited from all suspected feverish patients attending Hospital and COVID-19 Examination and Health Care Centers in Saudi Arabia, from May 2020 to December 2022. Inclusion criteria comprised any patient suffering from episodes of

fever ≥38oC for less than 3 days followed by episodes of normality, chills, sweating . headache , fatigue . But exclusion criteria included those diagnosed with Cold and Flu ,Suspected patients were examined by physicians of the corresponding hospitals and health care centers gave their oral consent (consent was obtained from the parents or guardians of participants below 18 years) to be part of the research. Selected demo-graphic population data were obtained including age, sex and nationality using structured questionnaire. The patients will screened for Covid-19 by PcR Test and Panbio Covid-19 self test at Home .

Selection of population:

Initially a total of 10000 suspected patients will recruited for the study. After the clinical examination of suspected patients with feverish conditions by the physicians of each corresponding hospital and the application of adopted inclusion and exclusion criteria, patients fulfilled the inclusion criteria. Out of which, patients were further eliminated from the study population forhaving one of the exclusion criteria. Patients will included as Covid-19 patient and served as the study population

Specimen

3.4.1 Sampling and microscopic examination:

Trained technician will collected using samples that come from your nose or mouth. There are two types of viral tests: rapid tests and laboratory tests. COVID-19 testing is one of many riskreduction measures, along with vaccination, masking, and physical distancing, that protect you and others by reducing the chances of spreading COVID-19. Rapid Point-of-Care tests, test performed or interpreted by someone other than the individual being tested, can be performed in minutes and can include antigen tests, some NAATs, and other tests.Self-tests are rapid tests that can be taken at home or anywhere, are easy to use, and produce rapid results.Laboratory tests can take days to complete and include RT-PCR and other types of NAATs.

Antibody Tests :

An Antibody Tests (also known as a serology test) can detect antibodies to SARSCoV-2 in your blood. Antibodies are proteins that your immune system makes to help fight infection and protect you from getting sick in the future. Antibody tests should not be used to diagnose a current infection, but they may indicate if you had a past infection. Antibody tests help learn about how human immune systems defend against the virus, as well as learn about population-level protection. If you get an antibody test after receiving a vaccine, you might test positive by some (but not all) antibody tests. This depends on which type of antibody the specific test detects. Depending on the type of test and where it was done, results can be ready within minutes to hours, or it can take a few days or longer if the test went to a lab. Results might take longer if a community does many tests at the same time. A "positive" test means a person is infected with coronavirus, and a "negative" test means they aren't infected. But sometimes the test results aren't accurate. A test result can be negative

even when someone has the virus. This is called a false negative test. And sometimes tests can be positive long after the initial infection when a person is no longer contagious. This is why it's so important to discuss test results with a health care provider who can help interpret what the result means and what you should do about it.

steps for doing a rapid lateral flow test:

Rapid lateral flow tests require either fro you or from Trained technician:

• throat and nose swab.

• nose swab only. Before taking the swab:

• wash your hands with soap and water or use a hand sanitiser

• clear, clean and dry a flat surface then lay out all the items in the test kit

• if your test does not come with a pre-filled tube, fill the tube with the liquid provided

• place the tube in the tube holder

• blow your nose

• wash your hands again or use a hand sanitiser Taking the swab

If your test requires a throat swab:

• open your mouth wide and rub the swab over both your tonsils (or where they would have been) at the back of your throat. Do this 4 times on each side

• using the same swab, wipe the inside of your nose as set out in the test kit instructions

If your test requires a nose swab only:

• use the swab to wipe the inside of your nose as set out in the test kit instructions

Completing the test:

put the end of the swab into the tube so it's in the liquid and swirl the swab around as directed in the test kit instructions, then close the lid

• squeeze the liquid from the tube onto the test strip

• check the waiting time in the instructions that came with your test kit

• wait for the time shown in your test kit instructions

Discussion:

The severe infectious disease known as COVID-19 is caused by the novel severe acute respiratory syndrome coronavirus 2. The disease became a pandemic just a few weeks after the first case was recorded in Wuhan, China, in late December 2019. The disease is caused by the novel severe acute respiratory syndrome coronavirus 2. The severity of the disease can range from asymptomatic infection to severe illness and, in some instances, death in patients who have been infected with the SARS-CoV-2 virus. Because this is a newly discovered virus, there is only a limited amount of evidence available regarding the risk variables related with the severity of illness,

as well as death, in the various populations. Nevertheless, hypertension, diabetes, male gender, older age, and those with immunosuppressive status are the most often recognized characteristics that increase the risk of death in COVID-19 patients. However, the number of deaths that occurred per million people as a result of COVID-19 infection ranged widely from country to country. For instance, compared to Malaysia, the United Kingdom had a significantly higher number of deaths caused by COVID-19 per million people. Age, hereditary variables, the rate at which COVID-19 is diagnosed, and the health care provider structure in each nation are just few of the additional factors that may also influence COVID-19-related mortality. As a result, it is essential to carry out a greater number of epidemiological studies in a variety of civilizations if one is to have a complete understanding of the natural history of the disease and the pertinent risk factors that are connected with it (Feras et al,2021).

The participants in the study indicated that fever, coughing, indications of respiratory distress syndrome, and respiratory failure were the most common symptoms they had, and that having these symptoms greatly increased the probability of dying from a COVID-19 infection. The findings of multiple past studies that have demonstrated an elevated risk of death in COVID-19 patients who have come with acute symptoms and/or signs of respiratory distress are supported by the observations made in the current study, which are in agreement with those findings. In addition, a history of diabetes mellitus, kidney diseases, congestive heart failure, and hypertension significantly increased the risk of death from COVID-19 in the current report. This correlates with many prior population-based studies that have reported these co-morbidities as major risk factors for death from COVID-19 (Alsofayan et al., 2020; Alguwaihes et al., 2020; Varikasuvu et al. The presence of chronic disorders in addition to COVID-19 infection may, in fact, be detrimental to the immune system and the stability of the hemodynamic system, which in turn may exacerbate the prognosis of COVID-19 infection.In addition, individuals with heart failure are at an especially high risk of death from COVID-19, and it has been demonstrated that earlier epidemics of coronavirus and influenza can make a pre-existing heart failure worse through a variety of different pathways (Chen et al,2020).

The frequencies of COVID-19 infection were significantly greater in blood types O+ (37%), A+ (29.2%), and B+ (22.6%) than they were in the AB- group, which was the least prevalent group among the participants of the study (0.4%). There is a correlation between the current data and an earlier study that was conducted in the same province in Saudi Arabia and found that individuals with blood group O had higher infection rates. It is possible that this is because individuals in this group have lower serum concentrations of von Willebrand factor (vWF) and factor VIII (FVIII).

In contrast, the current research did not find any connections between the various blood groups and the danger of dying from a COVID-19 infection. Blood group O may raise the chance of infection from COVID-19, but it does not appear to increase the risk of death associated with this virus. Our data and other findings support this conclusion. On the other hand, some researchers found that individuals with blood group A had greater rates of COVID-19 infection, but patients with blood group O appeared to be protected. As a consequence of this, further research is still required in order to precisely evaluate the functions that blood types play in COVID-19 infection (Cooling,2015)

It is possible that it will be essential to take into consideration a number of limitations when interpreting the findings of this study. Because this was a retrospective and cross-sectional study, we were only able to make limited assessments of the clinical courses and outcomes as we looked at the historical data. It is recommended that further research on COVID-19 be conducted in the area in order to build on severity predictions (Dessie& Zewotir,2021)

Conclusion:

In the early stages of the COVID-19 pandemic in the Western Province of Saudi Arabia, this study analyzed many factors that may have contributed to an increased likelihood of passing away as a result of an infection with COVID-19. Patients in our sample who reported having COVID-19-related symptoms, such as fever, cough, pneumonia, or respiratory distress syndrome, had a considerably higher chance of passing away. These symptoms were the most often reported. Additionally, a history of renal and cardiovascular disorders both contributed to the severity and prognosis of COVID-19 infection and were linked with higher fatality rates. These findings underscore the significance of early detection and supportive therapy for patients who are affected by COVID-19 infection. Even though our research population had much higher frequencies of blood groups O+, A+, and B+, the distributions of the various blood groups were not related with an elevated risk of death from COVID-19. This was the case despite the fact that these blood groups had significantly higher frequencies. Therefore, additional research with bigger populations is required in order to determine the associations between different blood groups and the severity of COVID-19 infection.

COVID-19 in Saudi Arabia experienced both increases and decreases epidemiologically in terms of new cases, mortality, active cases, and critical cases, delineating phases of early infections (March-May, 2020), heightened spread (June-July, 2020), rapid decline, stabilization, second-wave (April-September, 2021), and full control (October 2021 and onwards). Although national statistics demonstrate exceptional control, the credit for this achievement should go to the dedicated efforts

of the Saudi Arabian Ministry of Health and the disciplined changes made by the general people. In comparison to the total population, the percentage of people who are afflicted is rather low; yet, this fact should be kept in mind as attempts to contain the virus are maintained. Strategies for preventing infections and minimizing their spread ought to be bolstered together and implemented hand in hand.

Geographically, administrative regions that are experiencing higher pressures of population migration and socioeconomic development are more likely to be affected. This is notably true for the country's largest cities, including Riyadh, Jeddah, Makkah, and Buraydah, as well as Dammam and Madina. In the end, the fulfillment of goals and targets in a timely manner was made possible by living a disciplined life that was in accordance with a law and order situation that was overseen by a government that provided the ultimate responsibility.

This research has various shortcomings, most notably those that are associated with the data. Despite this, the overall issue can be communicated to an international audience using the data that is now available on the national context. If there had been more in-depth data on the age and gender specificity of infections, recoveries, and fatalities, one could have gained more understanding from the situation. Such specifics might also be useful for research that takes into account many geographic regions.

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